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Multiple high- and ultra-high-pressure orogenies in the Qinling Mountains: boundary conditions permitting their formation and exhumation

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1 Introduction

1.1 Scope of the study

Stretching for > 2000 km between the Sino-Korean craton in the north and the Yangtze craton in the South, the Qinling-Tongbai-Hong'an-Xinxian-Dabie-Sulu-Imjingang orogen is the centrepiece of Chinese geology. During its Neoproterozoic-Phanerozoic evolution it recorded:

- The Neoproterozoic assemblage (e.g., Wang et al., 2003; 2005) and disintegration of Rodinia (e.g., Li et al., 1999) and the subsequent break-up of the long and narrow Qinling microcontinent from the Yangtze craton (Ratschbacher et al., 2006).
- The formation of Cambrian ultra-high pressure (UHP) metamorphic gneisses and eclogites (Yang et al., 2003)
- The Early Palaeozoic amalgamation of the Qinling microcontinent and an intervening Erlangping intra-oceanic arc to the Sino-Korean craton (Ratschbacher et al., 2006)
- An Ordovician-Devonian Andean-style continental arc set up on the Qinling microcontinent (e.g., Ratschbacher et al., 2003 and therein)
- The creation of Carboniferous quartz-eclogites (Ratschbacher et al., 2006; Sun et al., 2002)
- The formation of the world's largest ultra-high pressure metamorphic terrane and the final amalgamation of the Sino-Korean and the Yangtze cratons in Triassic-Early Jurassic times (e.g., Hacker et al. 2004; 2006)
- Jurassic-Recent deformation, magmatism, and sedimentation (e.g., Ratschbacher et al., 2000).

Revealing this complex history provides a major contribution to the understanding of the geological evolution of east-central Asia and furthermore extends the knowledge about formation and exhumation of high pressure and ultra-high pressure metamorphic rocks.

Comprehensive research created the detailed widely accepted picture listed above. However, there exist numerous contradicting opinions. For instance, Faure et al. (2008) propose a Silurian collision of the Yangtze craton and the North China block and speculated about Devonian-Permian rifting affecting the northern part of the Yangtze craton. On the other hand, Dong et al. (2011) decline the existence of the Erlangping intra-oceanic arc.

Another outstanding controversy regards the Triassic "Mianlüe suture", a hypothetic fault zone thought to stretch all through the northern Yangtze craton (e.g., Meng & Zhang, 1999; 2000). Its existence has been proposed more than ten years ago based on the occurrence of ophiolitic blocks not dated at this time. Questioning this theory, recent SHRIMP U/Pb zircon dating (Yan et al., 2007; Shi et al., 2007; Wang et al., 2011) demonstrates a Neoproterozoic age of these ophiolites.

Apart from these regional geological problems, there are only scarce information available on the pressure-temperature-time (PTt) evolution of metamorphic rocks of the Qinling area (e.g., Hu et al., 1993; Liu & Zhu, 1995; Wei et al., 1999; You et al., 1993; Zhang, 1999; Zhou et al., 1993). Therefore, a thorough modern petrographical study is needed to refine the tectono-metamorphic evolution of this part of the orogen.

This thesis provides detailed petrological investigations including equilibrium assemblage analysis. These new findings are interpreted in context to new geochronology and known data from the literature. Controversies regarding the evolution of the Qinling belt are addressed and a more detailed picture based on models of Ratschbacher et al. (2003; 2006) is created.

1.2 Organisation of the thesis

1.2.1 Overview

To create a comprehensive picture of the processes yielding to multible orogenies in the Qinling belt and resolve outstanding controversies regarding the tectono-metamorphic history of the Qinling belt, an interdisciplinary project combining modern petrology, geochemistry, geochronology, and structural geology was initiated by scientists from Basel university and TU Bergakademie Freiberg. This thesis contributes a thorough petrography.

1.2.2 Sampling

Samples with numbers starting with a "Q" were provided by Bradley R. Hacker (UC Santa Barbara); samples D7625 and D7626 by Lothar Ratschbacher.

All other samples were taken during two expeditions. The first was undertaken in May and June 2007. Participants were Leander Franz (Basel), Lothar Ratschbacher, Uwe Kroner, Carsten Weise, Maria Wiesinger (all from TU Bergakademie Freiberg), Wang Tao (Beijing), several Chinese students, and the author. The second expedition (October to November 2008) was attended by Maria Wiesinger, Shi Wei, Liu Xiaochun (both from Beijing), several Chinese students, and the author.

1.2.3 Manuscript I: "The Early Palaeozoic evolution of the Qinling Belt, east central China"

The manuscript will be submitted to the Journal of metamorphic Geology.

Samples Q09B and Q33B together with additional EMP analysis of these samples were provided by Bradley R. Hacker. All other samples were taken during two expeditions mentioned above. The author of the thesis selected and prepared samples for EMP analysis, performed the calculations and wrote the manuscript. The tectonic model resulted from fruitful discussions with Leander Franz and Lothar Ratschbacher. Leander Franz and Christian de Capitani provided constructive reviews. Data in the chapter "Geochronology" were provided by Lothar Ratschbacher (Th/Pb monazite; Ar/Ar amphibole and micas) and Bradley R. Hacker (U/Pb titanite).

For publication, the manuscript will be extended with tectonic investigations, and a thorough documentation of the geochronological data. Furthermore, introduction, discussion and conclusions will be adapted.

1.2.4 Manuscript II: "The heart of China revisited, Part I: Carboniferous-Permian subduction along the Qinling orogen"

The manuscript will be submitted to Lithos.

Samples D7625 and D7626 were provided by Lothar Ratschbacher. All other samples were taken during two expeditions mentioned above. The author of the thesis selected and prepared samples for EMP analysis, performed the thermodynamic modelling and wrote the manuscript. The tectonic model resulted from fruitful discussions with Leander Franz and Lothar Ratschbacher. Leander Franz and Christian de Capitani provided constructive reviews. Data in the chapter "Geochronology" were provided by Lothar Ratschbacher (Ar/Ar amphibole and micas), and Rolf Romer (U/Pb garnet-staurolite).

For publication, the manuscript will be extended with tectonic investigations and a thorough documentation of the geochronological data. Furthermore, introduction, discussion and conclusions will be adapted.

1.2.5 Manuscript III: "The heart of China revisited, Part II: Triassic post-collisional overprint in the Qinling orogen "

The manuscript will be submitted to Lithos.

Samples together with several earlier made EMP analysis of these samples were kindly provided by Bradley R. Hacker. The author of the thesis selected and prepared samples for additional EMP analysis, performed the thermodynamic modelling and wrote the manuscript. It was thoroughly reviewed by Leander Franz, Lothar Ratschbacher, and Christian de Capitani. Data in the chapter "Geochronology" were provided by Lothar Ratschbacher.

For publication, the manuscript will be extended with tectonic investigations and a thorough documentation of the geochronological data. Furthermore, introduction, discussion and conclusions will be adapted.

1.2.6 "Conclusions"

This chaper contains a discussion on the Neoproterozoic history of the Qinling area as well as the derived tectono-metamorphic model of the Palaeozoic to Early Mesozoic evolution of the Qinling belt.

1.2.7 "Appendix"

Appendix A shows all calculated equilibrium assemblage and isopleth diagrams; appendix B all reliable electron microprobe analyses. The entire appendix is attached on CD.

1.3 References

Dong, Y., Zhang, G., Neubauer, F., Liu, X., Genser, J. & Hauzenberger, C., 2011. Tectonic evolution of the Qinling orogen, China: Review and synthesis. Journal of Asian Earth Sciences, 41, 213-237.

Faure, M., Lin, W., Monié, P. & Meffre, S., 2008. Palaeozoic collision between the North and South China blocks, Triassic intracontinental tectonics, and the problem of the ultrahigh-pressure metamorphism. C. R. Geoscience, 340, 139-150.

Hacker, B.R., Ratschbacher, L. & Liou, J.G., 2004, Subduction, collision and exhumation in the ultrahigh-pressure Qinling-Dabie orogen. in Malpas, J., Fletcher, C.J.N., Ali, J.R., and Aitchison, J.C., eds., Aspects of the Tectonic Evolution of China: Geological Society of London Special Publication, 226, 157-175.

Hacker, B.R., Wallis, S.R., Ratschbacher, L., Grove, M. & Gehrels, G., 2006. High- temperature geochronology constraints on the tectonic history and architecture of the ultrahigh-pressure Dabie-Sulu Orogen. Tectonics, 25, TC5006.

Hu, N., Yang, J., An, S., Hu J., 1993. Metamorphism and tectonic evolution of the Shangdan fault zone, Shaanxi, China. Journal of metamorphic Geology, 11, 537-548.

Li, Z.X., Li, X.H., Kinny, P.D. & Wang, J., 1999, The break-up of Rodinia: did it start with a mantle plume beneath South China? Earth and Planetary Science Letters, 173, 171-181.

Liu, L., & Zhou, D., 1995. Discovery and study of high-pressure basic granulites in Songshugou area of Shangnan, East Qinling. Chinese Science Bulletin, 40, 400-404.

Meng, Q.-R. & Zhang, G.-W., 1999. Timing of collision of the North and South China blocks: Controversy and reconciliation. Geology, 27, 123-126.

Meng, Q.-R. & Zhang, G.-W., 2000. Geologic framework and tectonic evolution of the Qinling orogen, central China. Tectonophysics, 323, 183-196.

Ratschbacher, L., Hacker, B.R., Webb, L.E., McWilliams, M., Ireland, T., Dong, S., Calvert, A., Chateigner, D. & Wenk, H.-R., 2000. Exhumation of the ultrahigh-pressure continental crust in east-central China: Cretaceous and Cenozoic unroofing and the Tan-Lu fault. Journal of Geophysical Research, 105, 13303-13338.

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Ratschbacher, L., Franz, L., Enkelmann, E., Jonckheere, R., & Axel Pörschke, Hacker B. R., Dong, S., & Zhang, Y., 2006, The Sino-Korean–Yangtze suture, the Huwan detachment, and the Paleozoic–Tertiary exhumation of (ultra)high-pressure rocks along the Tongbai–Xinxian–Dabie Mountains. In: Hacker, B. R., McClelland, W. C. & Liu, J. G., eds., Ultrahigh pressure metamorphism: Deep continental subduction. Geological Society of America Special Paper, 403, 44-75.

Shi, Y., Liu, D., Zhang, Z., Miao, L., Zhang, F., Xue, H., 2007. SHRIMP Zircon U-Pb Dating of Gabbro and Granite from the Huashan Ophiolite, Qinling Orogenic Belt, China: Neoproterozoic Suture on the Northern Margin of the Yangtze Craton. Acta Geol. Sin. 81, 239-243.

Sun, W., Williams, I.S. & Li, S., 2002. Carboniferous and Triassic eclogites in the western Dabie Mountains, east-central China: evidence for protracted convergence of the North and South China Blocks. J. metamorphic Geol., 20, 873-886.

Wang, T., Wang, X., Zhang, G., Pei, X. & Zhang, C., 2003. Remnants of a Neoproterozoic Collisional Orogenic Belt in the Core of the Phanerozoic Qmling Orogenic Belt (China). Gondwana Research, 4, 699-710

Wang, T., Zhang, Z., Wang, X., Wang, Y. & Zhang, C., 2005. Neoproterozoic Collisional Deformation in the Core of the Qinling Orogen and its Age: Constrained by Zircon SHRIMP Dating of Strongly Deformed Syn-collisional Granites and Weakly Deformed Granitic Veins. Acta Geologica Sinica, 79, 220-232 (in Chinese with English abstract).

Wang, T., Wang, Z.Q., Yan, Q.R., Yan, Z., Qin, X.F., Zhang, Y.L. & Xiang, Z.J., 2011. The formation age and geochemical characteristics of the metavolcanic rock blocks of the Baishuijiang Group in South Qinling. Acta Petrologica Sinica, 27, 645-656 (in Chinese with English abstract).

Wei, C., Yang, C. & Zhang, S., 1999. Metamorphism of the East Sector of the Southern Qinling Orogenic Belt and Its Geological Significance. Acta Geologica Sinica, 73, 65-77

Yan, Q., Wang, Z., Yan, Z., Xiang, Z., Chen, J. & Wang, T., 2007. SHRIMP Analyses for Ophiolitic – Mafic Blocks in the Kangxian - Mianxian Section of the Mianxian - Lueyang Melange: Their Geological Implications. Geology review, 53, 755-764 (in Chinese with English abstract)

Yang, J., Xu, Z., Dobrzhinetskaya, L. F., Green II, H. W., Pei, X., Shi, R., Wu, C., Wooden, J. L., Zhang, J., Wan, Y., Li, H., 2003: Discovery of metamor-

phic diamonds in central China: an indication of a > 4000-km-long zone of deep subduction resulting from multiple continental collisions. Terra Nova, 15, 370-379.

You, Z., Han, Y., Suo, S., Chen, N. & Zhong, Z., 1993. Metamorphic history and tectonic evolution of the Qinling Complex, eastern Qinling Mountains, China. Journal of Metamorphic Geology, 11, 549-560.

Zhang, Z.J., 1999. Metamorphic evolution of garnet-clinopyroxene-amphibole rocks from the Proterozoic Songshugou mafic-ultramafic complex, Qinling Mountains, central China. Island Arc, 8, 259-280.

Zhou, G., Liu, Y.J., Eide, E.A., Liou, J.G. & Ernst, W.G., 1993. High-pressure/low-temperature metamorphism in northern Hubei Province, central China. Journal of metamorphic Geology, 11, 561-574.

2 The Early Palaeozoic evolution of the Qinling Belt, east central China

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2.1 Abstract

In Cambrian times, deep subduction of the Qinling microcontinent below the intra-oceanic Erlangping arc created ultra-high pressure metamorphic eclogites and gneisses. The coesite-eclogite facies stage was constrained at 550°C and 3.1 GPa. During uplift, a quartz-eclogite facies recrystallization occured at 2.0-2.3 GPa and ~660 °C. Further uplift was characterized by nearly isothermal decompression and a penetrative overprint at 630-640 °C and 1.1-1.5 GPa. Ar/Ar phengite and U/Pb titanite ages of ~470 Ma highlight exhumation into the crust together with cooling in the Middle Ordovician.

The southern margin of the Qinling microcontinent faced a north-trending subduction zone and a magmatic arc set up that was active from the Middle Cambrian till the Early Devonian (~110 Ma). Due to the high heat flow, the central-southern part of the Qinling unit underwent ultra-metamorphism at peak metamorphic conditions of 680-775 °C at 0.5-0.75 GPa. The UHP metamorphics lack indications of an overprint by the magmatic arc pointing to a late juxtaposition of both crustal segments.

Ar/Ar amphibole ages reflect reduced arc activity and onset of cooling in the Early-Middle Devonian. Cooling through biotite closure occurred between 370-330 Ma and was likely affected by local heat sources and shearing.

2.2 Introduction

Stretching for > 2000 km between the Sino-Korean craton in the north and the Yangtze craton in the South (Fig. 1), the Qinling-Tongbai-Hong'an-Xinxian-Dabie-Sulu-Imjingang orogen is the centrepiece of Chinese geology. During its Neoproterozoic-Phanerozoic evolution it recorded several subduction-acretion events including a Neoproterozoic (Wang T et al., 2003; 2005a), a Cambrian (e.g., Yang J et al., 2003), a Carboniferous (e.g., Ratschbacher et al. ,2006; Sun et al., 2002c), and a Triassic one (e.g., Hacker et al. 2004; 2006). Revealing this complex history provides a major contribution to the understanding of the geological evolution of east-central Asia and furthermore extends the knowledge about formation and exhumation of high pressure (HP) and ultra-high pressure (UHP) metamorphic rocks. This study focuses on the Early Palaeozoic history of the Qinling area whose key aspects are:

- The formation of Cambrian ultra-high pressure metamorphic gneisses and eclogites (Yang J et al., 2003)
- The Early Palaeozoic amalgamation of the Qinling microcontinent and an intervening Erlangping intra-oceanic arc to the Sino-Korean craton (Ratschbacher et al., 2006)

- Emplacement of ophiolites nowadays forming two discrete roughly east-west stretching slices, i.e., the Erlangping unit and the Shangdan ophiolites (Dong et al., 2011b)
- An Ordovician-Devonian Andean-style continental arc that set up on the Qinling microcontinent (e.g., Ratschbacher et al., 2003 and therein).

Although research over the past decades created these corner stones there are still several outstanding points that need to be cleared up:

- Although UHP metamorphism has been proven by the discovery of diamond inclusions in zircons (Yang J et al., 2003), the exact pressure-temperature (PT) conditions during formation and exhumation of Cambrian UHP metamorphic gneisses and eclogites are unknown
- The relation of the UHP metamorphics to two Early Palaeozoic sutures recognised in the eastern part of the orogen by Ratschbacher et al. (2006) is unclear
- There exist two competing models for the formation of the Shangdan ophiolites: they are either part of a large nappe with Erlangping ocean origin thrust over the entire Qinling unit (Faure et al., 2001; 2008; Ratschbacher at al., 2003) or were emplaced during a Silurian collisions of a terrane with Yangtze craton origin (e.g., Dong et al., 2011b) or the Yangtze craton itself (Faure et al., 2008) with the Qinling microcontinent.
- A profound modern petrographic description of metamorphics formed during the activity of the Andean-style continental arc is lacking.

The above listed points are addressed by combining detailed petrological studies including equilibrium assemblage analysis with tectonic investigations and geochronology. The findings are interpreted in context with data from the literature.

2.3 Regional geological overview

From north to south, the Qinling Belt comprises the following tectono-metamorphic units (Fig. 2):

2.3.1 Sino-Korean craton, its cover and the Kuanping unit

The basement of the Sino-Korean craton consists of the 2.0-2.6 Ga old Taihua gneiss (Kröner et al., 1988) and the Xiong'er Group (Ratschbacher et al., 2006). Low- to medium-grade greenschists, micaschists, amphibolites and marbles form its southern margin, the Kuanping unit. Detrital zircons from several clastic metasediments bear youngest grains at ~600 Ma (Diwu et al., 2010). The lack of ~0.7-0.8 Ga grains indicates Sino-Korean provenance. Based on a meta-basalt with N-MORB signature yielding a concordant U/Pb zircon age of 943 ± 6 Ma (Diwu et al., 2010), Dong et al. (2011c) regarded the Kuanping unit as Neoproterozoic back-arc basin. This contradicts other studies interpreting the Kuanping unit as passive continental margin or accretionary wedge (e.g., Ratschbacher et al., 2003).

2.3.2 Erlangping unit

The ophiolitic Erlangping unit comprises greenschist to amphibolite facies metamorphic gabbros, pillow lavas, sheeted dikes, andesites, rhyolites, ultramafics, cherts, turbidites and marbles (Meng and Zhang, 2000; Dong et al., 2011c; Xue et al., 1996b). Radiolaria suggest a Cambrian-Silurian age of the cherts (Niu et al., 1993; Wang N., 1989). The Erlangping unit has been regarded as an Early Ordovician intra-oceanic arc (Xue et al., 1996a) reflected by U/Pb zircon ages of a basalt (472 ± 11 Ma; Yan Q et al., 2007a) and a trondhjemite intruding pillow lavas (480 ± 1 Ma; Xue et al., 1996a). It has also been interpreted as remnant of a back-arc basin by Dong et al. (2011c). U/Pb ages of 443-467 Ma obtained from pillow-lavas (compiled by Dong et al., 2011c) may date the back-arc rifting. An imprecise Rb/Sr age of 406 ± 22 Ma obtained from a pillow-lava (Sun et al, 2002b) likely dates metamorphism caused by the magmatic Qinling arc (see below).

2.3.3 Qinling unit and Early Palaeozoic continental Qinling arc

The basement of the Qinling unit is built up by a Proterozoic volcano-sedimentary sequence of siliciclastics, marbles and mafic rocks that has been intruded by a suite of Late Proterozoic (~890-960 Ma) syn-collisional, peraluminous S-type granitoids (Chen D et al., 2004a; Chen Z et al., 2006; Wang T et al., 2005a). Beside these Jinningian plutons, published U/Pb zircon ages from mafic and felsic intrusives also reflect a ~0.7-0.8 Ga event, i.e. continental arc magmatism and rifting processes affecting the

Yangtze craton. Their absence in the Sino-Korean craton ties the basement of the Qinling unit to the Yangtze craton. Subsequently, the Qinling unit rifted away from the Yangtze craton forming a narrow east-west stretching microcontinent (Ratschbacher et al., 2006).

At the northern margin of the Qinling unit felsic gneisses and intercalated metabasites underwent a Cambrian ultra-high pressure metamorphism as proven by the presence of micro-diamond inclusions in zircon. A weighted mean U/Pb-age of 507 ± 37 Ma based on SHRIMP analyses of four zircon rims likely dates the pressure peak (Yang et al., 2003).

During the Early Palaeozoic, the southern margin of the Qinling microcontinent faced a north-trending subduction zone and a magmatic arc set up. Subsequently, numerous often multi-stage granitoid plutons (e.g., Wang T et al., 2000) intruded the Qinling, Erlangping and Kuanping units (e.g., Ratschbacher et al., 2003 and therein). Published Cambrian U/Pb zircon ages obtained from a migmatic gneiss (~517 Ma; Dong et al., 2011a), two granodiorites (507 ± 3 Ma, 503 ± 11 Ma; Wang T et al., 2009a) and the mafic-intermediate Fushui intrusion (514.3 ± 1.3 Ma; Chen Z et al., 2004) as well as a chemical Pb/Th monazite age of 520 ± 23 Ma (Chen Q et al., 2006) from a garnet-staurolite schist point to onset of magmatic activity and a related metamorphic overprint at mid Cambrian times. The youngest arc-related intrusions yield ~402 ± 1 Ma (Xue et al., 1996a), 401 ± 14 and 395 ± 6 Ma (Lerch et al., 1995) thus implying ~110 Ma of magmatic activity.

Rocks of the central and southern Qinling unit experienced an upper amphibolite facies metamorphic overprint at mid-crustal levels that came along with migmatization of felsic gneisses. Published PT estimates point to ~700 °C at 0.5-0.7 GPa (You et al., 1993).

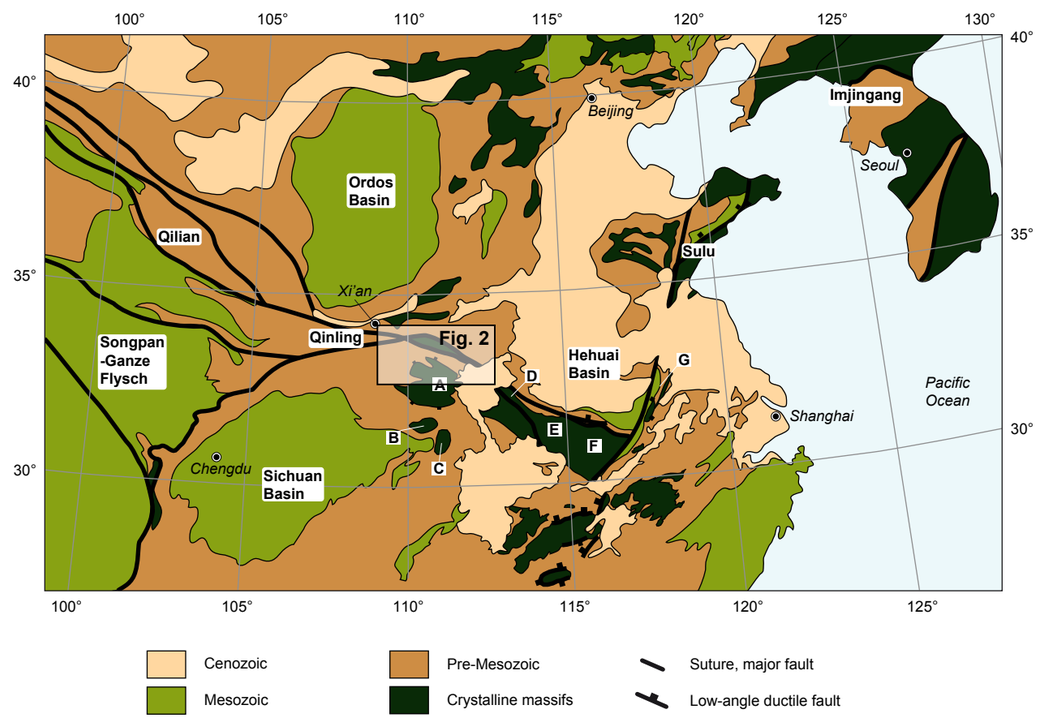
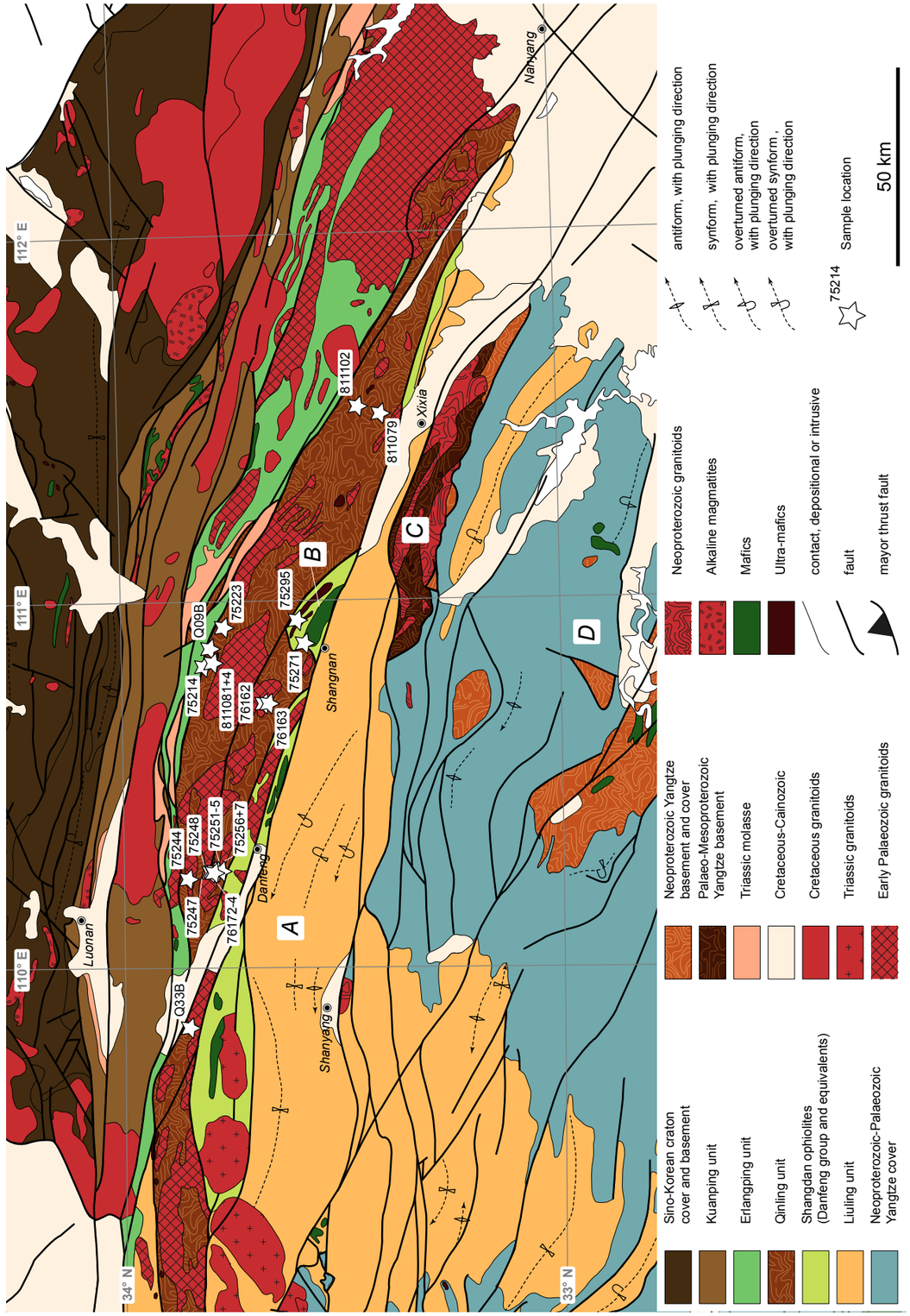


Figure 1. The Qilian-Qinling-Tongbai-Hong'an-Dabie-Sulu-Imjingang orogenic belt of eastern Asia (Ratschbacher et al., 2003 and references therein).
A: Wudang complex; B: Shennong; C: Kongling; D: Tongbai; E: Hong'an; F: Dabie Shan; G: Zangbaling



The southern boundary of the magmatic arc is the Shangdan fault zone, which can be traced from the Nanyang basin in the east to the Guanzizhen County in the west, where it vanishes below Cretaceous-Cainozoic sediments.

2.3.4 The Songshugou complex

The ~25 km long and 5 km wide Songshugou ophiolite is the remnant of a nappe thrust on the Qinling unit. The core comprises a long and narrow body of fresh dunite with subordinate harzburgite and wehrlite. With fault contact marked by penetrative serpentinization, this ultramafic body is completely surrounded by fine-grained, highly strained amphibolites that host numerous lenses of coarse-grained amphibolites displaying plagioclase coronas around relic garnet porphyroblasts, high-pressure mafic granulites as well as some felsic granulites (Dong et al., 2008; Zhang ZJ, 1999 and own investigations). Mafic granulites display relics of an eclogite facies stage followed by peak metamorphic conditions of 830-920 °C at 1.0-1.6 GPa and a subsequent medium-pressure amphibolite facies overprint (Liu L & Zhu, 1995; Zhang ZJ, 1999). Geochemical analyses of metabasites reveal E-MORB and T-MORB (Dong et al., 2008) signatures. A Sm/Nd age of 1030 ± 46 Ma based on five meta-basic whole rock samples might reflect formation of magmatic precursors (Dong et al., 1997a). Published concordant U/Pb zircon ages of 485-518 Ma (Chen D et al., 2004b; Liu J et al., 2009; Liu J & Sun, 2005) likely highlight granulite facies peak metamorphism.

2.3.5 Shangdan ophiolites (Danfeng Group and equivalents)

Along the Shangdan fault zone, numerous greenschist-facies ophiolite bodies in the Danfeng, Heihe, Xieyuguan, Caotangou, and Guanzizhen areas comprise Cambrian-Silurian cherts, ultramafic and mafic rocks, pillow lavas, radiolarian cherts, and intermediate-acidic intrusions. Mafic rocks have N-MORB, E-MORB and island-arc/continental arc signatures (Yan Q et al., 2008; Dong et al., 2011b). U/Pb zircon ages of 534-471 Ma (Dong et al., 2011b and therein; Xue et al., 1996a) point to Cambrian-Ordovician magmatism. An U/Pb zircon age of 442 ± 7 Ma obtained from a subduction-related diorite intruding pillow lavas (Yan Q et al., 2008) may give a minimum age of accretion to the Qinling microcontinent. Published Ar/Ar ages of 426-395 Ma (Sun et al., 2002b; Dong et al., 2011b and therein) highlight a Devonian metamorphic overprint.

Published emplacement models either suggest that the Shangdan ophiolites were part of a large nappe with Erlangping group origin thrust over the entire Qinling unit (Faure et al., 2001; 2008; Ratschbacher at al., 2003) or were emplaced during the closure of the Shangdan ocean (e.g., Dong et al., 2011b) by collisions of a terrane with Yangtze craton origin or the Yangtze craton itself (Faure et al., 2008) with the Qinling microcontinent. The former is supported by the similar ages and geochemical signatures. The second model is unlikely as it implies Devonian collision of the Yangtze craton with the NCB subsequently followed by rifting and break-up of the Yangtze craton to create the “Mianlüe ocean” (e.g., Meng & Zhang 1999; 2000). But there are neither indications for a Devonian rifting affecting the Yangtze craton nor for the existence of a “Mianlüe ocean”.

2.3.6 Liuling unit

Southerly abutting sedimentary basins are put together as Liuling unit. Toward the east, the Liuling unit can be correlated with the Nanwan unit of Xinxian, and the Foziling unit of the Dabie Shan. It comprises metamorphic Cambrian-Carboniferous sandstones, turbidites, conglomerates, greenschists, volcanics, cherts, recrystallized limestones and black shales (Yan Q et al., 2004; Yan Z et al. 2006 and therein), which partly have been dated by biota. For the northern part of the central Liuling unit (Shanyang basin), Hu et al. (1993) reported an amphibolite facies overprint at 612 °C and 0.8 GPa.

Figure 2 (page 12). Geological overview of the working area with sample locations (Tab. 1; redrawn from Zhang et al., 1996).
A: Shanyang basin; B: Songshugou ophiolite; C: Douling complex; D: Wudang complex

2.3.7 Douling complex

The Douling complex is a part of the Yangtze craton forming a south-directed basement wedge (Faure et al., 2008). It is built up of a Palaeoproterozoic volcano-sedimentary sequence of gneisses and schists with subordinate quartz keratophyres, pyroclastics, and basalts that was intruded by continental arc-related Neoproterozoic quartz diorites, granodiorites, and gabbros at 760-685 Ma (Zhang C et al., 2004). The basement rocks underwent an upper amphibolite facies overprint at 650-700 °C and 0.7-0.8 GPa (Zhang S et al., 1996). Neoproterozoic schists of the Yaolinghe Group unconformably overlie the basement. Our field observations show that the basement together with its cover was intensively folded and affected by high-pressure/low- temperature metamorphism.

The basement lithology resembles the one of the nearby Qinling unit, but different ages obtained from Neoproterozoic intrusions, the absence of Devonian magmatites and metamorphism as well as the penetrative low-grade overprint makes the Douling complex distinct. The Neoproterozoic cover sediments (Yaolinghe Group) tie it to the Wudang complex.

2.3.8 Wudang complex

The Wudang complex is composed of Palaeoproterozoic Yangtze basement unconformably overlain by metamorphic Neoproterozoic – Early Palaeozoic sediments including quartzites, conglomerates, schists and marbles with intercalated tuffites. It was intruded by numerous mafic dykes during the Neoproterozoic reflecting the beginning of Rodinia break-up (e.g., Li Z.X. et al., 2003). Late Triassic exhumation led to its formation as a metamorphic core complex (Ratschbacher et al. 2003). The occurrence of riebeckite at its northern margin (Mattauer et al., 1985) indicates a Triassic high-pressure/low-temperature overprint tying the Wudang complex to a ~600 km long blueschist-greenschist belt along the southern margin of the Qinling-Tongbai-Dabie orogen (Eide & Liu, 2000).

2.3.9 Yangtze craton and cover

In the Shennong and Kongling areas, gneissic trondhjemites of the Archean Yangtze basement have been dated at ~2.9 Ga (U/Pb zircon; Gao et al., 1996 and therein). Proterozoic Yangtze basement also crops out in the Douling, Wudang and Xixian complexes (see above) as well as in the Foping area, where two-pyroxene granulites (720-780 °C at ~0.6 GPa; Wei et al., 1998) occur. Abundant Neoproterozoic granitoid and mafic intrusions are remnants of three distinct events:

(1) Syn-collisional granites (~950-895 Ma U/Pb zircon) and the emplacement of the Huashan ophiolite (Shi et al., 2007) reflect collision of continental blocks during assemblage of the Precambrian supercontinent Rodinia, i.e. the Jinningian orogeny (e.g., Ling et al., 2002).

(2) A magmatic arc set up at the western and north-western margin of the Yangtze craton in Xixian, Yanbian and likely the Bikou block, whose mafic rocks alternatively might be remnants of continental flood basalts (Wang XC et al., 2008). Published U/Pb zircon ages obtained from mafic intrusives range from ~846 to 776 Ma (e.g., Yan Q et al., 2003; 2004; Zhou et al., 2002a; 2002b; 2006). Turbidites of the Hengdan group in the north-western part of the Bikou block show magmatic arc provenance as they contain 700-850 Ma old detrital zircons (Druschke et al., 2006). The Hengdan group has thus been regarded as fore-arc basin although the youngest detrital grains prove sedimentation at least ~75 Ma after emplacement of the youngest known arc magmatites.

(3) The widespread intrusion of mafic dyke swarms reflects the Neoproterozoic break-up of Rodinia. Li ZX et al. (2003) discriminated two discrete periods at 830-795 Ma and 780-745 Ma on samples from the southern and western Yangtze craton.

The sedimentary cover comprises ~12 km thick Mesoproterozoic to Triassic sediments. The Meso- to Neoproterozoic volcano-sedimentary sequences of the Wudang, Bikou, and Yaolinghe Groups comprise spilite, basalt, andesite, tuffites, volcanoclastic rocks and greywacke (e.g., Gao et al, 1996; Wang XC et al., 2008), which underwent a greenschist to blueschist facies overprint. Phanerozoic sediments include siliciclastics and platform to shelf carbonates as well as Permian coals and phosphorites (see Ratschbacher et al. 2003, for review), which are mostly low-grade to unmetamorphosed. However, in the Ankang-Fuping-Liuba areas, a greenschist- to amphibolite facies overprint was reported. (Wei et al., 1999).

Table 1. Sample locations.

Sample	Rock type	Unit	Latitude (N)	Longitude (E)
75214D	Garnet gneiss	Qinling unit	33°50.992'	110°49.176'
75223A	Garnet-bearing phengite gneiss	Qinling unit	33°48.214'	110°54.602'
75244C	Granite	Qinling unit	33°51.504'	110°14.302'
75247F	Garnet-bearing sillimanite gneiss (melanosome)	Qinling unit	33°47.174'	110°16.729'
75248C	Garnet-bearing sillimanite gneiss (melanosome)	Qinling unit	33°46.543'	110°16.741'
75251E	Garnet-bearing sillimanite gneiss (melanosome)	Qinling unit	33°46.389'	110°16.364'
75253A	Amphibolite	Qinling unit	33°45.941'	110°16.696'
75254A	Garnet-cummingtonite gneiss (melanosome)	Qinling unit	33°45.620'	110°16.708'
75255A	Garnet amphibolite	Qinling unit	33°45.243'	110°16.875'
75256A	Garnet amphibolite	Qinling unit	33°43.947'	110°17.049'
75257A	Rodingite	Qinling unit	33°43.934'	110°17.009'
75271B	Garnet gneiss (melanosome)	Qinling unit	33°36.075'	110°51.253'
75295A	Rodingite	Qinling unit	33°35.128'	110°57.656'
75295B	Rodingite	Qinling unit	33°35.128'	110°57.656'
76162B	Garnet gneiss	Qinling unit	33°40.095'	110°42.745'
76162H	Mylonitic garnet gneiss	Qinling unit	34°40.095'	111°42.745'
76163B	Garnet gneiss (blasto-mylonite; melanosome)	Qinling unit	33°39.513'	110°43.123'
76163E	Garnet gneiss	Qinling unit	33°39.513'	110°43.123'
76163F	Garnet-hornblende-biotite schist (melanosome)	Qinling unit	33°39.513'	110°43.123'
76172C	Garnet gneiss (melanosome)	Qinling unit	33°45.786'	110°16.837'
76173A	Syeno-granite	Qinling unit	33°45.493'	110°16.715'
76174B	Amphibole syenite	Qinling unit	33°45.286'	110°16.935'
76175A	Garnet gneiss (migmatite)	Qinling unit	33°44.681'	110°16.924'
811079A	Garnet gneiss (melanosome)	Qinling unit	33°23.718'	111°30.819'
811081A	Garnet amphibolite (retrogressed eclogite)	Qinling unit	33°49.533'	110°49.433'
811084A	Garnet amphibolite (retrogressed eclogite)	Qinling unit	33°49.867'	110°49.010'
811102F	Garnet gneiss (melanosome)	Qinling unit	33°26.555'	111°31.792'
Q09B	Garnet amphibolite (retrogressed eclogite)	Qinling unit	33°50.336'	110°51.531'
Q33B	Garnet-sillimanite gneiss (migmatite)	Qinling unit	33°51.464'	109°50.228'

2.4 Methods

2.4.1 Sampling

We collected ~300 samples mainly along north-south trending traverses covering the working area (Fig. 2; Tab. 1).

2.4.2 Microprobe analysis

Nineteen samples were analysed with the electron microprobe (EMP) at GFZ Potsdam, TU Freiberg, and UC Santa Barbara. The operation conditions were as follows: (1) Four-spectrometer CAMECA SX-100 at Potsdam: 15 kV accelerating voltage; 20 nA beam current; 1-15 μm beam diameter; 10–20 s major and 20–40 s minor elements peak-counting time. (2) Five-spectrometer JEOL JXA-8900R at Freiberg: 15 kV accelerating voltage; 20 nA beam current; Si, Al, Mg, Ca, Sr, Ba, and K 20 s and Fe, Ni, Na, Cr, Mn, Ti 30 s peak-counting time. (3) Five-spectrometer CAMECA SX50 at Santa Barbara: 15 kV accelerating voltage; 15 nA beam current; 10–20 s major and 20–40 s minor elements peak-counting time. We used natural and synthetic mineral standards of the Smithsonian Institute, MAC™, and CAMECA. Raw intensity data were corrected with the PAP program (Pouchou & Pichoir, 1985). Representative analyses of major phases are shown in Tables 2-9.

2.4.3 Bulk-rock geochemistry

Bulk-rock geochemistry was analysed by X-ray fluorescence using a Bruker SRS 3000 WDS-XRF at

Table 2. Representative EMP analyses of garnet. Cations based on a 12 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

Garnet	Q09B	Q09B	811084A	811084A	811081A	811081A	75214D	75214D	Q33B	Q33B	75247F	75247F	75248C	75248C	75251E	75251E	76172C
	F5#1	F5#6	F5#1	F5#16	F1#2	F1#10	F4#1	F4#11	F1#1	F1#12	F0#1	F0#12	F1#2	F1#26	F2#18	F2#28	F2#44
	rim	core	rim	core	rim	core	rim	core	rim	core	rim	core	rim	core	core	rim	core
wt.-%																	
SiO_2	37.66	38.12	38.63	38.21	38.65	38.66	37.37	37.42	37.84	37.71	37.42	37.26	36.34	36.60	37.39	37.30	37.64
TiO_2	0.12	0.10	0.07	0.24	0.15	0.18	0.04	0.11	0.01	0.00	0.00	0.01	0.03	0.02	0.01	0.00	0.00
Al_2O_3	21.18	20.63	21.33	21.03	21.20	21.34	20.83	20.46	21.67	21.38	20.52	20.64	20.68	20.61	21.37	21.01	21.17
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.02	0.00	0.00	0.02	0.01	0.04	0.01	0.04
Fe_2O_3	0.32	0.00	0.00	0.00	0.00	0.36	0.38	0.93	0.00	0.13	0.30	0.08	0.00	0.08	0.00	0.00	0.59
MgO	3.37	2.87	4.22	2.41	4.20	3.99	2.25	2.33	5.35	5.46	1.31	2.17	2.03	2.22	2.08	1.37	5.71
CaO	10.47	11.90	9.69	10.82	9.70	9.96	4.98	6.78	1.39	1.40	1.51	1.31	1.25	1.25	1.35	1.35	1.35
MnO	0.36	0.87	0.61	0.81	0.66	0.80	7.19	7.41	2.67	2.86	7.54	5.57	7.66	7.13	6.08	8.12	4.38
FeO	25.32	23.77	25.11	26.33	25.39	25.70	26.96	24.31	30.48	30.81	31.88	32.56	30.59	30.95	31.96	30.53	28.93
Na_2O	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00
Total	98.80	98.30	99.66	99.85	99.95	100.99	100.02	99.75	99.45	99.76	100.48	99.60	98.59	98.88	100.28	99.72	99.80
Cations																	
Si	2.992	3.038	3.025	3.019	3.023	3.002	3.002	3.002	3.002	2.993	3.032	3.027	2.993	3.001	3.010	3.031	2.986
Ti	0.007	0.006	0.004	0.014	0.009	0.011	0.002	0.007	0.001	0.000	0.000	0.001	0.002	0.001	0.001	0.000	0.000
Al	1.984	1.938	1.968	1.959	1.954	1.953	1.971	1.934	2.026	2.000	1.960	1.976	2.007	1.992	2.028	2.012	1.979
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.002	0.001	0.002
Fe3+	0.019	0.000	0.000	0.000	0.000	0.021	0.023	0.056	0.000	0.007	0.018	0.005	0.000	0.005	0.000	0.000	0.035
Mg	0.399	0.341	0.493	0.284	0.490	0.462	0.270	0.278	0.633	0.646	0.158	0.263	0.249	0.271	0.250	0.166	0.675
Ca	0.891	1.016	0.813	0.916	0.813	0.829	0.428	0.583	0.118	0.119	0.131	0.114	0.110	0.110	0.117	0.117	0.115
Mn	0.024	0.059	0.040	0.054	0.043	0.052	0.489	0.503	0.180	0.193	0.518	0.383	0.534	0.495	0.414	0.559	0.294
Fe^{2+}	1.682	1.585	1.644	1.740	1.660	1.669	1.811	1.631	2.022	2.045	2.160	2.212	2.107	2.122	2.151	2.074	1.919
Na	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.000
Total	8.000	7.990	7.987	7.987	7.992	8.000	7.998	7.996	7.983	8.003	7.978	7.982	8.002	7.999	7.974	7.964	8.006
Endmembers																	
Pyrope	13.3	11.4	16.5	9.5	16.3	15.3	9.0	9.3	21.4	21.5	5.3	8.8	8.3	9.1	8.5	5.7	22.5
Almandine	56.1	52.8	55.0	58.1	55.2	55.4	60.4	54.4	68.5	68.1	72.8	74.4	70.2	70.8	73.4	71.1	63.9
Spessartine	0.8	2.0	1.3	1.8	1.4	1.7	16.3	16.8	6.1	6.4	17.4	12.9	17.8	16.5	14.1	19.2	9.8
Grossular	29.7	33.9	27.2	30.6	27.0	27.5	14.3	19.5	4.0	4.0	4.4	3.9	3.7	3.7	4.0	4.0	3.8

Table 2 (continued).

Garnet	76271C	76175A*	76175A*	76175A**	76175A**	75254A	75254A	75254A	76163B	76163B	75271B	811102F	811102F	811079A	811079A	76163F	76163F
	F2#90	F12#39	F12#74	F5#2 rim	F5#24	F4#2	F4#5	F4#36	F4#2	F4#39	F2#35	F1#1	F1#38	F1#1	F1#16	F5#4	F5#40
	rim	core	rim		core	rim		core	rim	core	core	rim	core	rim	core	rim	core
wt.-%																	
SiO_2	37.12	36.99	36.24	36.78	36.79	37.22	37.50	37.52	36.64	36.98	36.87	37.19	37.61	37.97	37.54	37.50	37.25
TiO_2	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.10	0.00	0.03	0.05
Al_2O_3	20.99	20.92	20.85	20.66	20.68	21.28	21.28	21.35	20.82	21.16	20.84	21.10	21.17	20.68	20.89	21.08	20.95
Cr_2O_3	0.05	0.04	0.02	0.01	0.00	0.05	0.05	0.01	0.04	0.03	0.09	0.04	0.02	0.05	0.03	0.02	0.02
Fe_2O_3	0.63	0.27	0.16	0.00	0.55	0.32	0.75	0.68	0.52	0.30	0.25	0.00	0.93	0.00	0.00	1.15	1.19
MgO	3.53	2.94	2.03	2.69	3.36	4.07	4.88	5.75	3.24	3.93	2.53	3.55	5.05	1.86	2.15	4.44	3.97
CaO	2.22	1.74	1.76	1.66	1.68	3.00	2.97	2.50	1.63	1.47	1.14	1.18	1.07	9.29	5.24	6.03	6.86
MnO	7.62	3.24	4.48	3.32	2.92	5.13	4.06	3.13	2.80	2.26	7.81	1.78	1.69	3.53	5.83	1.69	2.89
FeO	27.96	33.67	33.36	33.42	33.10	28.67	28.78	28.78	33.55	33.49	30.40	34.82	32.91	26.13	28.14	28.10	26.39
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.10	99.80	98.89	98.53	99.10	99.77	100.26	99.72	99.23	99.62	99.91	99.65	100.45	99.60	99.83	100.03	99.57
Cations																	
Si	2.978	2.990	2.976	3.010	2.988	2.975	2.971	2.971	2.977	2.976	2.990	2.997	2.982	3.032	3.016	2.968	2.965
Ti	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.000	0.002	0.003
Al	1.985	1.993	2.017	1.993	1.980	2.004	1.986	1.993	1.993	2.008	1.992	2.004	1.978	1.946	1.978	1.966	1.966
Cr	0.003	0.002	0.001	0.001	0.000	0.003	0.003	0.000	0.002	0.002	0.006	0.002	0.002	0.003	0.002	0.001	0.001
Fe3+	0.038	0.016	0.010	0.000	0.034	0.019	0.045	0.041	0.032	0.018	0.015	0.000	0.055	0.000	0.000	0.068	0.071
Mg	0.422	0.354	0.249	0.328	0.407	0.485	0.577	0.679	0.392	0.471	0.305	0.426	0.597	0.222	0.258	0.523	0.472
Ca	0.191	0.150	0.155	0.145	0.147	0.257	0.252	0.212	0.142	0.127	0.099	0.102	0.091	0.795	0.451	0.512	0.585
Mn	0.518	0.222	0.311	0.230	0.201	0.348	0.272	0.210	0.192	0.154	0.536	0.121	0.113	0.239	0.397	0.113	0.195
Fe^{2+}	1.876	2.276	2.291	2.287	2.248	1.916	1.907	1.906	2.279	2.254	2.061	2.347	2.182	1.745	1.891	1.860	1.756
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.009	8.004	8.010	7.993	8.005	8.010	8.012	8.012	8.010	8.010	8.004	8.000	8.000	7.987	7.994	8.013	8.013
Endmembers																	
Pyrope	14.0	11.8	8.3	11.0	13.6	16.1	19.2	22.6	13.0	15.7	10.2	14.2	20.0	7.4	8.6	17.4	15.7
Almandine	62.4	75.8	76.2	76.5	74.9	63.8	63.4	63.4	75.8	75.0	68.7	78.3	73.1	58.2	63.1	61.8	58.4
Spessartine	17.2	7.4	10.4	7.7	6.7	11.6	9.1	7.0	6.4	5.1	17.9	4.0	3.8	8.0	13.2	3.8	6.5
Grossular	6.3	5.0	5.2	4.9	4.9	8.6	8.4	7.1	4.7	4.2	3.3	3.4	3.0	26.5	15.1	17.0	19.5

* melanosome ** leucosome

Table 3. Representative microprobe analyses of pyroxene. Cations based on a 6 oxygen basis. Ferric iron was estimated using the method of Droop (1987).

Pyroxene	Q09B	Q09B	811084A	811084	811084	75257A	75257A
	F3#22	F3#23	F7#21	F3#2	F5#2	F5#27	F5#35
						core	rim
wt.-%							
SiO_2	54.21	54.23	55,27	54,47	54,75	57.98	57.72
TiO_2	0.14	0.15	0,16	0,30	0,19	0.00	0.00
Al_2O_3	7.63	7.70	8,08	7,04	6,74	0.16	0.11
Cr_2O_3	0.09	0.11	0,00	0,00	0,00	0.10	0.07
Fe_2O_3	0.09	0.12	3,14	3,73	3,66	0.19	0.32
MgO	10.05	10.13	8,43	8,83	9,34	34.86	34.57
CaO	18.12	17.95	14,43	16,17	16,47	0.19	0.19
MnO	0.06	0.00	0,05	0,04	0,09	0.18	0.19
FeO	6.22	6.24	5,28	5,62	5,37	6.68	6.89
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	0.09	0.08
Na_2O	3.96	4.08	5,91	5,02	4,84	0.00	0.00
K_2O	0.01	0.00	0,00	0,00	0,00	0.00	0.00
Total	100.58	100.71	100,75	101,22	101,45	100.43	100.12
Cations							
Si	1.961	1.959	1.988	1.967	1.971	1.993	1.993
Ti	0.004	0.004	0.004	0.008	0.005	0.000	0.000
Al	0.325	0.328	0.343	0.300	0.286	0.006	0.004
Cr	0.003	0.003	0.085	0.101	0.099	0.005	0.008
Fe^{3+}	0.003	0.003	0.000	0.000	0.000	0.003	0.002
Mg	0.542	0.546	0.452	0.475	0.501	1.786	1.779
Ca	0.702	0.695	0.556	0.626	0.635	0.007	0.007
Mn	0.002	0.000	0.002	0.001	0.003	0.005	0.006
Fe^{2+}	0.188	0.188	0.159	0.170	0.162	0.192	0.199
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	0.002	0.002
Na	0.278	0.286	0.412	0.352	0.338	0.000	0.000
K	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.009	4.012	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.742	0.743	0.740	0.737	0.756	0.903	0.899

Basel on fused glass discs made of 300 mg ignited rock powder and 4700 mg ultrapure $Li_2B_4O_7$. Accuracy was checked against USGS, NIM, and SARM standards.

2.4.4 Determination of metamorphic conditions

We obtained data on the metamorphic evolution mainly with the Theriak/Domino-program package (de Capitani & Brown, 1987; de Capitani, 1994; de Capitani & Petrakakis, 2010; the program package is available at http://titan.minpet.unibas.ch/minpet/theriak/theruser.html) that uses Gibbs-free-energy minimisation to calculate equilibrium assemblages together with the modal proportions and compositions of individual stable phases at given T and P based on bulk-rock composition and thermodynamic models of rock forming minerals. Equilibrium assemblage and isopleth diagrams showing the compositions of major phases such as garnet, plagioclase, phengite, biotite or amphiboles were computed and interpreted by comparing observed assemblages and intersections of isopleths.

For all equilibrium-assemblage calculations, we used the thermodynamic database of Holland & Powell (1998; version tcds55) together with activity models of thermocalc 3.30 (see appendix). Model systems are CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (CKFMASH), and TiO_2-Na_2O-CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (TNCKFMASH). Generally, H_2O was in excess.

An essential aspect of the equilibrium-assemblage calculations is the choice of a proper bulk-rock composition for the equilibrium-mineral assemblage. In case of homogeneous samples (i.e., the investigated ultra-mafics), we used bulk-rock chemical analysis data. As several accessory phases, which are not considered in the calculation (e.g., apatite, pyrite), contribute to the bulk, the P and S were subtracted from the chemical data before modelling. In samples with distinct compositional layering or other inhomogeneities, we modelled the local chemical composition using microprobe analyses of the equilibrium-mineral assemblage and counting of typically 700 points.

Apart from thermodynamic modelling, we applied winTWQ multi-equilibrium calculations (Berman, 1991; 2007; see appendix, for solution models) as well as conventional thermo-barometers.

Table 4. Representative microprobe analyses of white micas. Cations based on a 12 oxygen basis. Endmembers follow Schliestedt (1980).

White mica	811081A	75223A	75223A	75248C	75251E	75251E	75271B
	F1#31	F4#13	F4#14	F1#1	F1#3	F1#4	F1#15
wt.-%							
SiO_2	51.67	48.59	48.51	45.53	45.95	45.58	46.23
TiO_2	1.12	1.23	1.26	0.98	0.57	0.38	0.88
Al_2O_3	28.66	28.68	29.08	35.88	38.13	36.67	35.19
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.90	2.17	2.22	0.48	0.35	0.43	0.59
CaO	0.00	0.00	0.00	0.01	0.02	0.01	0.00
MnO	0.00	0.00	0.01	0.05	0.01	0.00	0.02
FeO	2.27	3.23	3.36	1.21	0.72	1.40	1.42
BaO	0.50	0.00	0.00	0.13	0.00	0.00	0.10
Na_2O	0.69	0.39	0.43	0.49	0.38	0.39	0.46
K_2O	9.79	9.93	9.79	10.90	10.28	10.66	10.86
Total	97.60	94.21	94.66	95.65	96.41	95.52	95.75
Cations							
Si	3.363	3.292	3.271	3.032	3.004	3.029	3.073
Ti	0.055	0.062	0.064	0.049	0.028	0.019	0.044
Al	2.198	2.290	2.311	2.815	2.938	2.871	2.757
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.281	0.219	0.224	0.048	0.034	0.043	0.058
Ca	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Mn	0.000	0.000	0.001	0.003	0.001	0.000	0.001
Fe^{2+}	0.124	0.183	0.189	0.067	0.040	0.078	0.079
Ba	0.013	0.000	0.000	0.003	0.000	0.000	0.003
Na	0.087	0.051	0.056	0.063	0.048	0.050	0.059
K	0.812	0.858	0.842	0.926	0.857	0.903	0.921
Total	6.933	6.955	6.958	7.006	6.952	6.994	6.995
Endmembers							
Margarite	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Paragonite	9.6	5.6	6.2	6.4	5.3	5.3	6.0
Celadonite	36.3	29.2	27.1	3.2	0.4	2.9	7.3
Muscovite	54.1	65.2	66.6	90.4	94.1	91.8	86.7
X_{Mg}	0.695	0.545	0.541	0.415	0.463	0.354	0.424

Table 5. Representative microprobe analyses of amphibole. Cations based on a 23 oxygen basis. Ferric iron was estimated using the minmax-midpoint method (Schumacher, 1997).

Amphibole	Q09B	Q09B	811084A	75254A	75254A	75254A	76163F	76163F	75295A	75295A	75257A	75257A
	F1#14	F1#24	F3#1	F3#3	F2#6	F2#7	F4#12	F4#21	F1#1 rim	F1#7	F6#2 rim	F6#7
	core	rim		calcic	Cum	Cum	core	rim		core		core
wt.-%												
SiO_2	46.71	44.29	43.98	47.53	52.72	52.87	46.59	46.85	59.80	59.49	59.62	57.25
TiO_2	0.44	0.71	0.97	0.23	0.11	0.11	0.88	0.82	0.04	0.02	0.01	0.04
Al_2O_3	13.80	15.84	13.48	11.13	1.79	1.99	11.42	11.53	0.02	0.14	0.04	1.51
Fe_2O_3	5.00	4.10	0.09	3.80	1.34	1.14	2.31	2.37	0.00	0.00	0.00	0.00
Cr_2O_3	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	0.45
MgO	13.45	11.61	9.45	12.05	16.24	16.22	10.64	10.70	28.71	23.34	28.49	22.41
CaO	10.45	10.10	10.45	11.65	0.68	0.85	11.34	11.50	0.72	13.50	0.44	13.08
MnO	0.06	0.05	0.07	0.32	1.16	1.13	0.12	0.09	0.33	0.04	0.25	0.10
FeO	8.35	9.81	15.89	11.42	23.83	23.83	13.80	13.99	7.73	1.33	8.11	1.98
Na_2O	1.96	2.40	2.77	0.89	0.17	0.16	1.06	1.07	0.03	0.07	0.01	0.32
K_2O	0.63	0.79	0.80	0.16	0.00	0.00	0.47	0.41	0.01	0.00	0.00	0.02
Total	100.85	99.76	97.93	99.17	98.03	98.31	98.63	99.33	97.41	97.95	97.02	97.15
Cations												
Si	6.522	6.305	6.520	6.807	7.759	7.753	6.770	6.762	8.088	8.061	8.098	7.874
Ti	0.046	0.076	0.108	0.024	0.012	0.012	0.096	0.089	0.004	0.002	0.001	0.004
Al	2.272	2.658	2.354	1.879	0.310	0.344	1.956	1.961	0.003	0.022	0.006	0.245
Fe^{3+}	0.525	0.439	0.010	0.409	0.148	0.126	0.253	0.257	0.000	0.000	0.000	0.000
Cr	0.001	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.005	0.049
Mg	2.799	2.465	2.088	2.573	3.564	3.546	2.304	2.302	5.787	4.714	5.770	4.594
Ca	1.563	1.540	1.659	1.788	0.106	0.134	1.766	1.779	0.105	1.960	0.064	1.927
Mn	0.007	0.006	0.008	0.039	0.144	0.140	0.015	0.011	0.038	0.004	0.029	0.011
Fe^{2+}	0.975	1.168	1.970	1.367	2.933	2.923	1.677	1.689	0.874	0.150	0.922	0.228
Na	0.529	0.661	0.796	0.247	0.048	0.045	0.298	0.299	0.007	0.019	0.003	0.084
K	0.112	0.144	0.150	0.028	0.000	0.001	0.087	0.076	0.001	0.000	0.000	0.003
Total	15.354	15.470	15.663	15.162	15.024	15.023	15.221	15.227	14.909	14.934	14.897	15.019
X_{Mg}	0.742	0.678	0.514	0.653	0.549	0.548	0.579	0.577	0.869	0.969	0.862	0.953

2.4.5 Garnet growth modelling

The zoning of a garnet porphyroblast reflects its evolution (e.g., Spear, 1993) and has therefore been used to reconstruct the PT history of metamorphic rocks (e.g., Evans, 2004; Gaidies et al., 2006; 2008b; Tinkham & Ghent, 2005). A key aspect for garnet growth modelling is the thorough examination of the observed zoning, i.e. wether it results from prograde, possibly multi-stage growth with minor or negligible influence of diffusion or if diffusion strongly modified the garnet zoning.

For example, core isopleths of a zoned garnet may intersect far away from the calculated garnet-in isograde. If the zoning is restricted to the rims, garnet isopleth thermo-barometry can still be used as the homogeneous core results from homogenization or reaction overstepping. In any other case, the application of the method is doubtful, because:

- The chosen bulk-rock composition might be inappropriate
- The garnet core composition could have underwent strong modification by diffusion
- The garnet core might be inherited.

On the other hand, if distinctly rimward decreasing pyrope and increasing spessartine contents reflect a strong retrograde zoning or if the calculated amount of garnet implies resorption instead of growth along the suggested PT-path, the garnet zoning has been distinctly modified by diffusion. However, the core of the crystal could still preserve its original com-

Table 6. Representative microprobe analyses of feldspar. Cations based on an 8 oxygen basis.

Feldspar	Q09B	811084A	811084A	75223A	75223A	75214D	75214D	Q33B	Q33B	75247F	75247F	75248C	75248C	75248C	75251E	75251E
	F5#6	F3#4	F3#6	F2#1 rim		F3#2	F3#3	F4#5	F10#7	F2#15	F3#9	F1#2 rim	F1#17	F2#9	F1#2	F4#2
					core											
	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Kfs	Pl	Kfs	Pl	Pl	Kfs	Kfs	Pl
wt.-%																
SiO_2	64.96	66.46	66.21	64.07	69.46	62.75	63.10	65.06	59.34	59.87	64.75	61.20	60.39	64.68	65.13	61.04
Al_2O_3	22.04	21.36	21.46	22.96	19.72	24.28	23.94	19.25	26.80	25.45	19.11	24.53	25.12	18.82	18.52	23.96
CaO	2.96	2.02	2.05	4.32	0.25	5.86	5.51	0.05	7.69	6.93	0.01	6.11	6.95	0.02	0.01	5.84
FeO	0.07	0.10	0.00	0.00	0.01	0.07	0.02	0.06	0.06	0.00	0.00	0.09	0.00	0.00	0.02	0.06
BaO	0.00	0.01	0.03	0.00	0.00	0.00	0.02	1.39	0.00	0.00	0.55	0.01	0.01	0.56	0.77	0.03
Na2O	10.06	10.99	11.04	9.79	12.36	8.80	9.17	1.38	7.24	7.64	1.09	8.82	8.15	1.28	0.85	8.58
K2O	0.06	0.06	0.04	0.07	0.07	0.09	0.08	13.80	0.15	0.20	15.20	0.14	0.23	14.82	15.30	0.19
Total	100.15	101.00	100.81	101.20	101.88	101.85	101.83	100.99	101.28	100.09	100.72	100.91	100.85	100.19	100.59	99.70
Cations																
Si	2.857	2.896	2.890	2.802	2.986	2.738	2.753	2.975	2.616	2.665	2.972	2.704	2.674	2.981	2.996	2.725
Al	1.142	1.097	1.104	1.184	0.999	1.249	1.231	1.038	1.392	1.335	1.034	1.278	1.311	1.022	1.004	1.261
Ca	0.140	0.094	0.096	0.202	0.012	0.274	0.257	0.002	0.363	0.331	0.001	0.289	0.330	0.001	0.001	0.279
Fe	0.002	0.003	0.000	0.000	0.000	0.003	0.001	0.002	0.002	0.000	0.000	0.003	0.000	0.000	0.001	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.000	0.010	0.000	0.000	0.010	0.014	0.000
Na	0.858	0.928	0.934	0.830	1.031	0.744	0.775	0.122	0.619	0.659	0.097	0.756	0.700	0.115	0.076	0.743
K	0.003	0.003	0.002	0.004	0.004	0.005	0.005	0.805	0.009	0.011	0.890	0.008	0.013	0.871	0.898	0.011
Total	5.002	5.022	5.026	5.023	5.031	5.012	5.022	4.970	5.001	5.002	5.004	5.039	5.027	5.001	4.989	5.022
Endmembers																
K-feldspar	0.3	0.3	0.2	0.4	0.4	0.5	0.4	84.3	0.9	1.1	89.2	0.8	1.3	87.4	90.9	1.0
Albite	85.7	90.5	90.5	80.1	98.5	72.8	74.7	12.8	62.5	65.9	9.7	71.7	67.1	11.5	7.7	71.9
Anorthite	14.0	9.2	9.3	19.5	1.1	26.8	24.8	0.2	36.7	33.0	0.1	27.5	31.6	0.1	0.1	27.0
Celsian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	1.0	0.0	0.0	1.0	1.4	0.0

Table 6 (Continued).

Feldspar	76172C	76175A*	76175A**	76175A**	75254A	76163B	75271B	811102F	811079A	76163F
	F4#11	F1#4	F3#4	F4#7	F4#2rim	F3#1 rim	F3#9 core	F2#5	F2#1	F1#1
	Pl	Pl	Pl	Kfs	Pl	Pl	Pl	Kfs	Pl	Pl
wt.-%										
SiO_2	59.77	62.18	61.75	64.59	57.00	58.87	63.32	64.33	58.77	45.56
Al_2O_3	25.58	24.35	24.44	18.72	26.98	26.84	23.68	18.82	26.34	34.78
CaO	7.71	5.95	5.89	0.05	9.04	6.84	4.87	0.04	7.96	19.33
FeO	0.03	0.03	0.00	0.06	0.14	0.00	0.00	0.04	0.07	0.08
BaO	0.01	0.00	0.00	0.26	0.00	0.01	0.01	0.76	0.00	0.02
Na2O	7.96	8.46	8.63	1.70	7.20	8.21	9.49	1.16	7.42	1.08
K2O	0.12	0.26	0.27	14.16	0.04	0.16	0.10	15.01	0.23	0.01
Total	101.18	101.22	100.97	99.54	100.40	100.37	101.48	100.14	101.16	100.85
Cations										
Si	2.644	2.731	2.721	2.984	2.555	2.535	2.768	2.975	2.752	2.090
Al	1.334	1.260	1.269	1.019	1.425	1.444	1.220	1.026	1.242	1.880
Ca	0.365	0.280	0.278	0.003	0.434	0.472	0.228	0.002	0.235	0.950
Fe	0.001	0.001	0.000	0.002	0.005	0.002	0.000	0.001	0.000	0.003
Ba	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.014	0.000	0.000
Na	0.683	0.720	0.737	0.152	0.625	0.573	0.771	0.104	0.788	0.096
K	0.006	0.014	0.015	0.834	0.002	0.004	0.016	0.885	0.010	0.001
Total	5.034	5.006	5.020	5.000	5.047	5.032	5.027	5.007	5.026	5.019
Endmembers										
K-feldspar	0.6	1.4	1.5	83.9	0.2	0.4	0.6	88.1	1.0	0.1
Albite	64.7	71.0	71.6	15.3	58.9	54.6	77.5	10.3	76.3	9.1
Anorthite	34.7	27.6	27.0	0.3	40.9	45.0	22.0	0.2	22.8	90.8
Celsian	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.4	0.0	0.0

Table 7. Representative microprobe analyses of biotite. Cations based on a 12 oxygen basis. Water was iteratively estimated assuming F + Cl + OH = 2.

Biotite	75223A	75214D	Q33B	75247F	75247F	75248C	75251E	76172C	76175A	75254A	76163B	75271B
	F4#4	F2#3	F3#8	F1#4	F1#5	F3#4	F3#3	F3#2	F1#12	F5#6	F1#12	F2#13
wt.-%												
SiO_2	49.30	36.60	35.65	34.77	34.59	34.49	35.22	36.30	34.72	37.66	34.91	34.82
TiO_2	1.08	1.72	2.90	3.81	3.81	4.14	3.56	2.31	4.50	2.48	4.06	3.97
Al_2O_3	29.50	18.33	18.79	18.55	18.51	18.81	19.06	17.48	17.88	17.04	17.60	17.91
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.92	10.49	10.99	6.66	6.56	6.70	6.46	11.81	6.16	12.17	8.00	6.20
CaO	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.00
MnO	0.03	0.16	0.09	0.19	0.08	0.24	0.20	0.17	0.09	0.06	0.07	0.32
FeO	2.92	18.97	17.29	21.76	22.12	22.06	21.80	18.43	23.61	17.35	22.31	23.36
BaO	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.19	0.14	0.29	0.16	0.11
Na_2O	0.34	0.29	0.12	0.00	0.00	0.09	0.10	0.18	0.08	0.25	0.13	0.10
K_2O	9.85	9.06	10.15	9.77	9.84	9.70	9.63	9.05	9.61	9.00	9.17	9.51
H_2O	4.48	3.95	3.95	0.00	0.00	3.87	3.86	3.95	3.82	3.98	3.91	3.83
F	0.00	0.05	0.08	0.00	0.00	0.08	0.10	0.06	0.14	0.13	0.00	0.08
Cl	0.00	0.02	0.00	0.00	0.00	0.03	0.05	0.00	0.05	0.00	0.04	0.06
Total	99.42	99.63	100.03	95.51	95.51	100.21	100.00	99.91	100.72	100.35	100.38	100.22
Cations												
Si	3.30	2.760	2.678	2.926	2.918	2.646	2.695	2.732	2.669	2.800	2.671	2.687
Ti	0.05	0.098	0.164	0.241	0.242	0.239	0.205	0.131	0.260	0.138	0.234	0.230
Al	2.33	1.629	1.663	1.840	1.840	1.700	1.719	1.551	1.620	1.493	1.587	1.629
Cr	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.19	1.179	1.231	0.836	0.825	0.767	0.737	1.325	0.706	1.349	0.912	0.714
Ca	0.00	0.000	0.004	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000
Mn	0.00	0.010	0.005	0.013	0.006	0.015	0.013	0.011	0.006	0.004	0.005	0.021
Fe^{2+}	0.16	1.196	1.086	1.532	1.560	1.415	1.394	1.160	1.518	1.079	1.427	1.508
Ba	0.00	0.000	0.000	0.000	0.000	0.002	0.000	0.006	0.004	0.008	0.005	0.003
Na	0.04	0.042	0.017	0.000	0.000	0.013	0.014	0.027	0.011	0.036	0.019	0.015
K	0.84	0.871	0.973	1.049	1.059	0.950	0.940	0.869	0.943	0.853	0.895	0.936
Total	6.92	7.785	7.821	8.437	8.450	7.747	7.719	7.810	7.737	7.760	7.759	7.744
Anions												
OH	2.00	1.986	1.980	0.000	0.000	1.978	1.970	1.985	1.960	1.971	1.995	1.974
F	0.00	0.012	0.020	0.000	0.000	0.018	0.024	0.015	0.034	0.029	0.000	0.019
Cl	0.00	0.002	0.000	0.000	0.000	0.004	0.006	0.000	0.006	0.000	0.005	0.007
X_{Mg}	0.54	0.496	0.531	0.353	0.346	0.351	0.346	0.533	0.317	0.556	0.390	0.321
X_{Ti}	0.03	0.034	0.058	0.071	0.071	0.086	0.074	0.045	0.094	0.048	0.082	0.083

position, thus a PT estimate for garnet core growth via isopleth thermo-barometry is well possible. But it is questionable to derive PT data for intermediate or rim compositions: although the influence of diffusion can be calculated (e.g., with the Theria_g program; Gaidies et al., 2008a; 2008b), the reactivity of the rock matrix must be considered. During prograde growth, the matrix usually is considered to be fluid-saturated due to dehydration reactions with rising temperatures which ensures quick ion-exchange and equilibration. But this may not be valid for a retrograde PT evolution, i.e. decreasing temperatures. Furthermore, different matrix minerals have different diffusivities and closure temperatures. If the corresponding matrix phase is a ferro-magnesian sheet silicate, the Fe-Mg exchange between garnet and the

Table 7 (Continued).

Biotite	811102F F2#1	811079A F2#1	76163F F2#3	75257A F4#4 rim	75257A F4#6 core
wt.-%					
SiO_2	36.17	35.81	36.87	42.96	44.53
TiO_2	4.09	3.71	3.35	0.20	0.23
Al_2O_3	18.08	15.46	15.50	12.16	12.63
Cr_2O_3	0.00	0.00	0.00	0.91	0.98
MgO	9.65	7.80	12.00	27.77	27.81
CaO	0.00	0.06	0.02	0.01	0.01
MnO	0.07	0.18	0.03	0.03	0.01
FeO	19.36	23.96	18.53	4.16	2.23
BaO	0.20	0.27	0.21	0.03	0.10
Na_2O	0.07	0.09	0.15	0.35	0.42
K_2O	9.70	9.06	8.98	8.61	9.21
H_2O	3.90	3.88	3.77	3.98	4.11
F	0.23	0.00	0.38	0.77	0.68
Cl	0.03	0.00	0.06	0.00	0.02
Total	101.45	100.27	99.68	101.62	102.67
Cations					
Si	2.698	2.766	2.786	2.962	3.014
Ti	0.230	0.216	0.190	0.011	0.011
Al	1.590	1.408	1.381	0.988	1.007
Cr	0.000	0.000	0.000	0.000	0.000
Mg	1.073	0.899	1.352	2.854	2.805
Ca	0.000	0.005	0.002	0.001	0.001
Mn	0.004	0.012	0.002	0.002	0.001
Fe^{2+}	1.208	1.548	1.171	0.240	0.126
Ba	0.006	0.008	0.006	0.001	0.003
Na	0.010	0.013	0.022	0.046	0.055
K	0.923	0.893	0.866	0.757	0.795
Total	7.744	7.767	7.777	7.861	7.817
Anions					
OH	1.943	1.999	1.902	1.830	1.854
F	0.053	0.000	0.091	0.169	0.144
Cl	0.004	0.001	0.007	0.000	0.002
X_{Mg}	0.470	0.367	0.536	0.923	0.957
X_{Ti}	0.082	0.076	0.066	0.003	0.004

matrix is limited by the garnet as sheet silicates re-equilibrate easier and at lower temperatures. For Mn it is well known that it back-diffuses into garnet (e.g., Kohn & Spear, 2000) because matrix phases cannot incorporate (enough) Mn into their lattice. The same could happen with Ca. In felsic metamorphics, the other relevant Ca-phase is plagioclase. However, Ca-diffusion in plagioclase is distinctly lower than in garnet due to coupled substitution with Si, Al and Na and therefore retrograde Ca exchange with garnet might be hampered. As consequence, different elements could stop retrograde equilibration at different PT conditions and an isopleth intersection may deviate distinctly from the actual PT conditions.

2.5 Petrography and phase equilibria of UHP metamorphics

The northern margin of the Qinling unit shows a succession of fine- to medium-grained, often garnet-bearing gneisses with intercalated marbles. The meta-sediments are associated with fine- to medium-grained eclogites and garnet amphibolites (i.e., retrogressed eclogites) forming lenses and boudins of a meter to several hundred meters length (Yang J et al., 2003).

2.5.1 Metabasites

The UHP/HP assemblage of eclogites comprises garnet (core), omphacite, coesite/quartz and rutile. Additionally, sample Q09B bears relic kyanite and sample 811081A contains rare phengite. During uplift, the partial decomposition of omphacite came along with ubiquitous amphibole growth, formation of interstitial plagioclase and the incomplete transformation of rutile to titanite and ilmenite. This penetrative overprint and adjacent tectonic movements almost completely blurred UHP/HP fabrics and created the main foliation of the metabasites marked by roughly aligned green amphibole prisms.

While most metabasite samples bear anhedral and fragmented garnet grains (Fig. 3a) pointing to recrystallization, eclogites Q09B and 811084A show euhedral garnet porphyroblasts up to 1 mm diameter containing numerous tiny inclusions of calcite, quartz, rutile, apatite, kyanite (sample Q09B), pyrite and pyrrhotite. Remarkably, some garnet porphyroblasts of sample 811084A show radial cracks around few quartz inclusions, a probable indication of former coesite presence (see Hu et al., 1995, for comparison). Garnet crystals of sample Q09B reveal a complex zoning (Fig. 4) with a spessartine maximum at the cores ($Alm_{53}Grs_{34}Prp_{11}Sps_2$), a concentric zone with maximal grossular and minimal pyrope content and strongly increasing pyrope content at the rims ($Alm_{53}Grs_{31}Prp_{15}Sps_1$). A few garnet crystals of sample

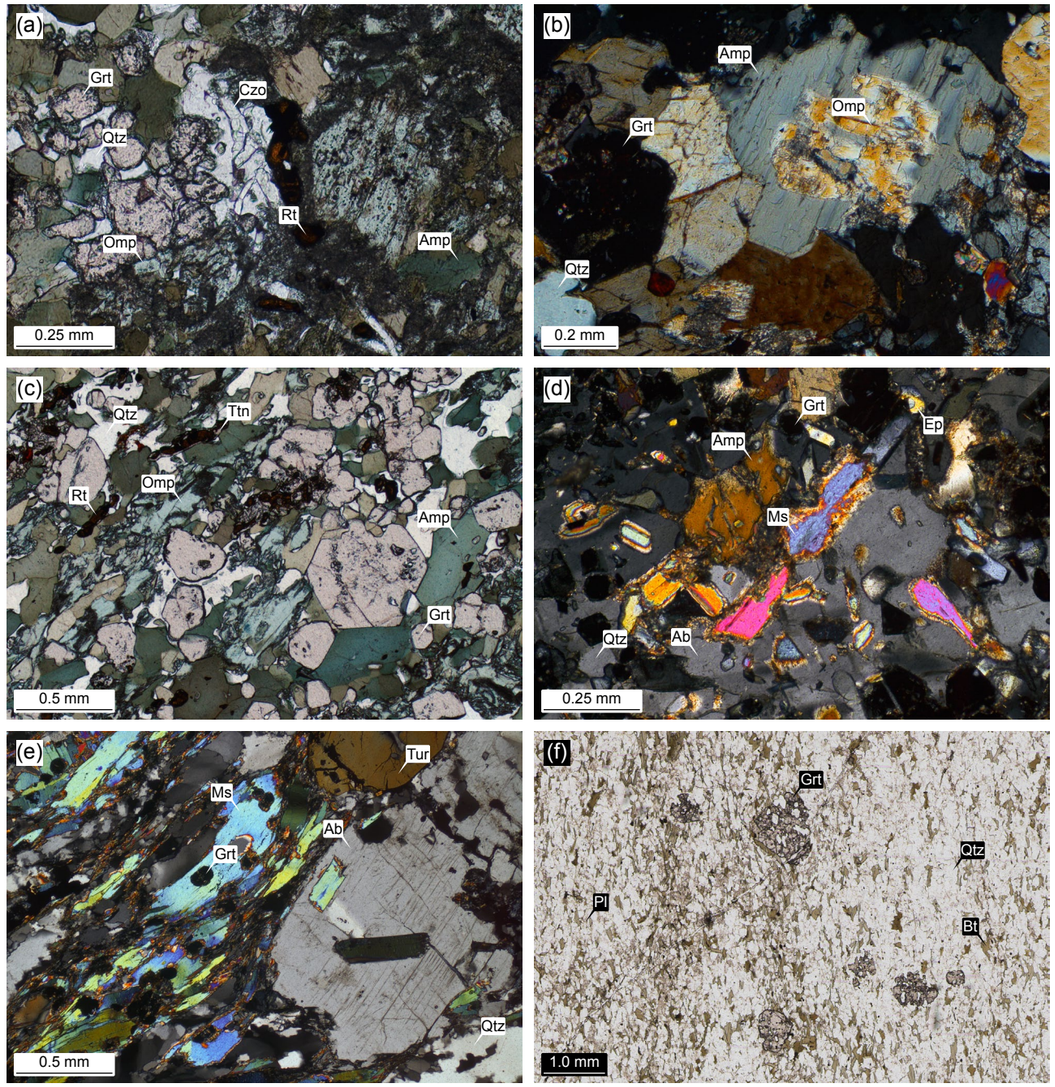


Figure 3. Photomicrographs of samples from the northern margin of the Qinling unit. (a), (c), and (f) plane polarized light, (b), (d), and (e) cross-polarized light. Mineral abbreviations follow Kretz (1983) and Spear (1993).
(a) Recrystallized garnet together with an omhacite prism and late amphibole (retrogressed eclogite 811084A).
(b) Relic omhacite encased in amphibole (retrogressed eclogite Q09B).
(c) Euhedral inclusion-rich garnet crystal together with aligned omhacite and amphibole prisms (retrogressed eclogite 811081A).
(d) Phengite flakes in retrogressed eclogite 811084A
(e) Coarse phengite flakes and albite porpyroblasts including garnet (garnet-bearing phengite gneiss 75223A).
(f) Garnet poikiloblasts in a weakly foliated matrix of biotite, plagioclase and quartz (garnet gneiss 75214D).

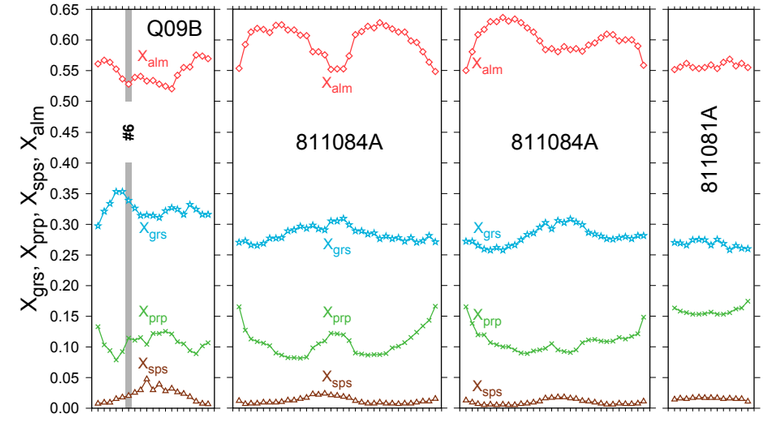


Figure 4. Representative EMP profiles through garnet crystals from eclogites from the northern margin of the Qinling unit. Spacing of the microprobe spots is 20 μm.

811084A have a small core of $Alm_{55}Grs_{31}Prp_{12}Sps_2$, followed by a pyrope-poor zone ($Alm_{62}Grs_{29}Prp_8Sps_1$; Fig. 4) that equals the core composition of other garnets. The rim composition is $Alm_{55}Grs_{27}Prp_{16}Sps_2$. Weakly zoned garnet grains of sample 811081A show an average composition of $Alm_{56}Grs_{27}Prp_{16}Sps_1$ (Fig. 4, Tab. 2). Relic omphacite prisms occur in samples Q09B, 811081A and 811084A (Figs. 3a-c). Their X_{Jd}-values vary between 0.25 and 0.35 (Tab. 3). Omphacite prisms are often surrounded by symplectitic intergrowths of albite, quartz and omphacite with lower X_{Jd}-values of 0.12-0.22. Phengite only occurs in sample 811081A, were it forms small, subhedral flakes (Fig. 3d). It shows high Si contents of 3.36 p.f.u.

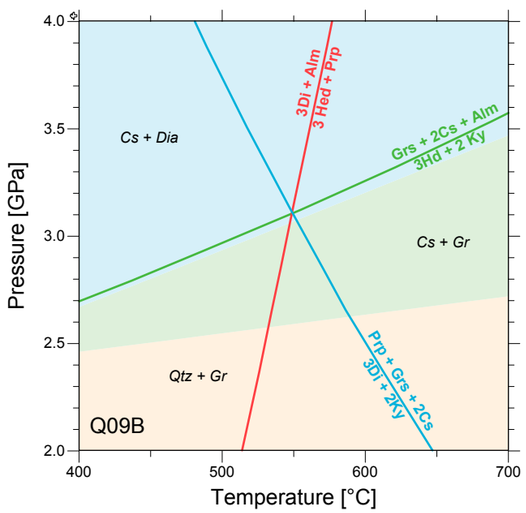


Figure 5. Results of winTWQ multi-equilibrium calculations applied to sample Q09B.

and an X_{Mg} of 0.69 (Tab. 4). Calcic amphiboles show compositions along the pargasite-edenite or tschermakite-magnesiohornblende joins (Tab. 5). Crystals of sample Q09B show a decrease of X_{Mg} from 0.75 to ~0.69 and an increase of the Ti content from 0.05 to 0.08 p.f.u. from core to the rim implying rising temperatures during growth. This is similar in sample 811081A, i.e. the X_{Mg} decreases towards the rim from 0.56 to 0.50 and the Ti-content from 0.08 to 0.12 p.f.u. Amphiboles of sample 811084A are unzoned with average X_{Mg}-values and Ti-contents of 0.52 and 0.10 p.f.u., respectively. Plagioclase formed interstitially in samples Q09B and 811081A and frequently shows clinozoisite inclusions. The composition is constant across the thin sections but varies in individual samples from $Ab_{97}An_{03}$ to $Ab_{87}An_{13}$ (Tab. 6).

The complex garnet zoning and ubiquitous relic phases prove chemical disequilibrium in the rocks. Therefore, thermodynamic modelling cannot be applied due to the inability of choosing an appropriate bulk-rock composition.

However, thermo-barometric information on the UHP stage was obtained from sample Q09B using multi-equilibrium calculations. Assuming equilibrium of relic kyanite, the appropriate kyanite-bearing garnet section, matrix omphacite with the highest X_{Jd}-value and SiO_2, winTWQ calculations point to 550 °C at 3.1 GPa (Fig. 5) in accord with the presence of diamond inclusions in zircon (Yang et al., 2003) and thus probably estimating the pressure peak of the PT path.

Based on the assemblage phengite – omphacite – garnet – quartz of sample 811081A conventional thermobarometry (Krogh Ravna, 2000; Krogh Ravna & Terry, 2004; Waters & Martin, 1993) yields ~660 °C at 2.0-2.3 GPa representing a recrystallization stage during uplift.

2.5.2 Felsic gneisses

The garnet-bearing phengite gneiss 75223A displays aligned coarse phengite flakes bending around mm-sized albite porphyroblasts. Anhedral garnet grains have diameters of 80-200 μm (Fig. 3e). Those included in albite or phengite are pristine while matrix grains are often chloritised. Late biotite grows on grain boundaries and cracks of phengite crystals. Relic rutile is encased in garnet as well as in matrix ilmenite. Other accessories include euhedral tourmaline up to 0.5 mm diameter, zircon, apatite and pyrite.

Garnet shows decreasing grossular and increasing almandine contents from core ($Alm_{74}Prp_9Grs_{15}Sps_2$) to rim ($Alm_{71}Prp_{7\text{-}8}Grs_{19}Sps_{2\text{-}3}$; Fig. 6a, Tab. 2). Albite porphyroblasts ($Ab_{94\text{-}97}An_{03\text{-}06}$) partly show thin oligoclase rims of $Ab_{80}An_{20}$. Phengite has Si-contents of 3.26-3.32 p.f.u. and X_{Mg}-values of 0.52 and 0.58 with the higher X_{Mg}-values corresponding to the higher Si-contents. Biotite is unzoned with an X_{Mg} of 0.54 and an X_{Ti} (=Ti/octahedral sum) of 0.027 (Tab. 7).

Garnet isopleths calculated in TNCKFMASH system intersect at 633 °C and 1.54 GPa in the stability field of the assemblage garnet – plagioclase – omphacite – phengite – paragonite – biotite – quartz – rutile (Fig. 6b) matching the observed except for small amounts of paragonite and omphacite whose absence may be explained by decomposition during further uplift. The pressure is substantiated by the X_{An}-isopleths of albite and the Si content of phengite (Fig. A1 in the appendix). The intersection of isopleths within this divariant field with continuous decomposition of omphacite and formation of plagioclase reflects a major recrystallization stage during uplift. Decomposition of rutile yielding ilmenite growth and the formation of An_{20}-rims on albite crystals are attributed to late metamorphic reactions.

Originating ~10 km west of the former sample, garnet gneiss 75214D consists of garnet, plagioclase, quartz, biotite and accessory ilmenite, apatite and zircon. It displays a rough foliation marked by aligned greenish-brown biotite flakes (Fig. 3f). Garnet shows a discontinuous zonation (Fig. 6c) with cores of $Alm_{54}Grs_{20}Prp_{09}Sps_{17}$ and rims of $Alm_{61}Grs_{14}Prp_{09}Sps_{16}$. Plagioclase composition is ~$Ab_{74}An_{26}$ (Tab. 6). Biotite shows an X_{Mg} of 0.50 and X_{Ti} of 0.028-0.034 (Tab. 7).

Modelling in TNCKFMASH with excess H_2O yields an intersection of garnet core isopleths at 635 °C and 1.06 GPa within the stability field of the assemblage garnet – plagioclase – biotite – phengite – quartz – ilmenite (Figs. 6d and A2). Phengite not observed in the thin section was most likely decomposed during uplift.

2.6 Petrography and phase equilibria of ultra-metamorphic rocks

Most rocks of the central and southern Qinling unit underwent a high-temperature, ultra-metamorphic overprint with distinct anatexis causing migmatization. For these rocks, the nomenclature of Mehnert (1968) was applied. Especially felsic gneisses experienced prominent anatectic processes with formation of quartz-feldspar-rich layers (leucosomes) and distinctly melt-depleted sections (melanosomes). The term palaeosome was used for virtually unaltered protoliths and moderately modified gneisses.

Migmatites are either intensively folded (Fig. 7a) or display parallel lateral extending layers (stromatitic structure according to Mehnert, 1986). The degree of partial melting increases toward the south as evident by an increasing amount of leucosomes. Anatexis is absent in metabasic lenses and boudins, which range from <1m to ~100 m in length. At the contact of the metabasites to the leucosomes, > 5 mm thick resorption zones (Fig. 7b) are present.

2.6.1 Fabrics and mineral compositions of palaeosomes and melanosomes

Palaeosomes are garnet-biotite gneisses consisting of garnet, biotite, plagioclase, quartz and sometimes sillimanite with additional K feldspar (Figs. 8a and b). Rarely, Fe-Mg-Mn amphiboles (Fig. 8c) join the peak metamorphic assemblages. A common retrograde phase is muscovite (Fig. 8d). Accessories include ilmenite, apatite, zircon, monazite (Fig. 8e), and rare xenotime (sample 75248C; identified by Raman spectroscopy). Textures vary strongly between individual samples: garnet gneiss 75247F (Fig. 8f) is a massive, granular, medium grained rock bearing numerous decussate biotite aggregates while samples 75248C, 75251E, 75271B, and 811079A display a

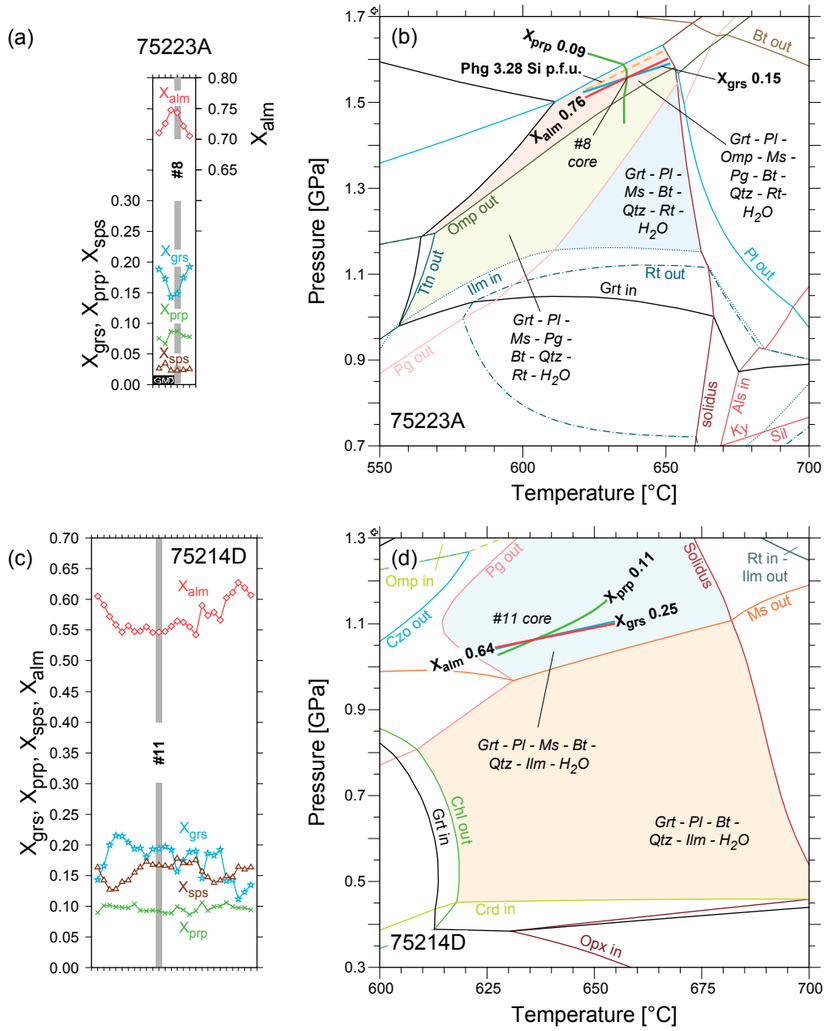


Figure 6. (a) Representative EMP profile through a garnet from sample 75223A. The highlighted analysis corresponds to the isopleth intersection in Fig. 6b. Spacing of the microprobe spots is 10 μm.
(b) Equilibrium assemblage diagram (TNCKFMASH system, excess H_2O) and intersection of garnet core isopleths of sample 75223A. Bulk-rock composition (in mol) is Si 24.176, Ti 0.179, Al 7.388, Fe 0.987, Mg 0.545, Ca, 0.179, Na, 1.324, K, 2.036, O 63.183.
(c) Representative EMP profile through a garnet from sample 75214D. The highlighted analysis corresponds to the isopleth intersection in Fig. 6d. Spacing of the microprobe spots is 20 μm.
(d) Equilibrium assemblage diagram (TNCKFMASH system, excess H_2O) and intersection of garnet core isopleths of sample 75214D. Bulk-rock composition (in mol) is Si 26.272, Ti 0.127, Al 4.528, Fe 1.071, Mg 0.955, Ca 0.743, Na 1.889, K 0.702, O 63.6545.

spaced foliation with uneven or anastomosing cleavage domains crosscut by euhedral biotite and muscovite flakes. Garnet-cummingtonite gneiss 75254A shows compositional banding accentuated by garnet-biotite-plagioclase-quartz, plagioclase-quartz, and cummingtonite-plagioclase-quartz dominated layers.

Although consisting of the same phases, melanosomes are particularly enriched in garnet and biotite. Individual samples display a rough or spaced foliation. Compositional layering is abundant: individual layers of samples 76172C and 811102F are dominated by biotite-plagioclase-quartz, and garnet-biotite-plagioclase-quartz assemblages (Fig. 8g). Several sections were mylonitized as evident by a matrix of dynamically recrystallized quartz, very fine-grained biotite, and rare plagioclase containing rounded clasts of garnet and plagioclase (Fig. 8h).

Mostly, garnet in palaeosomes and melanosomes forms anhedral crystals of 0.2-2.0 mm diameter. Euhedral garnet was only found in sample Q33B. EMP analyses (Fig. 9, Tab. 2) show low grossular contents of 4-9 mol-% and high almandine contents of 63-79 mol-%. Pyrope and spessartine contents vary between 5 and 24 mol-%. While grossular contents are rather constant through most grains, distinctly increasing spessartine and decreasing pyrope contents towards the rim reflect retrograde zoning.

In contrast to other garnets from felsic migmatites, crystals from garnet gneiss 811079A show elevated grossular contents in the core ($Alm_{63}Grs_{15}Prp_9Sps_{13}$) and a discontinuous increase of grossular in the retrograde rim section ($Alm_{58}Grs_{27}Prp_7Sps_8$; Fig. 9).

Plagioclase is weakly zoned or unzoned with X_{An}-values of 0.22-0.40 (Tab. 6) and often includes randomly oriented sillimanite needles. K feldspar has an albite content of ~9 mol-%. Biotite is reddish-brown coloured and has high X_{Ti}-values of 0.045-0.100; the highest occur in the cores of large flakes. The X_{Mg}-value (0.35-0.65) varies strongly between individual samples (Tab. 7). Late muscovite is often intergrown with biotite. It also forms euhedral crystals crosscutting the foliation or mantling sillimanite (Fig. 8d). It has low Si contents of 3.00-3.13 p.f.u. and X_{Mg}-values of 0.35-0.48, which vary between individual grains. Euhedral colourless amphibole prisms of sample 75254A are randomly oriented and accumulated in several layers (Fig. 8c). They are cummingtonite according to Leake (1997) with an X_{Mg}-value of 0.55 (Tab 5). Relic green calcic amphibole (magnesiohornblende according to Leake, 1997) of that sample shows an X_{Mg} of 0.63-0.65. Ilmenite is present in all samples forming grains up to 0.2 mm. It shows minor hematite contents up to 5 mol-% and pyrophanite contents of 2-10 mol-%.

2.6.2 Fabrics and mineral compositions of leucosomes

Leucosomes are medium-grained, massive unfoliated rocks, which usually display a granular fabric (Fig. 8i). They are mainly composed of plagioclase, K feldspar and quartz with accessory zircon and apa-

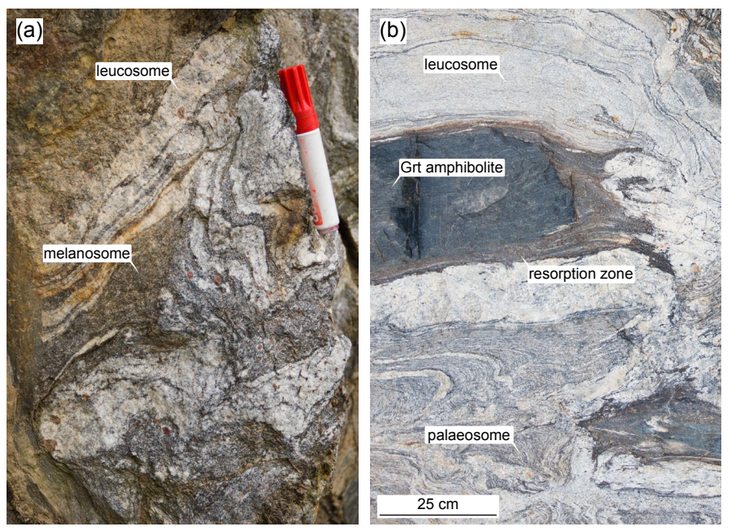
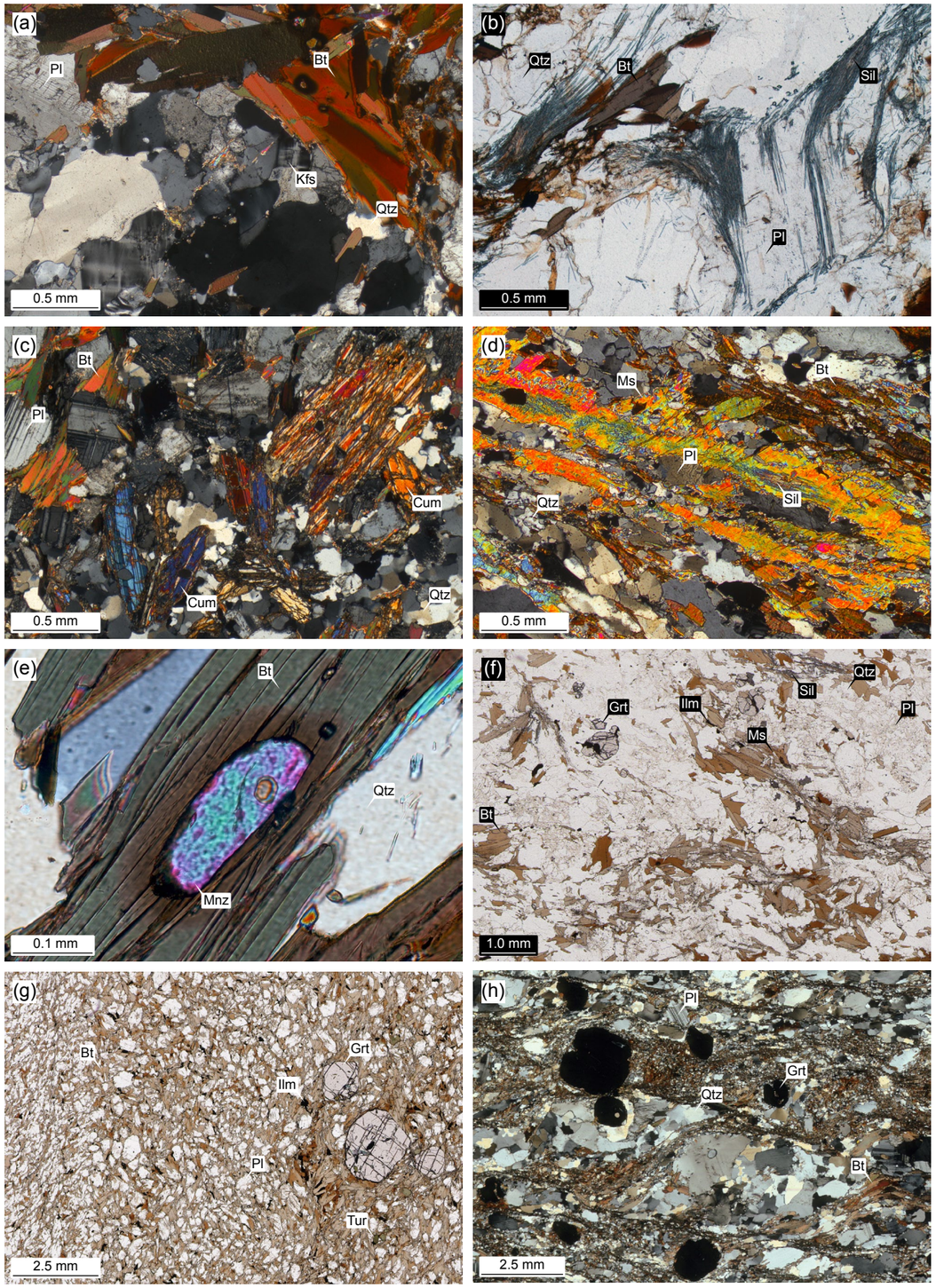


Figure 7. Photographs of outcrop 76163 showing typical structures of migmatites.
(a) Intensively folded felsic migmatite.
(b) Resorption zone at the margin of a garnet amphibolite embedded in leucosome



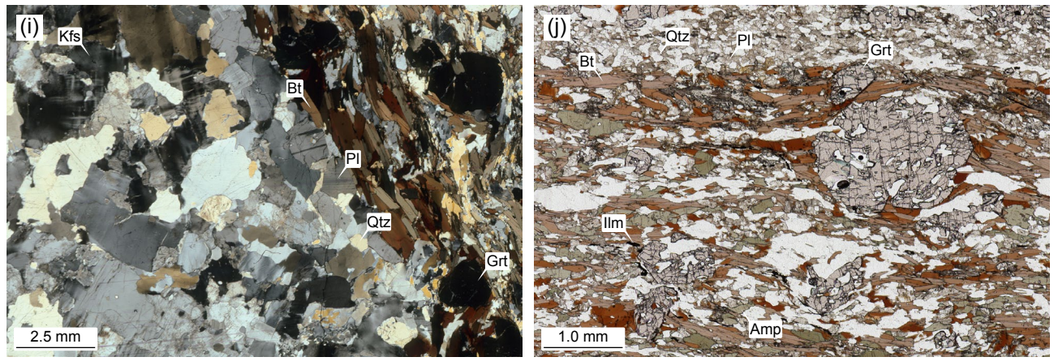


Figure 8 (continued). Photomicrographs of migmatic gneisses and intercalated metabasites. (a), (c), (d), (e), (h), and (i) cross-polarized light; (b), (f), (g), and (j) plane polarized light.
(a) K feldspar grains together with plagioclase, quartz and biotite; garnet-bearing sillimanite gneiss 75247F.
(b) Sillimanite intensively intergrown with plagioclase; garnet-sillimanite gneiss 75248C.
(c) Randomly oriented cummingtonite prisms in a matrix of plagioclase, biotite and quartz, garnet-cummingtonite gneiss 75254A.
(d) Late muscovite mantels peak metamorphic sillimanite, garnet-sillimanite gneiss 75251E.
(e) Monazite grain included in biotite, garnet-sillimanite gneiss 75248C.
(f) Massive inhomogeneous garnet-sillimanite gneiss 75247F.
(g) Compositional banding of garnet gneiss 76172C.
(h) Garnet clasts in a mylonitic matrix, garnet gneiss 76163B.
(i) Granular leucosome in contact to well foliated melanosome, garnet gneiss 76175A
(j) Euhedral garnet porphyroblast in a matrix of amphibole, biotite, plagioclase and quartz, garnet amphibolite 76163F.

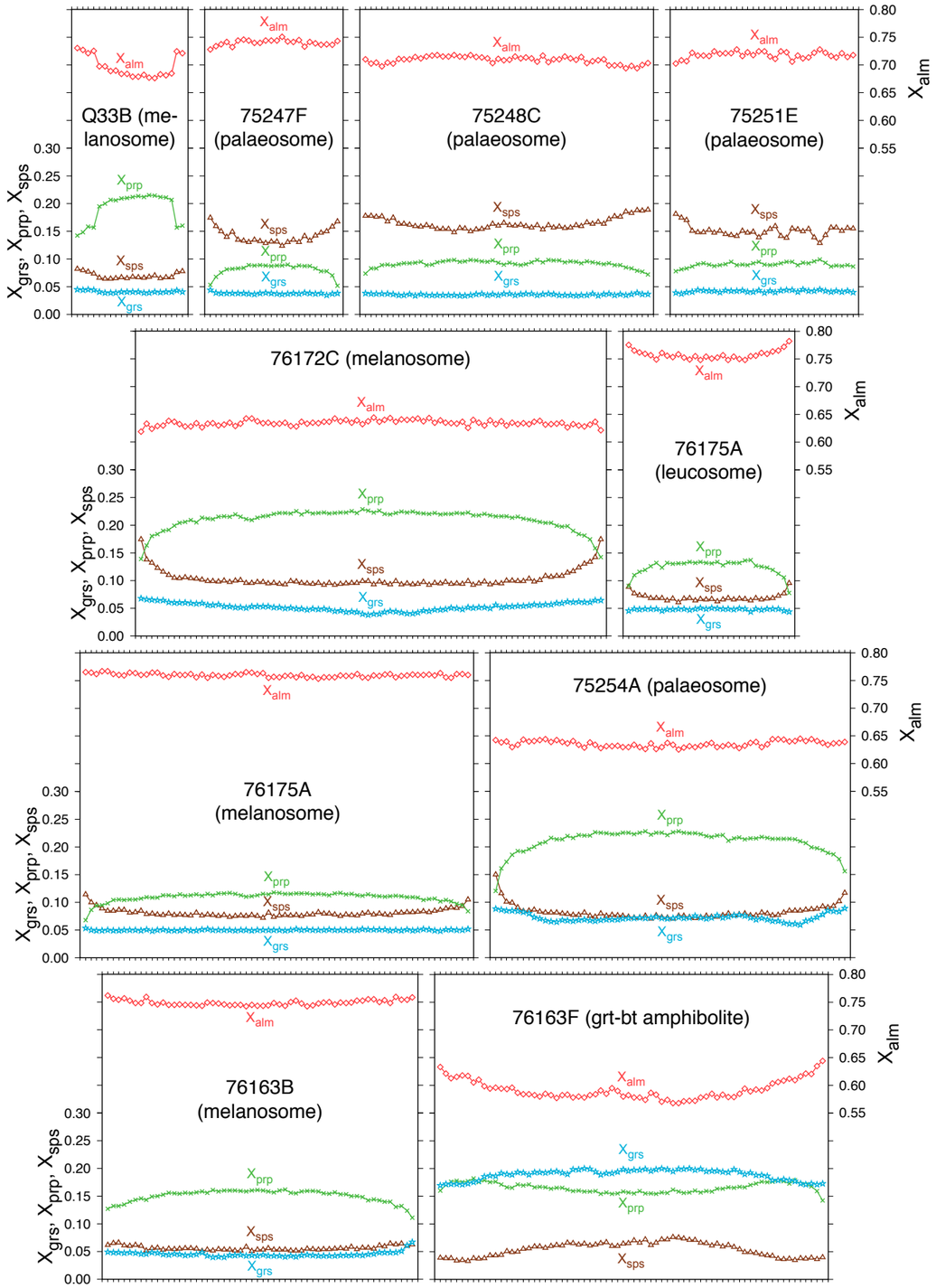
tite. Some samples contain anhedral garnet crystals or randomly oriented biotite flakes.

The composition of the leucosome phases was investigated in sample 76175A. EMP analyses of plagioclase, K feldspar, and garnet show almost identical compositions as obtained for abutting melanosomes (Tabs. 2; 6; Fig. 9) implying equilibration.

2.6.3 Fabrics and mineral composition of intercalated metabasites

While metabasites in the central Qinling unit consist of amphibole, plagioclase and quartz, they additionally bear garnet and biotite in the southern part of the Qinling unit. Accessories include ilmenite, apatite and zircon. Secondary muscovite and epidote are present. Our samples are medium-grained and display a continuous foliation accentuated by aligned amphibole prisms and biotite flakes (Fig. 8j). Individual metabasite bodies often have resorption zones at the contact to the surrounding migmatites (Fig. 7b). These resorption zones are distinctly enriched in biotite and garnet.

Euhedral garnet of sample 76163F shows a composition of $Alm_{58}Grs_{19\text{-}20}Prp_{16}Sps_{6\text{-}7}$ in the core and $Alm_{62}Grs_{17}Prp_{17}Sps_{4}$ near the rim highlighting prograde zoning (Fig. 9, Tab. 2). Decreasing pyrope contents at the outermost rim section point to retrogression. Garnets from other analysed metabasites are anhedral and poikiloblastic. They show low spessartine contents of 4-6 mol-%, variable pyrope contents of 8 to 18 mol-%, grossular contents of 16 to 20 mol-% and almandine contents of 64 to 68 mol-%. At the outermost rims, decreasing pyrope- as well as increasing almandine- and spessartine contents reflect retrogression. Amphiboles are weakly zoned with increasing X_{Mg}-values and degreasing Ti-contents towards the rims. The composition varies somewhat between individual samples, i.e. the X_{Mg} is 0.42-0.58, the Si content is 6.45-6.80 p.f.u. and the Ti-content is 0.08-0.17 p.f.u (Tab. 5). According to Leake (1997) they are either tschermakite, ferrotschermakite, fer-



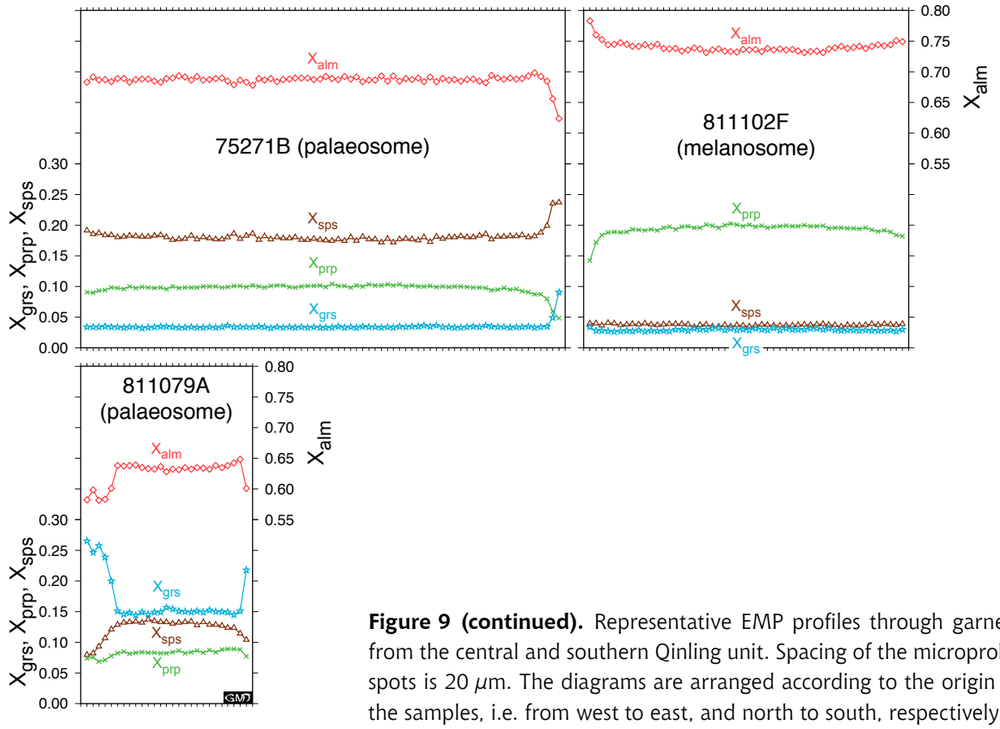


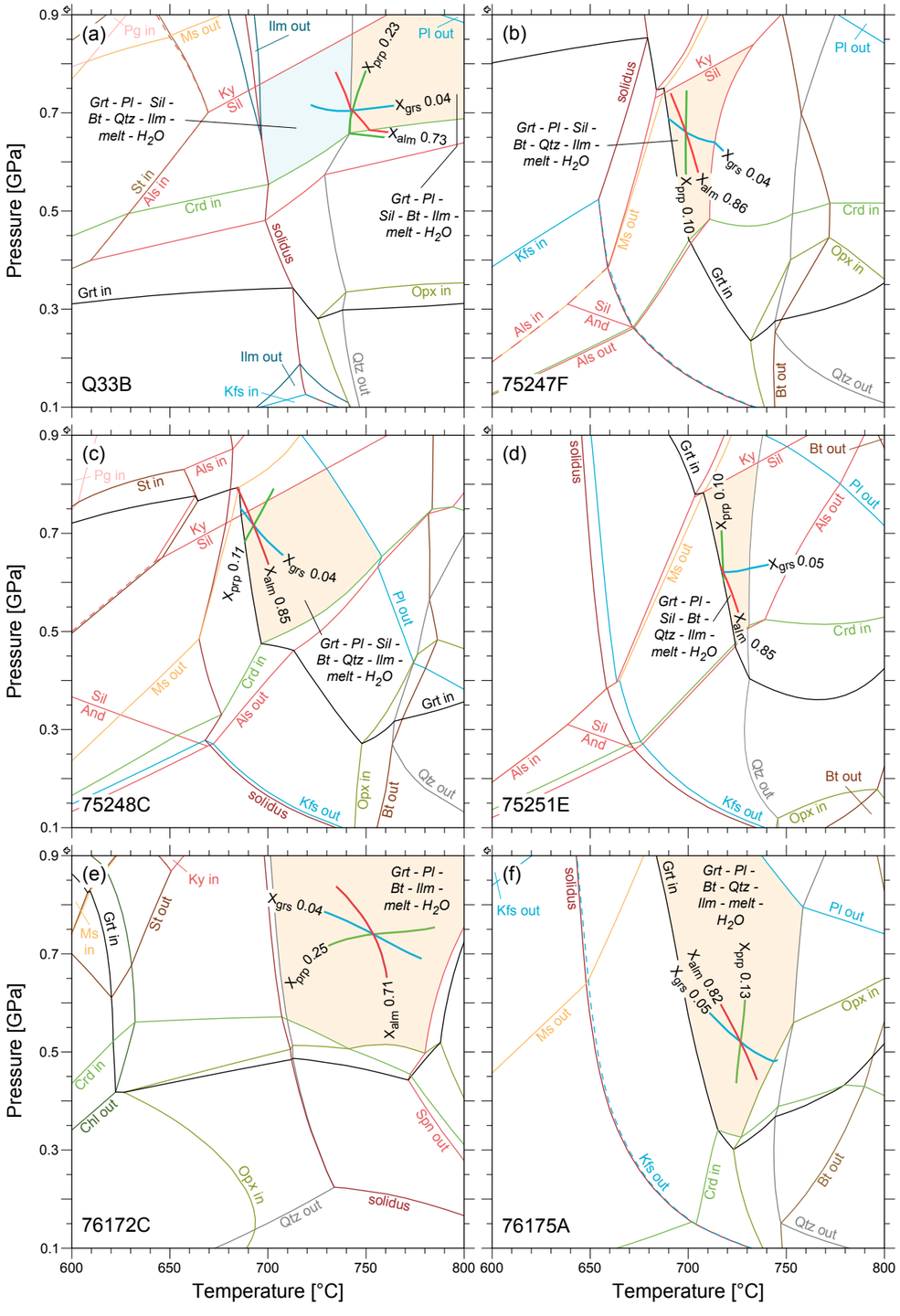
Figure 9 (continued). Representative EMP profiles through garnets from the central and southern Qinling unit. Spacing of the microprobe spots is 20 μm. The diagrams are arranged according to the origin of the samples, i.e. from west to east, and north to south, respectively.

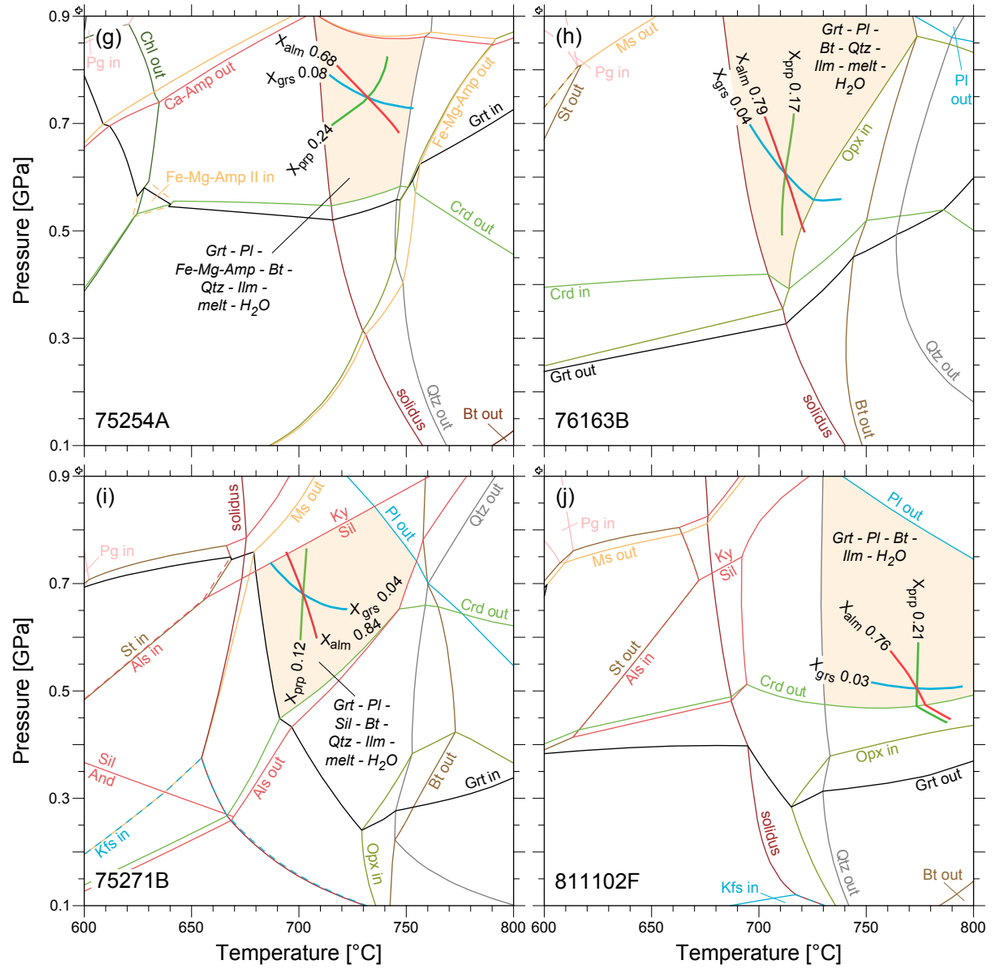
rohornblende or hornblende. Plagioclase has X_{An}-values of 0.87-0.91. Biotite shows X_{Mg}-values of 0.46-0.53 and Ti-contents of 0.06-0.09 p.f.u. Ilmenite shows minor hematite contents up to 3 mol-% and pyrophanite contents of 1-10 mol-%.

2.6.4 Phase equilibria and metamorphic conditions

Thermodynamic modelling was performed in the TNCKFMASH system with excess H2O using bulk rock compositions derived by point counting (Figs. 10; 11). The calculations revealed onset of partial melting of felsic gneisses at 660-700 °C at medium pressures as implied by the observed assemblages: the lack of orthopyroxene and cordierite point to minimum pressures of 0.5-0.6 GPa while the ubiquitous occurrence of sillimanite constrains maximum pressures of ~0.7-0.9 GPa. These P-T conditions were refined by garnet isopleth thermobarometry (Figs. 10; 11; A3-A14) applied to garnet cores, which are thought to preserve peak metamorphic conditions. The westernmost investigated sample (garnet-sillimanite gneiss Q33B, Figs. 10a, A3) points to 743 °C at 0.71 GPa. Originating north of the city of Danfeng, felsic gneiss samples 75247F (699 °C at 0.66 GPa; Figs. 10b, A4), 75248C (693 °C at 0.72 GPa; Figs. 10c, A5), 75251E (722 °C at 0.62 GPa; Figs. 10d, A6) and 76172C (754 °C at 0.75 GPa; Figs. 10e, A7) yield similar conditions. Further south, garnet gneiss 76175A points to 727 °C at 0.52 GPa (Figs. 10f, A8). Garnet-cummingtonite gneiss 75254A points to 732 °C at 0.75 GPa (Figs. 10g, A9). Further east, garnet gneiss 76163B yields 712 °C at 0.61 GPa (Figs. 10f, A10). From the same outcrop metabasite 76163F displays garnet growth from 675 °C at 0.73 GPa to 760 °C at 0.68 GPa reflecting strong heating (Figs. 11, A14). Originating just west of the Songshugou ophiolite, garnet gneiss 75271B points to 702 °C at 0.68 GPa (Figs. 10i, A11). The highest peak temperatures were obtained from garnet gneiss 811102F from the north-eastern part of the Qinling unit, i.e. 773 °C at 0.51 GPa (Figs. 10j, A12).

Altogether, the intersections of almandine, grossular, and pyrope isopleths of garnet cores highlight a high-grade, upper amphibolite facies metamorphic





Q33B: Si 20.139, Ti 0.115, Al 9.013 Fe 3.487, Mg 1.841, Ca 0.860, Na 1.367, K 1.489, O 61.6435.

75247F: Si 23.476, Ti 0.136, Al 6.247, Fe 1.873, Mg 0.598, Ca 0.880, Na 1.738, K 1.282, O 61.4555.

75248C: Si 24.019, Ti 0.284, Al 5.980, Fe 2.643, Mg 1.086, Ca 0.367, Na 0.818, K 1.555, O 62.8585.

75251E: Si 23.379, Ti 0.399, Al 6.745, Fe 1.887, Mg 0.582, Ca 0.667, Na 1.580, K 2.084, O 62.6415

76172C: Si 23.842, Ti 0.346, Al 5.786, Fe 2.246, Mg 0.900, Ca 0.741, Na 1.952, K 1.435, O 62.6355.

76175A: Si 23.842, Ti 0.346, Al 5.786, Fe 2.246, Mg 0.900, Ca 0.741, Na 1.952, K 1.435, O 62.6355.

75254A: Si 20.373, Ti 0.233, Al 6.573, Fe 2.207, Mg 2.212, Ca 1.364, Na 1.977, K 1.000, O 58.343.

76163B: Si 24.300, Ti 0.221, Al 5.741, Fe 1.871, Mg 0.957, Ca 0.923, Na 2.116, K 0.866, O 62.8955.

75271B: Si 23.336, Ti 0.206, Al 6.002, Fe 2.223, Mg 0.777, Ca 0.495, Na 1.511, K 1.358, O 61.0165.

811102F: Si 22.133, Ti 0.223, Al 7.034, Fe 2.904, Mg 1.304, Ca 0.695, Na 2.095, K 1.570, O 61.9985.

811079A: Si 23.287, Ti 0.209, Al 6.069, Fe 1.800, Mg 0.970, Ca 1.176, Na 2.168, K 1.016, O 61.6335.

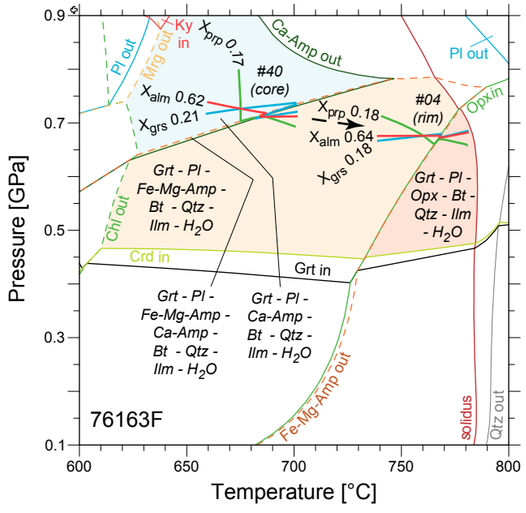


Figure 11. Results of thermodynamic modelling (TNCKFMASH system, excess H2O) applied to garnet amphibolite 76163F. The bulk-rock composition (in mol) is Si 19.345, Ti 0.693, Al 6.613, Fe 5.194, Mg 3.594, Ca 1.603, Na 0.166, K 1.548, O 61.2435.

overprint in the middle crust. The retrograded garnet rims preclude application of the method as retrograde equilibration of Ca, Mg, and Fe with matrix phases might have stopped at different temperatures (see introduction).

A unique exception is garnet gneiss 811079A from the south-eastern margin of the Qinling unit that contains distinctly different zoned garnets than other samples from this area. Garnet core isopleths point to 700 °C at 0.80 GPa, i.e. similar as obtained for nearby samples. Garnet rims, however, point to 680 °C at 1.05 GPa (Fig. 9k, A13). Here, the method is applicable as the calculated amount of garnet (Fig. A13) implies growth along the derived P-T path. These P-T conditions coincide with the occurrence of kyanite in this area (You et al., 1993) and are similar to anti-clockwise PT paths recorded in Qinling granulites from the Tongbai area (Liu X et al., in press).

2.7 Ultramafic rocks

The core of the Songshugou ophiolite is mainly built up by granular, fine- to medium grained rodingite (former spinel dunite to spinel lherzolite according to Zhang 1999, Fig. 12a), which was intruded by several folded veins of coarse-grained olivine-websterite and olivine-clinopyroxenite (Fig. 12b). Hydrous phases are widespread colourless amphibole (cummingtonite and tremolite), subordinate phlogopite and talc. In the core of the complex, retrograde serpentine rarely occurs on grain boundaries and cracks while ultramafics near the boundary to the surrounding metabasites are thoroughly serpentinized.

Rodingite 75295A from the centre of the Songshugou ophiolite shows a granular fine-grained matrix of olivine, euhedral amphibole prisms and accessory spinel (Fig. 12a). Olivine has an X_{Mg}-value of 0.90 (Tab. 8). Spinel is magnesiochromite with cores of $(Mg_{0.37}Fe^{2+}_{0.62})(Al_{0.29}Cr_{0.63}Fe^{3+}_{0.08})_2O_4$ and rims of $(Mg_{0.25}Fe^{2+}_{0.74})(Al_{0.15}Cr_{0.65}Fe^{3+}_{0.19})_2O_4$ (Tab. 9). Amphibole prisms show tremolite cores (X_{Mg} 0.96) and cummingtonite rims (X_{Mg} 0.87; Fig. 13; Tab 5). Phase equilibrium calculations in the CKFMASH system with excess H_2O constrain a stability field at 650-710 °C at <0.8 GPa for the equilibrium mineral assemblage tremolite-cummingtonite-olivine-spinel of the rodingite (Fig. 14a). Conventional olivine-spinel-thermometry (Ballhaus et al., 1991; O'Neill & Wall, 1987) points to somewhat lower temperatures of 600-630 °C in the derived pressure range, which may result from retrograde cooling. These data clearly indicate that the ultramafics experienced a thermal re-equilibration during the ultra-metamorphism in the Qinling unit and a common exhumation with the surrounding metamorphics.

At outcrop 75257A located 5 km northwest of the city of Danfeng, a m-sized boudin of rodingite was found in contact to the ultra-metamorphic rocks. Its protolith was a granular spinel peridotite showing primary olivine, orthopyroxene and spinel as well as secondary amphibole prisms and needles and zoned phlogopite flakes embedded in a serpentine matrix (Figs. 12c, d). Composition of the primary and secondary minerals closely resemble to the

Figure 10 (pages 34 and 35). Results of thermodynamic modelling (TNCKFMASH system, excess H_2O) applied to gneisses of the central and southern Qinling unit. The bulk-rock compositions were obtained by point-counting.

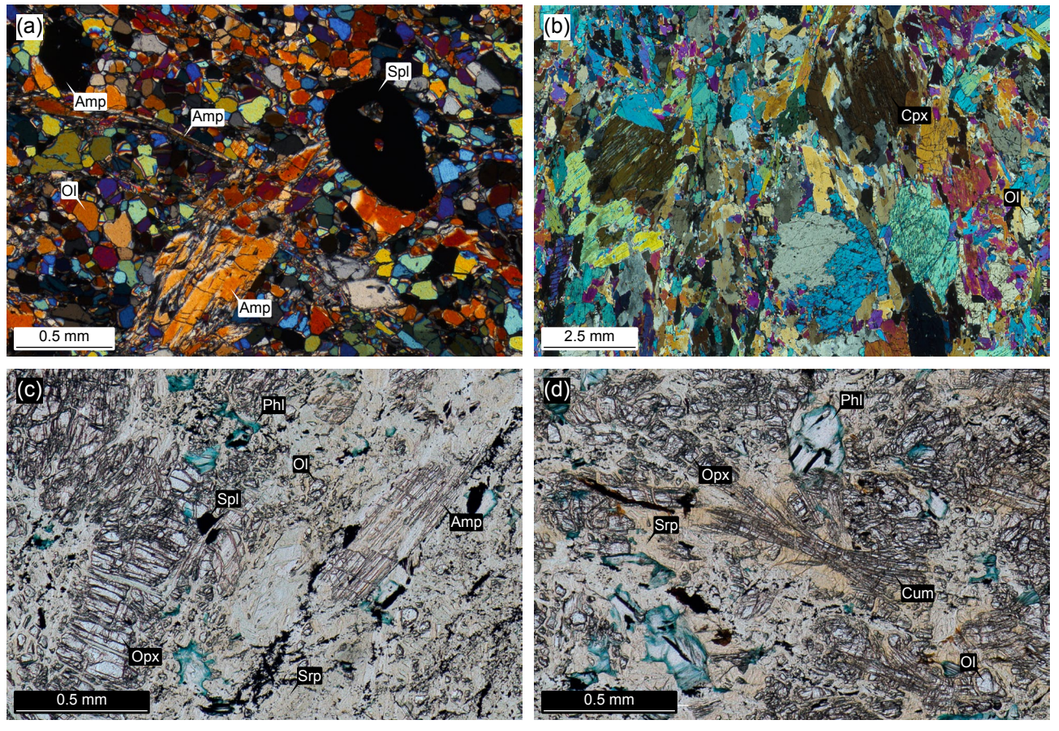


Figure 12. Photomicrographs of ultra-mafics. (a), and (b) cross-polarized light, (c), and (d) plane polarized light.
(a) Amphibole prisms and spinel in a granular olivine matrix; rodingite 75295A.
(b) Clinopyroxene with exsolution lamellae; olivine-clinopyroxenite 75295B.
(c) Amphibole and orthopyroxene prisms in a serpentinized matrix; rodingite 75257A.
(d) Cummingtonite, zoned phlogopite and relic olivine in a serpentinized matrix; rodingite 75257A.

ones from the Songshugou ophiolite with olivine and orthopyroxene showing X_{Mg}-values of 0.89-0.90 and magnesiochromite with a core composition of $(Mg_{0.34}Fe^{2+}_{0.65})(Al_{0.26}Cr_{0.69}Fe^{3+}_{0.05})_2O_4$ and a rim composition of $(Mg_{0.28}Fe^{2+}_{0.71})(Al_{0.15}Cr_{0.81}Fe^{3+}_{0.04})_2O_4$. Larger amphibole prisms are composed of tremolite cores (X_{Mg} 0.96) and cummingtonite rims (X_{Mg} 0.87) while needles are unzoned cummingtonite (Fig. 13, Tab. 5). Phlogopite has colourless cores (X_{Mg} 0.95) and bluish rims with a slightly higher Fe-content (X_{Mg} 0.92; Tab. 4; Figs. 12c, d).

The PT evolution of this ultramafic sample probably started in the spinel peridotite stability field of the upper mantle. During exhumation, the rock experienced hydrous metasomatism with growth of tremolite at the expense of primary clinopyroxene. Subsequently, cummingtonite formed at the expense of orthopyroxene, which is shown in the equilibrium assemblage diagram of Fig. 14b. The equilibrium mineral assemblage tremolite-cummingtonite-orthopyroxene-olivine-phlogopite is stable in a narrow field at 680-740°C and <1.1 GPa. This PT estimate is supported by olivine-spinel thermometry of Ballhaus et al. (1991), which calculates 630-700°C at 1.0 GPa. In analogy to the Songshugou complex, the high-grade amphibolite facies metamorphism of the rodingite probably occurred during the ultra-metamorphism of the Qinling migmatites. The decomposition of olivine and relic orthopyroxene to serpentine followed on the retrograde path (Fig. 14b).

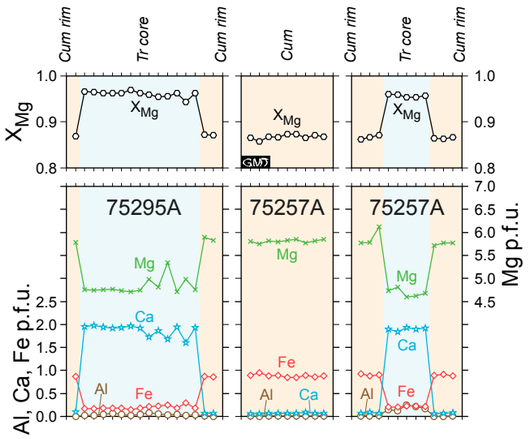


Figure 13. EMP profile across amphibole crystals from rodingites 75295A and 75257A.

2.8 Geochronology

2.8.1 Th/Pb monazite dating

Th/Pb ion-probe dating of metamorphic monazite from the central Qinling unit reveal the following: Monazites from migmatic garnet gneiss 76163B show two major age clusters at 381 ± 7 and 352 ± 6 Ma, respectively. Mylonitic garnet gneiss 76162H and orthogneiss 76173A reveal major age clusters of 397 ± 5 Ma and 392 ± 4 Ma and youngest grains at 352 ± 5 and 354 ± Ma, respectively. Significantly older monazites (~459 Ma) were found in garnet gneiss 75271B. The youngest grains of that sample yield 343 ± 6 Ma. Remarkably, all metamorphic monazite samples reveal an old age cluster, few young grains at ~350 Ma and numerous single grain ages in between. As experimental investigations of monazites proved that diffusional resetting only subordinately affects monazite ages (Seydoux-Guillaume et al., 2002; Teufel & Heinrich, 1997) but dissolution-precipitation under fluid presence is a very efficient resetting mechanism even at low temperatures of 400 °C (Teufel & Heinrich, 1997), the derived younger age group of ~350 Ma likely reflects ceasing of monazite recrystallization rather than growth or cooling through a closure temperature. As consequence, the old age clusters may only yield minimum ages for monazite growth and thus for peak metamorphism.

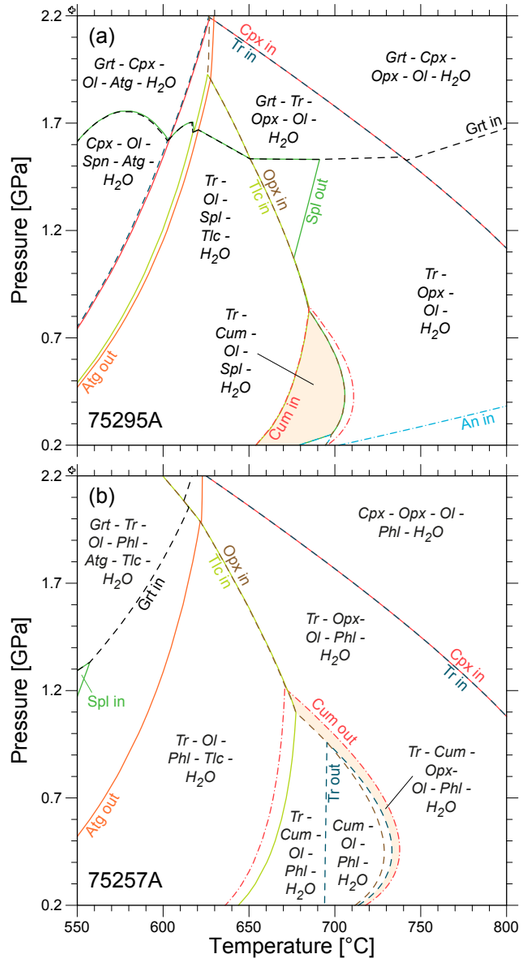


Figure 14. (a) Equilibrium assemblage diagram of sample 75257A. The bulk-rock composition (in mol) obtained via XRF analysis is Si 16.731, Al 0.305, Fe 2.381, Mg 21.163, Ca 0.222, K 0.158, O 57.7645.
(b) Equilibrium assemblage diagram of sample 75295A. The bulk-rock composition (in mol) obtained via XRF analysis is Si 14.709, Al 0.133, Fe 2.444), Mg 24.498, Ca 0.177, O 56.7365. To overcome destabilisation of spinel by exclusion of Cr from the calculations due to the lack of thermodynamic data, Al-rich phases chlorite, cordierite and chloritoid were excluded from the calculation of both diagrams.

Table 8. Representative microprobe analyses of olivine. Cations based on a 4 oxygen basis.

Olivine	75295A F3#5	75295A F3#7	75257A F3#4	75257A F4#1
wt.-%				
SiO_2	41.13	41.18	40.67	40.60
TiO_2	0.00	0.00	0.02	0.02
Al_2O_3	0.01	0.00	0.00	0.00
Cr_2O_3	0.02	0.00	0.05	0.03
MgO	49.73	49.68	48.34	48.43
CaO	0.00	0.02	0.00	0.00
MnO	0.13	0.20	0.18	0.11
FeO	9.01	8.97	10.58	10.84
NiO	0.41	0.41	0.42	0.43
Total	100.44	100.45	100.26	100.46
Cations				
Si	1.001	1.002	0.999	0.997
Ti	0.000	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.001	0.001
Mg	1.804	1.802	1.770	1.772
Ca	0.000	0.000	0.000	0.000
Mn	0.003	0.004	0.004	0.002
Fe^{2+}	0.183	0.182	0.217	0.223
Ni	0.008	0.008	0.008	0.008
Total	2.999	2.998	3.000	3.003
X_{Mg}	0.908	0.908	0.891	0.888

Magmatic monazites from undeformed granite 75244C yield 395 ± 3 Ma likely dating emplacement.

2.8.2 U/Pb titanite dating

Titanite from retrogressed eclogite 811084A yield 470 Ma reflecting exhumation into the lower crust.

2.8.3 Ar/Ar biotite, white mica and amphibole dating

Phengites taken from garnet gneiss 75223A yield 470 ± 0.3 Ma, which is slightly younger than the age of the youngest zircon of this rock and the oldest known mica age of that slice.

Amphiboles from amphibolites, garnet amphibolites and a amphibole syenite from the central Qinling unit yield plateau ages of 393 ± 1 Ma (sample 75247F), 384 ± 1 Ma (sample 75252A), 359 ± 1 Ma (sample 75253B), 374 ± 2 Ma (sample 75255A), 377 ± 1 Ma (sample 75256A) and 389 ± 1 Ma (sample 76174B), respectively. The latter shows disturbance at ~339 Ma.

Biotite from granites 75253B and 76173A yields 359 ± 1 Ma and 356 ± 1 Ma, respectively. Biotite flakes taken from garnet amphibolite 75255A and amphibole syenite 76174B give significantly younger plateau ages of 359 ± 1, and 370 ± 1 Ma, respectively, than obtained from amphiboles of these samples. Two garnet gneisses yield Ar/Ar biotite ages of 334 ± 1 Ma (sample 76162B) and 330 ± 1 Ma (sample 76163E), respectively. The different Ar/Ar biotite ages reflect local differences in the cooling history of the Qinling unit: ages of 356-370 Ma were obtained from samples taken on a profile north of the city of Danfeng (Fig. 2) while those of ~330 Ma originate from samples taken south of the Huichizi pluton.

Table 9. Representative microprobe analyses of spinel. Cations based on a 4 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

Spinel	75295A F2#1 rim	75295A F2#9 core	75257A F1#7 core	75257A F1#17 rim
wt.-%				
SiO_2	0.01	0.02	0.01	0.03
TiO_2	0.43	0.06	0.21	0.18
Al_2O_3	7.40	15.00	12.99	7.30
Cr_2O_3	46.93	48.20	52.74	59.13
Fe_2O_3	14.39	6.76	3.63	3.05
MgO	4.76	7.55	6.87	5.40
CaO	0.00	0.00	0.00	0.00
MnO	0.42	0.35	0.31	0.29
FeO	25.66	22.68	23.56	24.90
	0.00	0.00	0.00	0.00
NiO	0.10	0.05	0.00	0.06
Total	100.10	100.65	100.31	100.32
Cations				
Si	0.000	0.000	0.000	0.001
Ti	0.011	0.001	0.005	0.005
Al	0.304	0.580	0.510	0.297
Cr	1.295	1.250	1.388	1.613
Fe^{3+}	0.378	0.167	0.091	0.079
Mg	0.248	0.369	0.341	0.277
Ca	0.000	0.000	0.000	0.000
Mn	0.013	0.010	0.009	0.008
Fe^{2+}	0.749	0.622	0.656	0.718
Zn	0.000	0.000	0.000	0.000
Ni	0.003	0.001	0.000	0.002
Total	3.000	3.000	3.000	3.000

2.9 Implications to the tectonometamorphic evolution of the Qinling belt

2.9.1 The Early Palaeozoic Qinling continental arc

In the Early Palaeozoic, the southern margin of the Qinling microcontinent faced a northward trending subduction zone. A continental arc set up and numerous, often multi-stage granitoid plutons (e.g., Wang T et al., 2000) intruded the Qinling, Erlangping and Kuanping units (Ratschbacher et al., 2003 and therein). Available U/Pb zircon ages of arc-related granitoids range from 507 to 399 Ma (ages compiled by Dong et al., 2011c and Wang T et al., 2009a, Fig. 15a) and imply ~110 Ma magmatic activity and thus continuous subduction of the Shangdan ocean. The high heat flow caused migmatization of felsic gneisses of the central and southern Qinling unit at peak metamorphic conditions of 680-775 °C at 0.5-0.75 GPa (Fig. 16). The earliest known metamorphic ages obtained from a migmatic gneiss (~517 Ma U/Pb zircon; Dong et al., 2011a), and a garnet-staurolite schist (520 ± 23 Ma Th/Pb monazite; Chen Q et al., 2006) reflect medium to upper amphibolite facies conditions in Cambrian times, i.e. at the same time the first arc-related magmatites intruded and the UHP metamorphics formed. A U/Pb zircon age of 473 ± 10 Ma (Yang L et al., 2010) obtained from a garnet gneiss provides another but distinctly younger metamorphic age. The large scattering of our own Th/Pb monazite ages (~380-400 Ma; ~459 Ma; oldest age groups) may be explained by long lasting influence of high temperatures together with intense recrystallization (see above). Maybe, the felsic migmatites experienced medium to upper amphibolite facies conditions during the entire magmatic arc activity, i.e. ~110 Ma. Cooling of the Qinling unit through amphibole closure at 359-410 Ma (Dong et al., 2011a and this study) highlights arc activity reduction in the Early-Middle Devonian.

2.9.2 The UHP metamorphics and their connection to the Erlangping unit

Located between the northern margin of the Qinling microcontinent and the southern margin of the Sino-Korean craton, the Erlangping ocean hosted an intra-oceanic arc and a back-arc basin as indicated by geochemical signatures of Erlangping unit ophiolites (Xue et al., 1996b; Dong et al., 2011b). Deep subduction caused UHP metamorphism of the felsic gneisses and associated mafic rocks nowadays exposed at the northern margin of the Qinling Unit at ~507 Ma (Yang J et al., 2003). The UHP metamorphism took place in the stability field of diamond (Yang J et al., 2003) and could be estimated at 550°C and 3.1 GPa. During uplift the UHP metamorphics underwent strong recrystallization (Fig. 16): a first overprint in the stability field of quartz eclogite at 2.0-2.3 GPa and ~660 °C was followed by an isothermal decompression at 1.1-1.5 GPa and 630-640°C. Ar/Ar phengite and U/Pb titanite dating yield ~470 Ma and imply exhumation into the lower crust within ~37 Ma. Remarkably, there is no indication of any thermal overprint of the neighbouring ultra-metamorphic rocks from the central-southern Qinling subunit, i.e. the shear zone between is characterized by condensed Silurian to Early Devonian isotherms which points to crustal shortening and a late juxtaposition of both crustal segments.

Though several authors (e.g., Dong et al., 2011c; Xue et al., 1996b) proposed the formation of the UHP metamorphic rocks in a south-trending subduction zone, northward subduction of the Qinling microcontinent and abutting oceanic crust below the intra-oceanic Erlangping arc is much more reasonable because the UHP metamorphics are located at the northern margin of the Qinling unit (Ratschbacher et al., 2003), i.e. south of the Zhuxia fault marking the border of the Erlangping and Qinling units. Furthermore, the ophiolite bodies located at the Shangdan fault are likely remnants of large nappes of Erlangping ocean origin and were thrust across the entire Qinling unit (Faure et al.,2001; 2008; Ratschbacher et al., 2003) implying top-south movement during emplacement. An alternative model for the formation of the Shangdan ophiolites suggests emplacement due to Devonian collision of the Yangtze craton with the amalgamated Sino-Korean craton – Erlangping – Qinling – continent (e.g., Dong et al., 2011c; Faure et al., 2008; Xue et al., 1996b). This is ruled out for the following reasons:

- Palaeomagnetic data indicate separation of the Sino-Korean and Yangtze cratons in Silurian-Devonian times (Huang et al., 2000; Zhao et al., 1993)
- There are no records of a Silurian-Devonian metamorphic overprint which should have affected the Yangtze craton and especially its northernmost exposed part, the Douling unit.

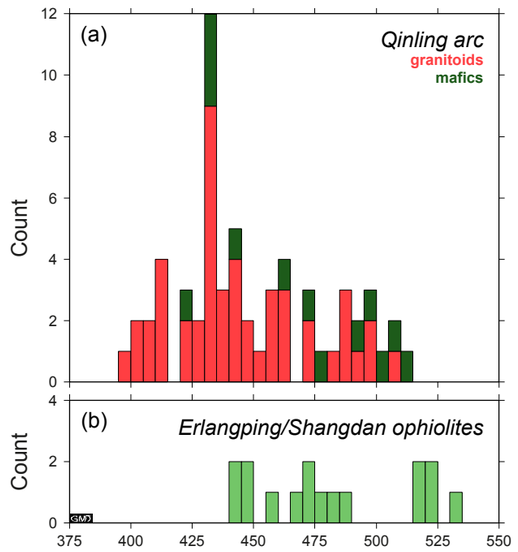


Figure 15. Summary of U/Pb zircon ages compiled by Dong et al. (2011c) and Wang T et al. (2009) of (a) granitoid (48, red) and mafic (13, green) Qinling arc-related intrusions
(b) 16 mafic rocks of the Erlangping/Shangdan ophiolites

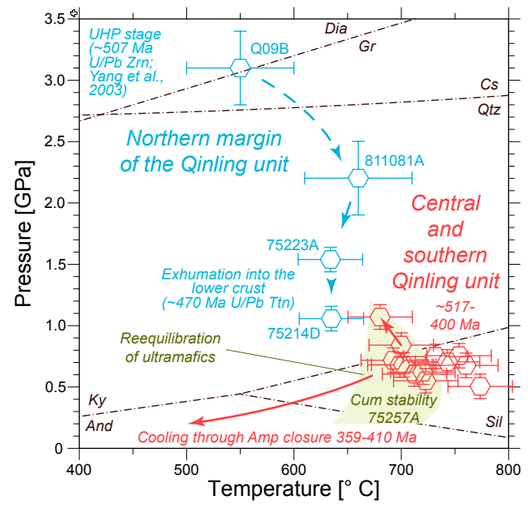


Figure 16. Summary of the metamorphic evolution of the Qinling unit. Timing of the Qinling unit evolution is from Dong et al. (2011c) and this study.

- The HP-UHP metamorphic rocks of the Dabie Shan, Hong'an, Tongbai, Douling and Wudang areas formed by Carboniferous (e.g., Sun et al., 2002c) and Triassic subduction (e.g., Hacker et al. 2004; 2006; Liu X et al., 2008; Ratschbacher et al., 2006) of the northern margin of the Yangtze craton. Therefore, a continental rift should have formed within the Yangtze craton opening the ocean that was closed during the Triassic orogeny. Although this was proposed by several studies (e.g., Faure et al., 2008), there neither exist indications of continental rifting nor remnants of Late Palaeozoic ocean floor.

2.9.3 The closure of the Erlangping ocean

According to Ratschbacher et al. (2006) the closure of the Erlangping ocean formed two sutures: one between the Qinling microcontinent and the Erlangping intra-oceanic arc and the other one between the Erlangping intra-oceanic arc and the Sino-Korean craton. The two sutures are younger than the remnants of the ocean floor and older than the continental arc granitoids intruding the Kuanping, Erlangping and Qinling units (Ratschbacher et al. ,2006). Granitoids related to the continental arc (see above) intruded the Erlangping unit as early as ~460 Ma (Dong et al, 2011c) indicating that amalgamation of the Qinling microcontinent with the Erlangping intra-oceanic arc was completed at this time. However, the back-arc basin existed longer as U/Pb zircon ages of 443-467 Ma of dacite and pillow lavas (Dong et al., 2011c and therein) indicate ongoing rifting till the Ordovician-Silurian boundary. The age of youngest known radiolaria suggest marine sedimentation till the Early Silurian (~428 Ma, Ratschbacher et al., 2003; Wang N., 1989). A granitoid intruding the Kuanping unit yield an U/Pb zircon age of 399 ± 14 Ma (Dong et al., 2011c) and provides a minimum age for the collision with the Sino-Korean craton. As consequence, at ~400-428 Ma the Erlangping back-arc basin and thus the entire Erlangping ocean must have closed due to final amalgamation of the Qinling microcontinent to the Sino-Korean craton.

Nowadays, there are no Silurian to Early Devonian high pressure metamorphic rocks known from the Qinling area, although they should have been

created by this collision. However, detrital phengites with Si-contents of ~3.40 p.f.u. occur together with muscovites in Carboniferous clastic sediments of the Beihuaiyang Group at the northern margin of the Dabie Shan. Rb/Sr single-grain model ages of these micas cluster at ~420 Ma and therefore point to a Silurian-Devonian medium- to low pressure as well as a simultaneous high-pressure metamorphic event affecting the source area(s) of the sediments, i.e. the eastern continuation of the Qinling belt (Chen F et al., 2009). These phengite might have grown during final amalgamation of the Qinling microcontinent with the Sino-Korean craton.

2.9.4 Cooling history

New Ar/Ar cooling ages of 359-393 Ma were obtained from metamorphic amphiboles of the Qinling Unit. Although they are somewhat younger, these ages substantiate published Rb/Sr and Ar/Ar ages of ~380-420 Ma (Dong et al., 2011c; Ratschbacher et al., 2003 and therein). Similar Ar/Ar ages from the Shangdan ophiolites (426-395 Ma, Dong et al., 2011b and therein) indicate that both, Qinling unit and the ophiolites experienced a similar cooling history.

Furthermore, these ages reflect reduced magmatic arc activity as well as uplift. Structural analysis shows that the Qinling unit was exhumed during oblique left-lateral shearing (Wang T et al., 2005b) triggered by oblique subduction (Ratschbacher et al., 2003).

Further cooling was likely affected by the proximity to local heat sources and deformation as indicated by distinctly different Ar/Ar biotite ages that cluster at 356-370 Ma and ~330 Ma (Dong et al., 2011a and this study).

2.9.5 The Songshugou ophiolite

The outlined evolution provides a reasonable scenario for the formation of the Songshugou ophiolite: it experienced its HP-granulite facies overprint (830-920 °C at 1.0-1.6 GPa; Liu & Zhu, 1995; Zhang ZJ, 1999) at 485-518 Ma (Chen D et al., 2004b; Liu J et al., 2009; Liu J & Sun, 2005), i.e. within errors at the same time the UHP metamorphics of the northern Qinling unit still subducted below the intra-oceanic Erlangping arc. The crustal base of the active arc provides an appropriate setting for a metamorphic overprint at such high temperatures, i.e. a high heat flow together with magmatic underplating. Thus, the mafic rocks experienced their HP-granulite facies overprint in the upper mantle below the Erlangping intra-oceanic arc. During collision with the Qinling microcontinent, the mafic and ultramafic rocks were exhumed and thrust southward as part of the Erlangping nappe stack. This is supported by structural observations pointing to top-south shearing (Mattauer et al., 1985). Subsequently, ultramafics and metabasites experienced the medium-pressure amphibolite facies overprint together with juxtaposed felsic gneisses of the Qinling Unit. The cooling history also ties the Songshugou ophiolite to the felsic migmatites of the Qinling unit as Ar/Ar dating of amphibole yield 372 ± 15 Ma (Liu J. et al., 2009), i.e. identical results as obtained for amphiboles from the Qinling unit.

2.10 Conclusions

Based on a different metamorphic evolution, the Qinling unit can be divided into a northern and a central-southern part.

During Cambrian subduction of the Qinling microcontinent below the intra-oceanic Erlangping arc the northern part underwent UHP metamorphism as evident by diamond inclusions in zircons taken from felsic gneisses and eclogites (Yang J et al., 2003). This coesite-eclogite facies overprint was constrained at 550 °C and 3.1 GPa. During uplift, a subsequent quartz-eclogite facies recrystallization occured at 2.0-2.3 GPa and ~660 °C. Further uplift was characterized by nearly isothermal decompression. A subsequent penetrative overprint occured at 630-640 °C and 1.1-1.5 GPa.

New Ar/Ar phengite and U/Pb titanite ages of ~470 Ma reflect cooling and exhumation into the crust till the Middle Ordovician.

At the same time, todays northern part was subducted into the diamond stability field, an Andean style continental arc formed at the southern margin of the Qinling unit. The magmatic arc was active from the Middle Cambrian till the Early Devonian (~110 Ma). Due to the high heat flow, felsic gneisses and amphibolites of the central-southern Qinling unit underwent an upper amphibolite facies overprint at 680-775 °C and 0.5-0.75 GPa. Remarkably, the UHP metamorphics lack indications of an overprint by the magmatic arc pointing to a late juxtaposition of both crustal segments.

Ar/Ar amphibole ages reflect reduced arc activity and onset of cooling in the Early-Middle Devonian. Cooling through biotite closure occurred between 370-330 Ma and was likely affected by local heat sources and shearing.

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2.12 Appendix

2.12.1 Solution models used to calculate equilibrium assemblage diagrams and isopleths

Solid solutions: Garnet, melt, biotite, spinel: White et al. (2007); white mica: Coggon & Holland (2002); amphibole: Diener et al. (2007); clinopyroxene: Green et al. (2007); chlorite, chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); orthopyroxene: White et al. (2002)

Non-solution phases: unless otherwise noted all other included into the database of Holland & Powell (1998)

2.12.2 Solution models used for winTWQ 3.34 multi-equilibrium calculations

For winTWQ calculations, we used the mineral datafile "DEC06.DAT" together with the solution datafile: "DEC06.SLN" and the solution models:

- Garnet: BA07 (based on Berman & Aranovich, 1996)
- clinopyroxene: BAP95 (Berman et al., 1995)

2.13 References

Ballhaus, C., Berry, R.F. & Green, D.H., 1991. High pressure experimental calibration of the olivine-orthopyroxene-spinel oxygen geobarometer: implications for the oxidation state of the upper mantle. Contributions to Mineralogy and Petrology 107, 27-40.

Berman, R.G, 1991. Thermobarometry using multi-equilibrium calculations: a new technique, with petrological applications. in: Gordon, T.M. & Martin, RF. (eds.) Quantitative methods in petrology: an issue in honor of Hugh J. Greenwood. Canadian Mineralogist, 29, 833-855.

Berman, R.G., 2007. winTWQ (version 2.3): a software package for performing internally-consistent thermobarometric calculations. Geological Survey of Canada, Open File 5462, 41 pages.

Berman, R.G. & Aranovich, L.Y., 1996. Optimzed standart state and mixing properties of minerals: I. Model calibration for olivine, orthopyroxene, cordierite, garnet, and ilmenite in the system FeO-MgO-CaO-Al2O3-SiO2-TiO2. Contributions to Mineralogy and Petrology, 126, 1-25.

Berman, R.G., Aranovich, L.Y. & Pattison, D.R.M., 1995. Reassessment of the garnet-clinopyroxene Fe-Mg exchange thermometer: II. thermodynamic analysis. Contributions to Mineralogy and Petrology, 119, 30-42.

Chen D., Liu, L., Sun, Y., Zhang, A., Zhang, C., Liu, X. & Luo, J., 2004a. Determination of the Neoproterozoic Shicaogou Syn-collisional Granite in the Eastern Qinling Mountains and Its Geological Implications. Acta Geologica Sinica, 78, 73-82

Chen, D., Liu, L., Sun, Y., Zhang, A., Liu, X. & Luo, J., 2004b. LA-ICP-MS zircon U-Pb dating for high-pressure basic granulite from North Qinling and its geological significance. Chinese Science Bulletin, 49, 2296-2304.

Chen, F., Zhu, X.-Y., Wang, W., Wang, F., Hieu, P.T. & Siebel, W., 2009. Single-grain detrital muscovite Rb–Sr isotopic composition as an indicator of provenance for the Carboniferous sedimentary rocks in northern Dabie, China. Geochemical Journal, 43, 257-273.

Chen, Q., Chen, N., Wang, Q., Sun, M., Wang, X., Li, X. & Shu, G., 2006. Electron microprobe chemical ages of monazite from Qinling Group in the Qinling Orogen: Evidence for Late Pan- African metamorphism? Chinese Science Bulletin, 51, 2645-2650.

Chen, Z., Lu, S., Li, H., Zhou, H., Xiang, Z. & Guo, J., 2004. Age of the Fushui intermediate-mafic intrusive complex in the Qinling orogen: new zircon

U-Pb and whole-rock Sm and Nd isotope chronological evidence. Geological Bulletin China, 23, 322-328 (in Chinese with English abstract).

Chen, Z., Lu, S., Li, H., Li, H., Xiang, Z., Zhou, H. & Song, B., 2006. Constraining the role of the Qinling orogen in the assembly and break-up of Rodinia: Tectonic implications for Neoproterozoic granite occurrences. Journal of Asian Earth Sciences, 28, 99-115.

Coggon, R. & Holland, T.J.B., 2002. Mixing properties of phengitic micas and revised garnet-phengite thermobarometers. Journal of Metamorphic Geology, 20, 683–696.

De Capitani, C., 1994. Gleichgewichts-Phasendiagramme: Theorie und Software. Berichte der Deutschen Mineralogischen Gesellschaft, Beih. Europ. J. Mineral. 48, 6.

De Capitani, C. & Brown, T. D., 1987, The computation of chemical equilibrium in complex systems containing non-ideal solutions. Geochimica et Cosmochimica Acta, 51, 2639-2652.

De Capitani, C. & Petrakakis, K., 2010, The computation of equilibrium assemblage diagrams with Theriak/Domino software. American Mineralogist, 95, 1006-1016.

Diener, J.F.A., Powell, R., White, R. W. & Holland, T.J.B., 2007, A new thermodynamic model for clino- and orthoamphiboles in the system Na2O-CaO-FeO-MgO-Al2O3-SiO2-H2O-O. Journal of metamorphic Geology, 25, 631-656.

Diwu, C.R., Sun, Y., Liu, L., Zhang, C.L. & Wang, H.L., 2010. The disintegration of Kuanping Group in North Qinling orogenic belts and Neo-Proterozoic N-MORB. Acta Petrologica Sinica, 26, 2025-2038 (in Chinese with English abstract).

Dong, Y., Zhou, D. & Liu, L., 1997a. Sm-Nd isotopic ages of the Songshugou ophiolite from the east Qinling and its geological significance. Regional Geology of China, 16, 217-221.

Dong, Y., Zhou, D. & Zhang, G., 1997b. Geochemistry and formation setting of Fushui complex, eastern Qin Ling. Geochimica, 26, 79-88 (in Chinese with English abstract).

Dong, Y., Zhou, M., Zhang, G., Zhou, D., Liu, L. & Zhang, Q., 2008. The Grenvillian Songshugou ophiolite in the Qinling Mountains, Central China: Implications for the tectonic evolution of the Qinling orogenic belt. Journal of Asian Earth Sciences, 32, 325-335.

Dong, Y., Genser, J., Neubauer, F., Zhang, G., Liu, X., Yang, Z. & Heberer, B., 2011a. U-Pb and 40Ar/39Ar geochronological constraints on the exhumation history of the North Qinling terrane, China. Gondwana Research, in press

Dong, Y., Zhang, G., Hauzenberger, C., Neubauer, F., Yang, Z. & Liu, X., 2011b. Palaeozoic tectonics and evolutionary history of the Qinling orogen: Evidence from geochemistry and geochronology of ophiolite and related volcanic rocks. Lithos, 122, 39-56.

Dong, Y., Zhang, G., Neubauer, F., Liu, X., Genser, J. & Hauzenberger, C., 2011c. Tectonic evolution of the Qinling orogen, China: Review and synthesis. Journal of Asian Earth Sciences, 41, 213-237.

Droop, G.T.B. (1987): A general equation for estimating Fe3+ concentrations in ferromagnesian silicates and oxides from microprobe analyses, using stoichiometric criteria. Mineralogical Magazine, 51, 431-435.

Druschke, P., Hanson, A.D., Yan, Q., Wang, Z. & Wang, T., 2006. Stratigraphic and U-Pb SHRIMP Detrital Zircon Evidence for a Neoproterozoic Continental Arc, Central China: Rodinia Implications. Journal of Geology, 114, 627-636.

Eide, E.A: & Liou, J.G., 2000. High-pressure blueschists and eclogites in Hong'an: a framework for addressing the evolution of high- and ultrahigh-pressure rocks in central China. Lithos, 52, 1-22.

Evans, T.P., 2004. A method for calculating effective bulk composition modification due to crystal fractionation in garnet-bearing schist: implications for isopleth thermobarometry. Journal of metamorphic Geology, 22, 547-557.

Faure, M., Lin, W. & Le Breton, N., 2001. Where is the North China–South China block boundary in eastern China? Geology, 29, 119-122.

Faure, M., Lin, W., Monié, P. & Meffre, S., 2008. Palaeozoic collision between the North and South China blocks, Triassic intracontinental tectonics, and the problem of the ultrahigh-pressure metamorphism. C. R. Geoscience, 340, 139-150.

Gaidies, F., Abart, R., de Capitani, C., Schuster, R., Connolly, J.A.D. & Reusser, E., 2006. Characterization of polymetamorphism in the Austroalpine basement east of the Tauern Window using garnet isopleth thermobarometry. Journal of metamorphic Geology24, 451-475.

Gaidies, F., de Capitani, C. & Abart, R., 2008a, THERIA_G: a software program to numerically model prograde garnet growth. Contributions to Mineralogy and Petrology, 155, 657-671.

Gaidies, F., de Capitani, C., Abart, R. & Schuster, R., 2008b, Prograde garnet growth along complex P–T–t paths: results from numerical experiments on polyphase garnet from the Wölz Complex (Austroalpine basement). Contributions to Mineralogy and Petrology, 155, 673-688.

Gao, S., Zhang, B.-R., Wang, D.-P., Ouyang, J.-P. & Xie, Q.-L., 1996. Geochemical evidence for the Proterozoic tectonic evolution of the Qinling Orogenic Belt and its adjacent margins of the North China and Yangtze cratons. Precambrian Research, 80, 23-48.

Green, E., Holland, T.J.B. & Powell, R., 2007. An order-disorder for omphacitic pyroxenes in the system jadeite-diopside-hedenbergite-acmite, with applications to eclogitic rocks. American Mineralogist, 92, 1181-1189.

Hacker, B.R., Ratschbacher, L. & Liou, J.G., 2004, Subduction, collision and exhumation in the ultrahigh-pressure Qinling-Dabie orogen. in Malpas, J., Fletcher, C.J.N., Ali, J.R., and Aitchison, J.C., eds., Aspects of the Tectonic Evolution of China: Geological Society of London Special Publication, 226, 157-175.

Hacker, B.R., Wallis, S.R., Ratschbacher, L., Grove, M. & Gehrels, G., 2006. High- temperature geochronology constraints on the tectonic history and architecture of the ultrahigh-pressure Dabie-Sulu Orogen. Tectonics, 25, TC5006.

Holland, T.J.B. & Powell, R., 1998, An internally consistent thermodynamic data set for phases of petrological interest. Journal of metamorphic Geology, 16, 309-343.

Hu, N., Yang, J., An, S., Hu J., 1993. Metamorphism and tectonic evolution of the Shangdan fault zone, Shaanxi, China. Journal of metamorphic Geology, 11, 537-548.

Hu, N., Zhao, D., Xu, B. & Wang, T., 1995. Petrography and metamorphism study on high-ultrahigh pressure eclogite from Guanpo area, northern Qinling mountain. J. Mineral. Petrol. 15, 1–9 (in Chinese with English abstract).

Huang, K., Opdyke, N.D. & Zhu, R., 2000. Further paleomagnetic results from the Silurian of the Yangtze Block and their implications. Earth and Planetary Science Letters, 175, 191-202.

Kohn, M.J. & Spear, F.S., 2000. Retrograde Net Transfer Reaction (ReNTR) Insurance for P-T Estimates. Geology, 28, 1127-1130.

Kretz, R., 1983, Symbols for rock-forming minerals. American Mineralogist, 68, 277-279.

Krogh Ravna, E., 2000. The garnet–clinopyroxene Fe2+-Mg geothermometer: an updated calibration. Journal of metamorphic Geology, 18, 211-219.

Krogh Ravna, E. & Terry, M.P., 2004. Geothermobarometry of UHP and HP eclogites and schists – an evaluation of equilibria among garnet-clinopyroxene- kyanite-phengite-coesite/quartz . Journal of metamorphic Geology, 22, 579-592.

Kröner, A., Compston, W., Zhang, G.W., Guo, A.L. & Todt, W., 1988. Age and tectonic setting of late Archean greenstone gneiss terrane in Henan province, China, as revealed by single-grain zircon dating. Geology, 16, 211 –215.

Leake, B. E., Woolley, A. R., Arps, C. E. S., Birch, W. D., Gilbert, M. C., Grice, J. D., Hawthorne, F. C., Kato, A., Kisch, H. J., Krivovichev, V. G., Linthout, K., Laird, J., Mandarino, J. A., Maresch, W. V., Nickel, E. H., Rock, N. M. S., Schumacher, J. C., Smith, D. C., Stephenson, N. C. N., Ungaretti, L., Whittaker, E. J. W. & Youzhi, G., 1997, Nomenclature of amphiboles: Report of the subcommittee on amphiboles of the International Mineralogical Association, commission on new minerals and mineral names. Canadian Mineralogist, 35, 219-246.

Lerch, M.F., Xue, F., Kröner, A., Zhang, G.W. & Todt, W., 1995. A Middle Silurian – Early Devonian magmatic arc in the Qinling Mountains of central China. Journal of Geology, 103, 437–449.

Li, Z.X., Li, X.H., Kinny, P.D., Wang, J., Zhang, S., Zhou, H., 2003. Geochronology of Neoproterozoic syn-rift magmatism in the Yangtze Craton, South China and correlations with other continents: evidence for a mantle superplume that broke up Rodinia. Precambrian Research, 122, 85-109.

Ling, W., Gao, S., Ouyang, J., Zhang, B. & Li, H., 2002. Time and tectonic setting of the Xixiang Group: Constraints from zircon U-Pb geochronology and geochemistry. Science China (Series D), 45, 818-831.

Liu, J. & Sun, Y., 2005. New Data on the "Hot" Emplacement Age of Ultramafic Rocks from the Songshugou Area in the Eastern Qinling. Geolog-

ical Review, 51, 198-192 (in Chinese with English abstract).

Liu, J., Sun, Y., Lai, T. & Sun, W., 2009. Emplacement age of the Songshugou ultramafic massif in the Qinling orogenic belt, and geologic implications. International Geology Review, 51, 58-76.

Liu, L., & Zhou, D., 1995. Discovery and study of high-pressure basic granulites in Songshugou area of Shangnan, East Qinling. Chinese Science Bulletin, 40, 400-404.

Liu, X., Jahn, B.-M., Dong, S., Lou, Y. & Cui, J., 2008. High-pressure metamorphic rocks from Tongbaishan, central China: U-Pb and 40Ar/39Ar age constraints on the provenance of protoliths and timing of metamorphism. Lithos, 105, 301-318.

Liu, X., Jahn, B.-M., Hua, J., Li, S., Liu, X. & Song, B., in press. Metamorphic patterns and SHRIMP zircon ages of medium- to high-grade rocks from the Tongbai orogen, central China: implications for multiple accretion/collision processes prior to terminal continental collision. Journal of metamorphic Geology.

Mattauer, M., Matte, P., Malavieille, J., Tapponnier, P., Maluski, H., Xu, Z.Q., Lu, Y.L., Tang, Y.Q., 1985. Tectonics of the Qinling belt: build-up and evolution of eastern Asia. Nature, 317, 496-500.

Mehnert, K.R., 1968. Migmatites and the origin of granitic rocks. Elsevier Publishing Company, Amsterdam – London – New York, 393 p.

Meng, Q.-R. & Zhang, G.-W., 1999. Timing of collision of the North and South China blocks: Controversy and reconciliation. Geology, 27, 123-126.

Meng, Q.-R. & Zhang, G.-W., 2000. Geologic framework and tectonic evolution of the Qinling orogen, central China. Tectonophysics, 323, 183-196.

Niu, B., Liu, Z., Ren, J., 1993. The tectonic relationship between the Qinling Mountains and Tongbai-Dabie Mountains with notes on the tectonic evolution of the Hehuai Basin. Bulletin of the Chinese Academy of Geological Sciences, 26, 1–12.

O'Neill H.S.C. & Wall V.J., 1987. The olivine-spinel oxygen geobarometer, the nickel precipitation curve, and the oxygen fugacity of the Earth's upper mantle. Journal of Petrology, 6, 1169-1191.

Pouchou, J. L. & Pichoir, F., 1985. 'PAP' φ(ρZ) procedure for improved quantitative microanalysis. In: Armstrong, J. T., Microbeam Analysis 1985, San Francisco Press, San Francisco, California, 104-106.

Qin, J., Lai, S. & Li, Y., 2008. Slab Breakoff Model for the Triassic Post-Collisional Adakitic Granitoids in the Qinling Orogen, Central China: Zircon U-Pb Ages, Geochemistry, and Sr-Nd-Pb Isotopic Constraints. International Geology Review 50, 1080-1104.

Ratschbacher, L., Hacker, B.R., Webb, L.E., McWilliams, M., Ireland, T., Dong, S., Calvert, A., Chateigner, D. & Wenk, H.-R., 2000. Exhumation of the ultrahigh-pressure continental crust in east-central China: Cretaceous and Cenozoic unroofing and the Tan-Lu fault. Journal of Geophysical Research, 105, 13303-13338.

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Ratschbacher, L., Franz, L., Enkelmann, E., Jonckheere, R., & Axel Pörschke, Hacker B. R., Dong, S., & Zhang, Y., 2006, The Sino-Korean–Yangtze suture, the Huwan detachment, and the Paleozoic–Tertiary exhumation of (ultra)high-pressure rocks along the Tongbai–Xinxian–Dabie Mountains. In: Hacker, B. R., McClelland, W. C. & Liu, J. G., eds., Ultrahigh pressure metamorphism: Deep continental subduction. Geological Society of America Special Paper, 403, 44-75.

Schliestedt, M., 1980. Phasengleichgewichte in Hochdruckgesteinen von Sifnos, Griechenland. Ph.D. thesis, TU Braunschweig.

Schumacher, J. C., 1997. The estimation of the proportion of ferric iron in the electron-microprobe analysis of amphiboles. Canadian Mineralogist, 35, 238-246.

Seydoux-Guillaume, A.-M., Paquette, J.-L., Wiedenbeck, M., Montel, J.-M. & Heinrich, W., 2002. Experimental resetting of the U–Th–Pb systems in monazite. Chemical Geology, 191, 165-181.

Shi, Y., Liu, D., Zhang, Z., Miao, L., Zhang, F., Xue, H., 2007. SHRIMP Zircon U-Pb Dating of Gabbro and Granite from the Huashan Ophiolite, Qinling Orogenic Belt, China: Neoproterozoic Suture on the Northern Margin of the Yangtze Craton. Acta Geol. Sin. 81, 239-243.

Spear, F.S., 1993. Metamorphic phase equilibria and pressure temperature time paths. Mineralogical Society of America Monographs, 799 pp.

Su, L., Song, S., Song, B., Zhou, D. & Hao, J., 2004. SHRIMP zircon U-Pb ages of garnet pyroxenite and Fushui gabbroic complex in Songshugou region and constraints on tectonic evolution of Qinling Orogenic Belt. Chinese Science Bulletin, 49, 1307-1310.

Sun, W.D., Li, S.G., Sun, Y., Zhang, G.W. & Li, Q., 2002b. Mid-Paleozoic collision in the north Qinling: Sm-Nd, Rb-Sr and 40Ar/39Ar ages and their tectonic implications. Journal of Asian Earth Sciences, 21, 69-76.

Sun, W., Williams, I.S. & Li, S., 2002c. Carboniferous and Triassic eclogites in the western Dabie Mountains, east-central China: evidence for protracted convergence of the North and South China Blocks. J. metamorphic Geol., 20, 873-886.

Teufel, S. & Heinrich, W., 1997. Partial resetting of the U-Pb isotope system in monazite through hydrothermal experiments: An SEM and U-Pb isotope study. Chemical Geology, 137, 273-281.

Tinkham, D.K. & Ghent, E.D., 2005. Estimating P-T conditions of garnet growth with isochemical phase-diagram sections and the problem of effective bulk composition. The Canadian Mineralogist, 43, 35-50.

Wang, N., 1989. Micropaleontological study of lower Paleozoic siliceous sequences of the Yangtze platform and eastern Qinling Range. J. Southeast Asian Earth Sci. 3, 141–161.

Wang, T., Wang, X. & Li, W., 2000. Evaluation of multiple emplacement mechanisms: the Huichizi granite pluton, Qinling orogenic belt, central China. Journal of Structural Geology, 22, 505-518.

Wang, T., Wang, X., Zhang, G., Pei, X. & Zhang, C., 2003. Remnants of a Neoproterozoic Collisional Orogenic Belt in the Core of the Phanerozoic Qmling Orogenic Belt (China). Gondwana Research, 4, 699-710

Wang, T., Zhang, Z., Wang, X., Wang, Y. & Zhang, C., 2005a. Neoproterozoic Collisional Deformation in the Core of the Qinling Orogen and its Age: Constrained by Zircon SHRIMP Dating of Strongly Deformed Syn-collisional Granites and Weakly Deformed Granitic Veins. Acta Geologica Sinica, 79, 220-232 (in Chinese with English abstract).

Wang, T., Pei, X.-Z., Wang, X.-X., Hu, N.-G., Li, W.-P & Zhang, G.-W., 2005b. Orogen-Parallel Westward Oblique Uplift of the Qinling Basement Complex in the Core of the Qinling Orogen (China): An Example of Oblique Extrusion of Deep-Seated Metamorphic Rocks in a Collisional Orogen. Journal of Geology 113, 181-200.

Wang, T., Wang, X.X., Tian, W., Zhang, C.L., Li, W.P. & Li, S., 2009a. North Qinling Paleozoic granite associations and their variation in space and time: Implications for orogenic processes in the orogens of central China. Science in China (Series D – Earth Sciences), 52, 1359-1384.

Wang, X.-C., Li, X.-H., Li, W.-X. Li, Z.-X., Liu, Y., Yang, Y.-H., Liang, X.-R. & Tu, X.-L., 2008. The Bikou basalts in the northwestern Yangtze block, South China: Remnants of 820-810 Ma continental flood basalts? Geological Society of America Bulletin, 120, 1478-1492.

Waters, D. & Martin, H., 1993. Geobarometry of phengite-bearing eclogites (updated calibration of 1996). Terra Abstracts 5, 410-411.

Wei, C., Yang, C., Zhang, S. & Li, R., 1998. Discovery of granulite from the Fuping area in southern Qinling Mountains and its geological significance. Chinese Science Bulletin, 43, 1358-1362.

Wei, C., Yang, C. & Zhang, S., 1999. Metamorphism of the East Sector of the Southern Qinling Orogenic Belt and Its Geological Significance. Acta Geologica Sinica, 73, 65-77.

White, R.W., Powell, R. & Clarke, G.L., 2002. The interpretation of reaction textures in Fe-rich metapelitic granulites of the Musgrave Block, central Australia: Constraints from mineral equilibria calculations in the system K2O-FeO-MgO-Al2O3-SiO2-H2O-TiO2-Fe2O3. Journal of Metamorphic Geology, 20, 41-55.

White, R. W., Powell, R. & Holland, T. J. B., 2007. Progress relating to calculation of partial melting equilibria for metapelites. Journal of Metamorphic Geology, 25, 511-527

Xue, F., Kröner, A., Reischmann, T. & Lerch, F., 1996a. Palaeozoic pre- and post-collision calc-alkaline magmatism in the Qinling orogenic belt, central China, as documented by zircon ages on granitoid rocks. Journal of the Geological Society (London) 153, 409-417.

Xue, F., Lerch, F., Kröner, A. & Reischmann, T., 1996b. Tectonic evolution of the East Qinling Mountains, China, in the Paleozoic: a review and a new tectonic model. Tectonophysics, 253, 271-284.

Yan, Q., Hanson, A.D., Wang, Z., Druschke, P.A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou,

H., & Jiang, C., 2003. SHRIMP Age and Geochemistry of the Bikou Volcanic Terrane: Implications for Neoproterozoic Tectonics on the Northern Margin of the Yangtze Craton. Acta Geologica Sinica, 77, 479-490.

Yan, Q., Hanson, A.D., Wang, Z.; Druschke, P.A., Yan, Z., Wang, T. & Liu, D., 2004. Neoproterozoic Subduction and Rifting on the Northern Margin of the Yangtze Plate, China: Implications for Rodinia Reconstruction. International Geology Review, 46, 817-832.

Yan, Q., Wang, Z., Chen, J., Yan, Z., Wang, T., Li, Q., Jiang, C. & Zhang, Z., 2007a. Tectonic Setting and SHRIMP Age of Volcanic Rocks in the Xieyuguan and Caotangou Groups: Implications for the North Qinling Orogenic Belt. Acta Geologica Sinica 81, 488-502.

Yan, Q., Wang, Z., Yan, Z., Xiang, Z., Chen, J. & Wang, T., 2007b. SHRIMP Analyses for Ophiolitic – Mafic Blocks in the Kangxian - Mianxian Section of the Mianxian - Lueyang Melange: Their Geological Implications. Geology review, 53, 755-764 (in Chinese with English abstract)

Yan, QR., Chen, JL., Wang, ZQ, Yan, Z., Wang, T., Li, QG., Zhang, ZQ. & Jiang, CF, 2008. Zircon U-Pb and geochemical analyses for leucocratic intrusive rocks in pillow lavas in the Danfeng Group, north Qinling Mountains, China. Science in China Series D, 51, 249-262

Yan, Z., Wang, Z., Wang, T., Yan, Q., Xiao, W. & Li, J., 2006. Provenance and tectonic setting of clastic deposits in the Devonian Xicheng basin, Qinling orogen, central China. Journal of Sedimentary Research, 76, 557-574

Yang, J., Xu, Z., Dobrzhinetskaya, L. F., Green II, H. W., Pei, X., Shi, R., Wu, C., Wooden, J. L., Zhang, J., Wan, Y., Li, H., 2003: Discovery of metamorphic diamonds in central China: an indication of a > 4000-km-long zone of deep subduction resulting from multiple continental collisions. Terra Nova, 15, 370-379.

Yang, L., Chen, F.K., Yang, Y.Z., Li, S.Q. & Zhu, X.Y., 2010. Zircon U-Pb ages of the Qinling Group in Danfeng area: Recording Mesoproterozoic and Neoproterozoic magmatism and Early Paleozoic metamorphism in the North Qinling terrain. Acta Petrologica Sinica, 26, 1589-1603 (in Chinese with English abstract).

You, Z., Han, Y., Suo, S., Chen, N. & Zhong, Z., 1993. Metamorphic history and tectonic evolution of the Qinling Complex, eastern Qinling Mountains, China. Journal of Metamorphic Geology, 11, 549-560.

Zhang, C., Li, M., Wang, T., Yuan, H., Yan, Y., Liu, X., Wang, J. & Liu, Y., 2004, U-Pb Zircon Geochronology and Geochemistry of Granitoids in the Douling Group in the Eastern Qinling. Acta Geologica Sinica, 78, 84-96.

Zhang, S., Wei, C., Zhao, Z. & Shen, J. 1996. Formation and metamorphic evolution of the Douling Complex from the East Qinling Mountains. Science in China (Series D), 39, supplement, 80-86.

Zhang, Z.J., 1999. Metamorphic evolution of garnet-clinopyroxene-amphibole rocks from the Proterozoic Songshugou mafic-ultramafic complex, Qinling Mountains, central China. Island Arc, 8, 259-280.

Zhang, Z., Zhang, G., Tang, S., Xu, J., Yang, Y. & Wang, J., 2002. Age of Anzishan granulites in the Mianxian-Lueyang suture zone of Qingling orogen: With a discussion of the timing of final assembly of Yangtze and North China craton blocks. Chinese Science Bulletin, 47, 1925-1930.

Zhao, X., Coe, R., Wu, H. & Zhao, Z., 1993. Silurian and Devonian paleomagnetic poles from North China and implications for Gondwana. Earth and Planetary Science Letters, 117, 497-506

Zheng, Y.-F., Zhou, J.-B., Wu, Y.-B. & Xie, Z., 2005. Low-Grade Metamorphic Rocks in the Dabie-Sulu Orogenic Belt: A Passive-Margin Accretionary Wedge Deformed during Continent Subduction. International Geology Review, 47, 851–871.

Zhou, M.-F., Kennedy, A.K., Sun, M., Malpas, J. & Lesher, C.M., 2002a. Neoproterozoic Arc-Related Mafic Intrusions along the Northern Margin of South China: Implications for the Accretion of Rodinia. Journal Geology, 110, 611-618.

Zhou, M.-F., Yan, D.-P., Kennedy, A.K., Li, Y. & Ding, J., 2002b. SHRIMP U-Pb zircon geochronological and geochemical evidence for Neoproterozoic arc-magmatism along the western margin of the Yangtze block, South China. Earth and Planetary Science Letters, 196, 51-67.

Zhou, M.-F., Ma, Y., Yan, D.-P., Xia, X., Zhao, J.-H. & Sun, M., 2006. The Yanbian Terrane (Southern Sichuan Province, SW China): A Neoproterozoic arc assemblage in the western margin of the Yangtze Block. Precambrian Research, 144, 19-38.

3 The heart of China revisited, part I: Carboniferous-Triassic subduction along the Qinling orogen

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Abstract

In the central and southern part of the Qinling orogen (central China) the Liuling, the Douling and the Wudang are tectono-metamorphic units with a complex metamorphic evolutions. The Liuling Complex consist of amphibolite facies metamorphics, which indicate an at least a two-stage burial-exhumation history during Late Carboniferous-Permian. Thermodynamic modelling of zoned garnet reveals a first clockwise Barrovian metamorphism, which took place under medium pressure amphibolite facies conditions (560-590 °C at 0.4-0.6≈GPa) and was followed by a second stage of high pressure amphibolite facies metamorphism (590 °C at 0.9 GPa). Lithology and geochronology classify the Liuling Complex as a Devonian to Early Carboniferous forearc basin, which received its metamorphic overprint at 250-320 Ma. The Neoproterozoic Douling Complex forms a basement wedge intercalated between the Liuling and the Wudang. Medium to high-grade metamorphic conditions (560-710 °C at 0.8-1.2 GPa) likely reflect a Neoproterozoic event. A thorough LT/HP metamorphic overprint (280-340 °C at 0.5-0.9 GPa) of probable Triassic age affected the Douling Complex as well as its cover units. Similar HP/LT metamorphic conditions (~300 °C at 0.4-0.9 GPa) are recorded in blueschists of the neighbouring northern Wudang Complex. In the centre of the Wudang Complex, HP/MT metamorphic conditions (500-550 °C at 1.0-1.2 GPa) recorded by garnet gneisses and amphibolites are followed by a HP/LT overprint of 300 °C and 0.6-0.7 GPa. Thermobarometry and geochronology indicate that the metamorphism in the Wudang Complex occurred due to subduction of the Yangtze craton underneath the amalgamated Qinling-Erlangping-Sino-Korean continent in the Triassic, which is also true for the Douling complex and its cover. Crustal N-S extension finally brought the Wudang and the Douling complex to the surface

3.1 Introduction

Stretching for > 2000 km between the Sino-Korean craton in the north and the Yangtze craton in the South (Fig. 17), the Qinling-Tongbai-Hong'an-Xinxian-Dabie-Sulu-Imjingang orogen is the centrepiece of Chinese geology. Revealing its complex multistage history provides a major contribution to the understanding of the geological evolution of east-central Asia and furthermore extends the knowledge about formation and exhumation of high pressure (HP) and ultra-high pressure (UHP) metamorphic rocks.

The Late Palaeozoic-Triassic evolution of the orogen is characterized by northward Palaeo-Tethys subduction and collision of the Yangtze craton with the amalgamated Sino-Korean craton – Erlangping – Qinling continent (north China block, NCB). Corner stones are ~310 Ma old quartz-eclogites (Ratschbacher et al., 2006; Sun et al., 2002c) of the Huwan mélange as well as formation of the world's largest ultra-high pressure metamorphic terrane together with the final amalgamation of the Sino-Korean and the NCB in Triassic-Early Jurassic times (e.g., Hacker et al. 2004; 2006). Late Carboniferous to Early Jurassic Ar/Ar and Rb/Sr mineral ages obtained from the Nanwan-Foziling fore-arc basin as well as the Erlangping and Qinling units of the Tongbai area and the ~255–240 Ma old Guishan complex blueschists indicate continuous Late Palaeozoic subduction (Ratschbacher et al., 2006). This is, however, contradicted by palaeomagnetic data (Zhao and Coe 1987; Enkin et al. 1992) suggesting that the Yangtze craton and the NCB moved farther apart in Middle Permian to Middle Triassic times.

In the central Qinling area, Late Carboniferous-Triassic Ar/Ar ages from the Liuling unit, i.e., the counterpart of the Nanwan-Foziling fore-arc basin (Ratschbacher et al., 2003 and therein) together with an 216 ± 7 Ma Ar/Ar age obtained from riebeckite of a blueschist from the Wudang complex testify to a similar evolution that has, however, not yet been thoroughly investigated.

This study extends the detailed picture from the eastern part of the orogen into the Qinling area particular focussing on the pressure-temperature-time (PTt) parameters of the central Liuling unit, the Douling complex, and the Wudang complex. This is addressed by combining detailed petrological studies including equilibrium assemblage analysis with tectonic investigations and geochronology and interpreting these findings in context with data from the literature.

3.2 Regional geological overview

From north to south, the Qinling Belt comprises the following tectono-metamorphic units (Fig. 18):

3.2.1 Sino-Korean craton, its cover and the Kuanping unit

The basement of the Sino-Korean craton consists of the 2.0-2.6 Ga old Taihua gneiss (Kröner et al., 1988) and the Xiong'er Group (Ratschbacher et al., 2006). Low- to medium-grade greenschists, micaschists, amphibolites and marbles form its southern margin, the Kuanping unit. Detrital zircons from several clastic metasediments bear youngest grains at ~600 Ma (Diwu et al., 2010). The lack of ~0.7-0.8 Ga grains indicates Sino-Korean provenance. Based on a meta-basalt with N-MORB signature yielding a concordant U/Pb zircon age of 943 ± 6 Ma (Diwu et al., 2010), Dong et al. (2011c) regarded the Kuanping unit as Neoproterozoic back-arc basin. This contradicts other studies interpreting the Kuanping unit as passive continental margin or accretionary wedge (e.g., Ratschbacher et al., 2003).

3.2.2 Erlangping unit

The ophiolitic Erlangping unit comprises greenschist to amphibolite facies metamorphic gabbros, pillow lavas, sheeted dikes, andesites, rhyolites, ultramafics, cherts, turbidites and marbles (Meng and Zhang, 2000; Dong et al., 2011c; Xue et al., 1996b). Radiolaria suggest a Cambrian-Silurian age of the cherts (Niu et al., 1993; Wang N., 1989). The Erlangping unit has been regarded as an Early Ordovician intra-oceanic arc (Xue et al., 1996a) reflected by U/Pb zircon ages of a basalt (472 ± 11 Ma; Yan Q et al., 2007a) and a trondhjemite intruding pillow lavas (480 ± 1 Ma; Xue et al., 1996a). It has also been interpreted as remnant of a back-arc basin by Dong et al. (2011c). U/Pb ages of 443-467 Ma obtained from pillow-lavas (compiled by Dong et al., 2011c) may date the back-arc rifting. An imprecise Rb/Sr age of 406 ± 22 Ma obtained from a pillow-lava (Sun et al, 2002b) likely dates metamorphism caused by the magmatic Qinling arc (see below).

3.2.3 Qinling unit and Early Palaeozoic continental Qinling arc

The basement of the Qinling unit is built up by a Proterozoic volcano-sedimentary sequence of siliciclastics, marbles and mafic rocks that has been intruded by a suite of Late Proterozoic (~890-960 Ma) syn-collisional, peraluminous S-type granitoids (Chen D et al., 2004; Chen Z et al., 2006; Wang T et al., 2005a). Beside these Jinningian plutons, published U/Pb zircon ages from mafic and felsic intrusives also reflect a ~0.7-0.8 Ga event, i.e. continental arc magmatism and rifting processes affecting the Yangtze craton. Their absence in the Sino-Korean craton ties the basement of the Qinling unit to the Yangtze craton. Subsequently, the Qinling unit rifted away from the Yangtze craton forming a narrow east-west stretching microcontinent (Ratschbacher et al., 2006).

At the northern margin of the Qinling unit a Cambrian ultra-high pressure metamorphism affected felsic gneisses and intercalated metabasites as proven by the presence of micro-diamond inclusions in zircon. A weighted mean U/Pb-age of 507 ± 37 Ma based on SHRIMP analyses of four zircon rims likely dates the pressure peak (Yang et al., 2003).

During the Early Palaeozoic, the southern margin of the Qinling microcontinent faced a northward trending subduction zone and a magmatic arc set up. Subsequently, numerous often multi-stage granitoid plutons (e.g., Wang T et al., 2000) intruded the Qinling, Erlangping and Kuanping units (e.g., Ratschbacher et al., 2003 and therein). Published Cambrian U/Pb zircon ages obtained from a migmatic gneiss (~517 Ma; Dong et al., 2011a), two granodi-

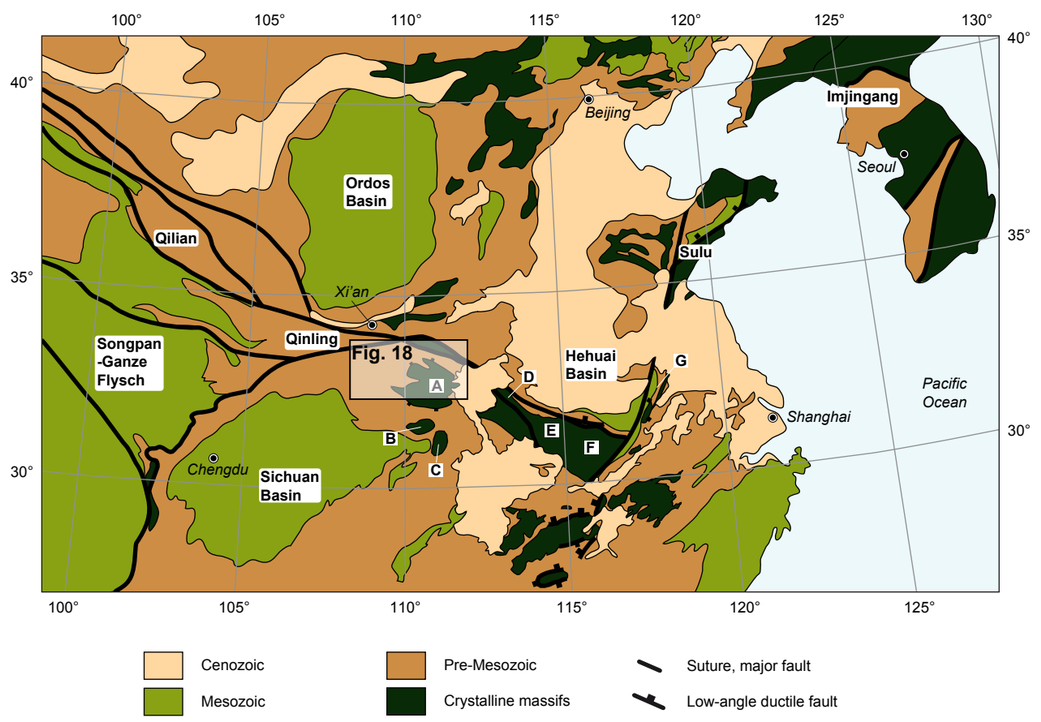
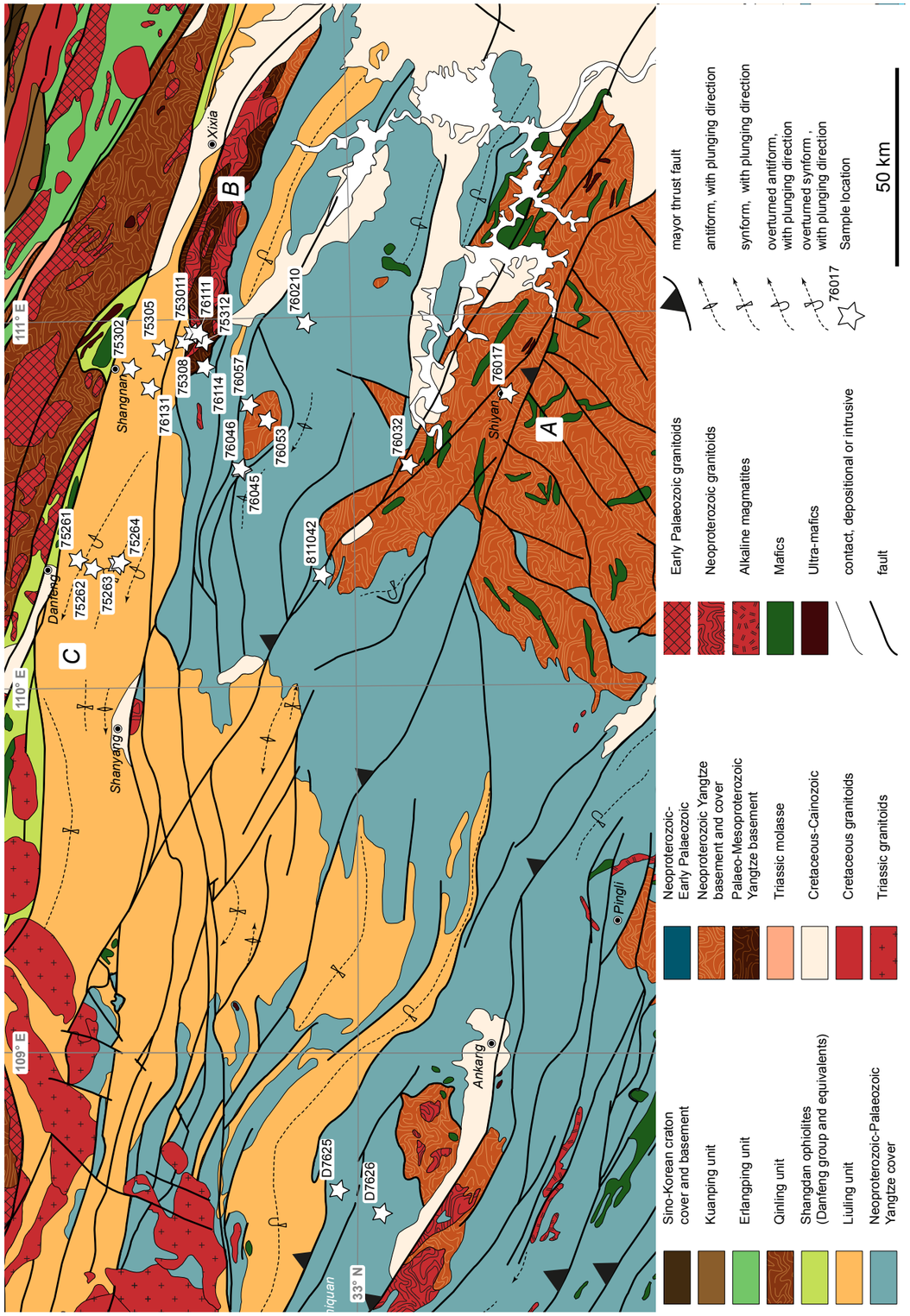


Figure 17. The Qilian– Qinling–Tongbai– Hong'an–Dabie –Sulu– Imjingang orogenic belt of eastern Asia (Ratschbacher et al. 2003 and references therein)
A: Wudang complex; B: Shennong; C: Kongling; D: Tongbai; E: Hong'an; F: Dabie Shan; G: Zangbaling.



orites (507 ± 3 Ma, 503 ± 11 Ma; Wang T et al., 2009 and therein) and the mafic-intermediate Fushui intrusion (514.3 ± 1.3 Ma; Chen Z et al., 2004) as well as a chemical Pb/Th monazite age of 520 ± 23 Ma (Chen Q et al., 2006) from a garnet-staurolite schist point to onset of magmatic activity and a related metamorphic overprint at mid Cambrian times. The youngest arc-related intrusions yield ~402 ± 1 Ma (Xue et al., 1996a), 401 ± 14 and 395 ± 6 Ma (Lerch et al., 1995) thus implying ~110 Ma of magmatic activity.

Rocks of the central and southern Qinling unit experienced an upper amphibolite facies metamorphic overprint at mid-crustal levels that came along with migmatization of felsic gneisses. Published PT estimates point to ~700 °C at 0.5-0.7 GPa (You et al., 1993).

The southern boundary of the magmatic arc is the Shangdan fault zone, which can be traced from the Nanyang basin in the east to the Guanzizhen County in the west, where it vanishes below Cretaceous-Cainozoic sediments.

3.2.4 Shangdan ophiolites (Danfeng Group and equivalents)

Along the Shangdan fault zone, numerous greenschist-facies ophiolite bodies in the Danfeng, Heihe, Xieyuguan, Caotangou, and Guanzizhen areas comprise Cambrian-Silurian cherts, ultramafic and mafic rocks, pillow lavas, radiolarian cherts, and intermediate-acidic intrusions. Mafic rocks have N-MORB, E-MORB and island-arc/continental arc signatures (Yan Q et al., 2008; Dong et al., 2011b). U/Pb zircon ages of 534-471 Ma (Dong et al., 2011b and therein; Xue et al., 1996a) point to Cambrian-Ordovician magmatism. An U/Pb zircon age of 442 ± 7 Ma obtained from a subduction-related diorite intruding pillow lavas (Yan Q et al., 2008) may give a minimum age of accretion to the Qinling microcontinent. Published Ar/Ar ages of 426-395 Ma (Sun et al., 2002b; Dong et al., 2011b and therein) highlight a Devonian metamorphic overprint.

Published emplacement models either suggest that the Shangdan ophiolites were part of a large nappe with Erlangping Group origin thrust over the entire Qinling unit (Faure et al., 2001; 2008; Ratschbacher at al., 2003) or were emplaced during the closure of the Shangdan ocean (e.g., Dong et al., 2011b). The former is supported by the similar ages and geochemical signatures. The second model is unlikely as it implies Devonian collision of the Yangtze craton with the NCB subsequently followed by rifting and break-up of the Yangtze craton to create the "Mianlüe ocean" (e.g., Meng & Zhang 1999, 2000). But there are neither indications for a Devonian rifting affecting the Yangtze craton nor for the existence of a "Mianlüe ocean".

3.2.5 Liuling unit

Southerly abutting sedimentary basins are put together as Liuling unit. Toward the east, the Liuling unit can be correlated with the Nanwan unit of Xinxian, and the Foziling unit of the Dabie Shan. It comprises metamorphic Cambrian-Carboniferous sandstones, turbidites, conglomerates, greenschists, volcanics, cherts, recrystallized limestones and black shales (Yan Q et al., 2004; Yan Z et al. 2006a and therein), which partly have been dated by biota. The Devonian Xicheng basin represents a former fore-arc for that Qinling Group provenance has been proven (Yan Z et al., 2006a; 2006b; Chen Y et al., 2008). South of it, Lower-Upper Triassic clastic sediments show Sino-Korean provenance (Chen Y et al., 2008) and neither indication of input from the Devonian Qinling arc nor Yangtze's 0.7-0.8 Ga arc formation and rifting events. For the northern part of the central Liuling unit (Shanyang basin), Hu et al. (1993) reported an amphibolite facies overprint at 612 °C and 0.8 GPa.

3.2.6 Douling complex

The Douling complex is a part of the Yangtze craton forming a south-directed basement wedge (Faure

Figure 18 (page 52).: Geological overview of the working area with sample locations (Tab. 10; redrawn from Zhang et al., 1996).
A: Wudang complex
B: Douling complex
C: Shanyang basin

et al., 2008). It is built up of a Palaeoproterozoic volcano-sedimentary sequence of gneisses and schists with subordinate quartz keratophyres, pyroclastics, and basalts that was intruded by continental arc-related Neoproterozoic quartz diorites, granodiorites, and gabbros at 760-685 Ma (Zhang C et al., 2004). The basement rocks underwent an upper amphibolite facies overprint at 650-700 °C and 0.7-0.8 GPa (Zhang S et al., 1996). Neoproterozoic schists of the Yaolinghe Group unconformably overlie the basement. Our field observations show that the basement together with its cover was intensively folded and affected by high-pressure/low- temperature metamorphism.

The basement lithology resembles the one of the nearby Qinling unit, but different ages obtained from Neoproterozoic intrusions, the absence of Devonian magmatites and metamorphism as well as the penetrative low-grade overprint makes the Douling complex distinct. The Neoproterozoic cover sediments (Yaolinghe Group) tie it to the Wudang complex.

3.2.7 Wudang complex

The Wudang complex is composed of Palaeoproterozoic Yangtze basement unconformably overlain by metamorphic Neoproterozoic – Early Palaeozoic sediments including quartzites, conglomerates, schists and marbles with intercalated tuffites. It was intruded by numerous mafic dykes during the Neoproterozoic reflecting the beginning of Rodinia break-up (e.g., Li Z.X. et al., 2003). Late Triassic exhumation led to its formation as a metamorphic core complex (Ratschbacher et al. 2003). The occurrence of riebeckite at its northern margin (Mattauer et al., 1985) indicates a Triassic high-pressure/low-temperature overprint tying the Wudang complex to a ~600 km long blueschist-greenschist belt along the southern margin of the Qinling-Tongbai-Dabie orogen (Eide & Liu, 2000; Zhou et al., 1993).

3.2.8 Yangtze craton and cover

In the Shennong and Kongling areas, gneissic trondhjemites of the Archean Yangtze basement have been dated at ~2.9 Ga (U/Pb zircon; Gao et al., 1996 and therein). Proterozoic Yangtze basement also crops out in the Douling, Wudang and Xixian complexes (see above) as well as in the Foping area, where two-pyroxene granulites (720-780 °C at ~0.6 GPa; Wei et al., 1998) occur. Abundant Neoproterozoic granitoid and mafic intrusions are remnants of three distinct events:

(1) Syn-collisional granites (~950-895 Ma U/Pb zircon) and the emplacement of the Huashan ophiolite (Shi et al., 2007) reflect collision of continental blocks during assemblage of the Precambrian supercontinent Rodinia, i.e. the Jinningian orogeny (e.g., Ling et al., 2002).

(2) A magmatic arc set up at the western and northwestern margin of the Yangtze craton in Xixian, Yanbian and likely the Bikou block, whose mafic rocks alternatively might be remnants of continental flood basalts (Wang XC et al., 2008). Published U/Pb zircon ages obtained from mafic intrusives range from ~846 to 776 Ma (e.g., Yan Q et al., 2003; 2004; Zhou et al., 2006). Turbidites of the Hengdan group in the north-western part of the Bikou block show magmatic arc provenance as they contain 700-850 Ma old detrital zircons (Druschke et al., 2006). The Hengdan group has thus been regarded as forearc basin although the youngest detrital grains prove sedimentation at least ~75 Ma after emplacement of the youngest known arc magmatites.

(3) The widespread intrusion of mafic dyke swarms reflects the Neoproterozoic break-up of Rodinia. Li ZX et al. (2003) discriminated two discrete periods at 830-795 Ma and 780-745 Ma on samples from the southern and western Yangtze craton.

The sedimentary cover comprises ~12 km thick Mesoproterozoic to Triassic sediments. The Meso- to Neoproterozoic volcano-sedimentary sequences of the Wudang, Bikou, and Yaolinghe Groups comprise spilite, basalt, andesite, tuffites, volcanoclastic rocks and greywacke (e.g., Gao et al, 1996; Wang XC et al., 2008), which underwent a greenschist to blueschist facies overprint. Phanerozoic sediments include siliciclastics and platform to shelf carbonates as well as Permian coals and phosphorites (see Ratschbacher et al. 2003, for review), which are mostly low-grade to unmetamorphosed. However, in the Ankang-Fuping-Liuba areas, a greenschist- to amphibolite facies overprint was reported. (Wei et al., 1999)

Subduction of the Yangtze craton and abutting oceanic crust underneath the amalgamated Sino-Korean craton – Erlangping – Qinling continent yielded creation and exhumation of Carboniferous (~310 Ma, Sun et al., 2002c) and Triassic (~220-240 Ma, e.g. Hacker et al., 2006) HP and UHP metamorphic rocks cropping out in the Dabie, Hong'an, Tongbai and Wudang areas (for review, see Hacker et al. 2004; 2006; Liu X et al., 2008; Ratschbacher et al., 2006).

Table 10. Sample locations

Sample	Rock type	Unit	Latitude (N)	Longitude (E)
75261C	Garnet-staurolite-mica schist	Liuling Unit	110°20.576'	33°38.031'
75262C	Hydrothermal vein	Liuling Unit	110°19.721'	33°35.935'
75263B	Calcite-bearing quartzite	Liuling Unit	110°20.063'	33°32.223'
75264B	Amphibole-calcite-epidote quartzite	Liuling Unit	110°20.212'	33°32.013'
75302A	Garnet gneiss	Liuling Unit	110°51.578'	33°28.970'
75305D	Calcite-bearing paragneiss	Liuling Unit	110°54.068'	33°25.606'
75308A	Meta-psammite	Liuling Unit	110°56.717'	33°22.971'
753011A	Stilpnomelane-calcite-phengite-chlorite-schist	Douling Complex	110°57.790'	33°21.284'
75312B	Stilpnomelane-calcite-phengite-chlorite-schist	Douling Complex	110°56.681'	33°19.784'
76017A	Garnet gneiss	Wudang Complex	110°47.544'	32°38.347'
76017B	Garnet-bearing amphibolite	Wudang Complex	110°47.544'	32°38.347'
76022B	Epidote-chlorite greenschist	Wudang Complex	110°55.972'	32°53.267'
760210A	Amphibole-epidote-phengite green-schist	Wudang Complex	110°59.922'	33°07.340'
76032C	Garnet gneiss	Wudang Complex	110°35.566'	32°52.431'
76032D	Garnet-bearing metapelite	Wudang Complex	110°35.566'	32°52.431'
76045G	Amphibole orthogneiss	Wudang Complex	110°34.228'	33°16.096'
76046A	Garnet amphibolite	Wudang Complex	110°34.312'	33°16.145'
76053A	Epidote-amphibole greenschist	Wudang Complex	110°43.688'	33°11.492'
76057B	Epidote-amphibole greenschist	Wudang Complex	110°46.632'	33°13.973'
76111A	Garnet-mica schist	Douling Complex	110°34.345'	33°12.436'
76114C	Garnet gneiss	Douling Complex	110°53.210'	33°18.735'
76131B	Quartz mica schist	Juliping Unit	110°48.560'	33°27.662'
811042C	Calcite-epidote-amphibole green-schist	Wudang Complex	110°18.030'	33°04.942'
D7625A	Garnet-amphibole-gneiss	Yangtze cover	108°37.331'	33°03.326'
D7626A	Garnet-bearing muscovite-paragonite-chlorite-schist	Yangtze cover	108°33.403'	32°57.837'

3.3 Methods

3.3.1 Sampling

We collected 300 samples mainly along north-south trending traverses covering the working area (Tab. 10).

3.3.2 Microprobe analysis

Nineteen samples were analysed with the electron microprobe (EMP) at GFZ Potsdam and TU Freiberg. The operation conditions were as follows: (1) Four-spectrometer CAMECA SX-100 at Potsdam: 15 kV accelerating voltage; 20 nA beam current; 1-15 μm beam diameter; 10–20 s major and 20–40 s minor elements peak-counting time. (2) Five-spectrometer JEOL JXA-8900R at Freiberg: 15 kV accelerating voltage; 20 nA beam current; Si, Al, Mg, Ca, Sr, Ba, and K 20 s and Fe, Ni, Na, Cr, Mn, Ti 30 s peak-counting time. We used natural and synthetic mineral standards of the Smithsonian Institute, MAC™, and CAMECA. Raw intensity data were corrected with the PAP program (Pouchou & Pichoir, 1985).

Table 11. Representative EMP analyses of garnet. Cations based on a 12 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

Garnet	75261C	75261C	75261C	75261C	75261C	75302A	75302A	76111A*	76111A*	76111A*	76111A**	76111A**	76114C	76114C	76114C	76017B
	F2 #1	F2 #5	F2 #11	F2 #18	F2 #29	F3 #2	F3 #21	F14 #3	F14 #13	F14 #23	F21 #3	F21 #26	F7 #4	F7 #9	F7 #27	F4 #30
	rim				core	rim	core	rim		core	core	rim	rim		core	core
wt.-%																
SiO_2	37.74	37.60	37.44	37.34	37.40	37.63	37.46	36.97	37.10	37.08	37.83	38.11	37.88	37.45	37.58	37.40
TiO_2	0.04	0.06	0.02	0.04	0.03	0.04	0.02	0.10	0.15	0.17	0.15	0.10	0.03	0.02	0.00	0.19
Al_2O_3	21.21	20.95	20.79	20.81	20.99	20.58	21.19	21.19	20.90	20.63	20.94	20.40	21.15	20.96	21.53	20.64
Cr_2O_3	0.01	0.04	0.00	0.04	0.02	0.04	0.03	0.00	0.01	0.00	0.03	0.00	0.05	0.05	0.04	0.00
Fe_2O_3	0.33	0.15	0.27	0.00	0.04	0.99	0.18	1.48	1.80	1.88	0.00	0.00	0.07	0.67	0.21	0.00
MgO	2.91	2.59	2.99	2.26	2.28	3.46	4.31	1.65	1.09	0.76	1.19	2.25	4.69	4.94	4.95	0.56
CaO	4.55	4.75	2.80	3.33	2.84	7.52	2.08	9.90	9.71	10.36	9.09	9.21	2.30	2.40	2.73	11.28
MnO	0.92	1.82	2.07	5.33	6.68	2.34	3.93	1.15	3.87	8.87	3.50	0.24	2.33	1.98	1.97	7.59
FeO	33.27	32.09	33.33	30.31	30.01	26.79	30.60	27.31	25.96	20.73	26.51	28.69	31.23	31.13	31.04	21.57
Na_2O	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.05	0.05	0.03	0.00	0.00	0.00	0.01	0.00	0.00
Total	100.98	100.05	99.70	99.47	100.29	99.41	99.80	99.79	100.63	100.52	99.24	99.01	99.74	99.60	100.05	99.22
Cations																
Si	2.994	3.011	3.014	3.020	3.008	3.000	2.992	2.955	2.959	2.964	3.035	3.052	3.012	2.987	2.978	3.013
Ti	0.002	0.004	0.001	0.002	0.002	0.003	0.001	0.006	0.009	0.010	0.009	0.006	0.002	0.001	0.000	0.011
Al	1.984	1.977	1.973	1.984	1.989	1.934	1.995	1.996	1.964	1.944	1.979	1.925	1.983	1.970	2.010	1.960
Cr	0.001	0.003	0.000	0.003	0.001	0.003	0.002	0.000	0.001	0.000	0.002	0.000	0.003	0.003	0.003	0.000
Fe3+	0.020	0.009	0.016	0.000	0.003	0.060	0.011	0.089	0.108	0.113	0.000	0.000	0.004	0.040	0.013	0.000
Mg	0.344	0.309	0.359	0.272	0.273	0.412	0.513	0.196	0.130	0.091	0.142	0.269	0.556	0.588	0.584	0.067
Ca	0.387	0.407	0.241	0.289	0.244	0.643	0.178	0.847	0.830	0.887	0.782	0.790	0.196	0.205	0.232	0.974
Mn	0.062	0.123	0.141	0.365	0.455	0.158	0.266	0.078	0.261	0.600	0.238	0.017	0.157	0.134	0.132	0.518
Fe^{2+}	2.208	2.149	2.244	2.050	2.019	1.787	2.044	1.826	1.731	1.386	1.778	1.921	2.077	2.077	2.057	1.453
Na	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.007	0.008	0.005	0.000	0.000	0.000	0.001	0.000	0.000
Total	8.001	7.991	7.990	7.984	7.994	8.000	8.003	8.000	8.000	8.000	7.965	7.980	7.991	8.006	8.009	7.996
Endmembers																
Pyrope	11.5	10.3	12.0	9.1	9.1	13.7	17.1	6.7	4.4	3.1	4.8	9.0	18.6	19.6	19.4	2.2
Almandine	73.6	71.9	75.2	68.9	67.5	59.6	68.1	61.9	58.7	46.8	60.5	64.1	69.5	69.2	68.4	48.2
Spessartine	2.1	4.1	4.7	12.3	15.2	5.3	8.9	2.6	8.8	20.2	8.1	0.6	5.3	4.4	4.4	17.2
Grossular	12.9	13.6	8.1	9.7	8.2	21.4	5.9	28.8	28.1	29.9	26.6	26.4	6.6	6.8	7.7	32.3

* pelitic layer; ** mafic layer

Table 11 (continued)

Garnet	76017B	76017B	76017A	76017A	76032C	76032C	76032D	76032D	76046A	76046A	76046A	76046A	D7626A	D7626A	D7625A	D7625A
	F4 #50	F4 #60	F2 #1	F2 #18	F3 #1	F3 #14	F1 #26	F1 #53	F3 #18	F3 #20	F3 #27	F3 #51	F2 #1	F2 #8	F6 #8	F6 #56
		rim	rim	core	rim	core	core	rim			core	rim	rim	core	rim	core
wt.-%																
SiO_2	37.76	37.58	37.34	37.21	37.66	37.60	37.66	37.66	37.73	37.37	37.27	37.88	37.27	37.28	38.02	37.78
TiO_2	0.08	0.11	0.04	0.14	0.10	0.14	0.20	0.06	0.07	0.20	0.41	0.07	0.28	0.04	0.12	0.14
Al_2O_3	20.97	21.08	20.75	20.53	20.71	20.74	20.31	20.75	20.78	20.54	20.23	20.81	20.72	20.55	20.85	20.81
Cr_2O_3	0.01	0.02	0.00	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.04
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.88	1.21	0.64	0.44	0.44	0.40	0.11	0.27	1.26	0.89	0.60	2.40	1.55	1.25	2.16	1.80
CaO	9.97	9.51	9.52	10.01	11.51	10.39	11.58	10.48	9.81	9.91	10.29	8.92	4.04	3.45	9.26	7.03
MnO	4.70	2.28	2.97	6.08	5.83	8.88	10.46	2.61	4.90	6.25	6.74	1.42	13.83	17.68	4.70	6.26
FeO	25.93	27.93	27.96	24.84	23.36	21.25	19.08	27.94	25.32	24.29	23.30	28.19	21.86	19.06	24.54	25.68
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.30	99.72	99.21	99.27	99.62	99.41	99.41	99.76	99.88	99.44	98.84	99.69	99.57	99.33	99.67	99.54
Cations																
Si	3.013	3.009	3.018	3.012	3.022	3.026	3.034	3.027	3.018	3.012	3.021	3.019	3.017	3.034	3.027	3.030
Ti	0.005	0.007	0.003	0.008	0.006	0.009	0.012	0.004	0.004	0.012	0.025	0.004	0.017	0.002	0.007	0.008
Al	1.972	1.989	1.976	1.959	1.958	1.967	1.929	1.965	1.959	1.951	1.933	1.954	1.977	1.971	1.956	1.967
Cr	0.001	0.002	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.003
Fe3+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.104	0.144	0.077	0.053	0.053	0.048	0.013	0.032	0.150	0.107	0.073	0.285	0.187	0.152	0.256	0.216
Ca	0.853	0.816	0.824	0.868	0.989	0.896	1.000	0.903	0.841	0.855	0.894	0.762	0.350	0.301	0.789	0.604
Mn	0.318	0.155	0.203	0.417	0.396	0.605	0.714	0.178	0.332	0.427	0.463	0.096	0.948	1.219	0.317	0.425
Fe^{2+}	1.730	1.870	1.890	1.681	1.568	1.430	1.286	1.878	1.694	1.637	1.579	1.879	1.480	1.297	1.634	1.722
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.996	7.990	7.991	8.000	7.993	7.982	7.989	7.987	7.998	8.001	7.988	7.999	7.977	7.977	7.988	7.976
Endmembers																
Pyrope	3.5	4.8	2.6	1.8	1.8	1.6	0.4	1.1	5.0	3.5	2.4	9.4	6.3	5.1	8.6	7.3
Almandine	57.6	62.7	63.1	55.7	52.2	48.0	42.7	62.8	56.1	54.1	52.5	62.2	49.9	43.7	54.5	58.0
Spessartine	10.6	5.2	6.8	13.8	13.2	20.3	23.7	5.9	11.0	14.1	15.4	3.2	32.0	41.0	10.6	14.3
Grossular	28.4	27.3	27.5	28.8	32.9	30.1	33.2	30.2	27.9	28.3	29.7	25.2	11.8	10.1	26.3	20.4

Table 12. Representative microprobe analyses of biotite. Cations based on a 12 oxygen basis. Water was iteratively estimated assuming F + Cl + OH = 2.

Biotite	75261C	75302A	76114C	76111A	76111A	76017B	76017B	76017A	D7625A
	F3 #4	F4 #1	F6 #1	F9 #1	F9 #3	F2 #1	F2 #2	F6 #1	F1 #3
wt.-%									
SiO_2	36.69	38.11	35.92	37.45	36.50	37.08	36.97	36.24	36.90
TiO_2	1.53	2.67	3.39	1.35	1.61	1.43	1.38	2.19	1.54
Al_2O_3	19.13	17.87	17.13	18.83	16.73	16.13	16.07	15.99	17.81
Cr_2O_3	0.00	0.07	0.00	0.04	0.01	0.00	0.00	0.00	0.00
MgO	11.50	12.36	9.75	7.61	10.08	9.12	9.05	6.23	12.19
CaO	0.02	0.00	0.06	0.26	0.31	0.03	0.03	0.11	0.01
MnO	0.01	0.04	0.17	0.27	0.32	0.14	0.19	0.17	0.10
FeO	17.69	16.90	19.54	19.45	21.27	22.36	22.68	25.95	17.16
Na_2O	0.38	0.19	0.31	0.13	0.10	0.06	0.09	0.08	0.12
K_2O	8.72	9.34	8.85	7.79	7.51	9.13	9.18	9.16	8.41
H_2O	3.98	4.05	3.93	3.80	3.77	3.90	3.90	3.77	3.85
F	0.09	0.09	0.00	0.24	0.29	0.00	0.00	0.18	0.25
Cl	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.75	101.77	99.07	97.22	98.42	99.56	99.73	100.12	98.38
Cations									
Si	2.738	2.782	2.739	2.870	2.801	2.848	2.842	2.822	2.785
Ti	0.086	0.146	0.194	0.078	0.093	0.083	0.080	0.128	0.087
Al	1.683	1.537	1.539	1.701	1.513	1.460	1.456	1.468	1.584
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.279	1.346	1.108	0.870	1.153	1.044	1.037	0.723	1.372
Ca	0.002	0.000	0.005	0.021	0.025	0.003	0.002	0.010	0.001
Mn	0.001	0.002	0.011	0.018	0.021	0.009	0.012	0.011	0.007
Fe^{2+}	1.104	1.032	1.246	1.247	1.365	1.436	1.458	1.690	1.083
Na	0.055	0.027	0.046	0.020	0.015	0.009	0.013	0.012	0.018
K	0.830	0.870	0.861	0.761	0.735	0.895	0.900	0.910	0.810
Total	7.778	7.745	7.750	7.588	7.723	7.791	7.807	7.777	7.750
Anions									
OH	1.979	1.973	1.996	1.943	1.929	2.000	2.000	1.956	1.941
F	0.021	0.021	0.000	0.057	0.071	0.000	0.000	0.044	0.059
Cl	0.000	0.005	0.003	0.001	0.000	0.000	0.000	0.000	0.000
X_{Mg}	0.537	0.566	0.471	0.411	0.458	0.421	0.416	0.300	0.559
X_{Ti}	0.030	0.051	0.069	0.028	0.031	0.029	0.028	0.045	0.030

Table 13. Representative microprobe analyses of chlorite. Cations based on a 28 oxygen basis.

Chlorite	75261C	75312B	75312B	76017B	76017B	76022B	76022B	76053A	76053A	76057B	76057B	760210A	760210A	811042C	811042C	D7626A	D7625A
	F3 #3	F2#5	F2 #21	F4 #1	F4 #2	F1 #2	F3 #1	F2 #1	F1 #4	F1 #2	F3 #1	F1#3*	F3 #3**	F2 #1	F2 #2	F5 #2	F3 #14
wt.-%																	
SiO_2	25.03	26.23	26.19	25.74	26.13	27.87	28.05	26.15	25.94	26.17	26.45	27.16	27.05	26.32	26.25	24.86	25.76
TiO_2	0.08	0.03	0.03	0.07	0.06	0.02	0.00	0.04	0.03	0.03	0.04	0.00	0.02	0.02	0.06	0.08	0.08
Al_2O_3	23.87	18.29	18.09	20.42	20.56	20.08	21.33	19.68	19.84	19.13	19.32	18.71	19.27	18.67	18.77	22.07	22.40
MgO	16.62	11.19	12.01	13.20	13.52	20.84	19.38	13.62	13.46	14.86	14.70	17.33	17.45	15.14	14.88	15.88	18.29
CaO	0.01	0.07	0.12	0.01	0.01	0.02	0.09	0.08	0.02	0.11	0.08	0.03	0.02	0.06	0.08	0.01	0.01
MnO	0.08	0.80	0.60	0.28	0.24	0.27	0.30	0.39	0.40	0.42	0.36	0.56	0.52	0.41	0.35	0.54	0.23
FeO	23.10	32.47	31.27	28.70	28.16	18.59	18.71	27.36	27.51	25.11	24.84	23.27	23.14	26.17	26.06	22.43	19.80
Na_2O	0.04	0.02	0.01	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.00	0.00
K_2O	0.00	0.05	0.03	0.00	0.01	0.00	0.03	0.02	0.00	0.02	0.05	0.00	0.02	0.01	0.02	0.01	0.01
Total	0.00	100.24	99.87	99.70	100.07	99.52	99.78	98.58	98.39	96.99	96.99	98.52	99.15	98.00	97.65	97.20	98.16
Cations																	
Si	5.130	5.686	5.661	5.476	5.517	5.649	5.662	5.599	5.568	5.644	5.688	5.710	5.648	5.645	5.648	5.282	5.333
Ti	0.013	0.005	0.006	0.010	0.010	0.004	0.000	0.006	0.005	0.006	0.006	0.000	0.003	0.003	0.009	0.013	0.012
Al	5.767	4.673	4.607	5.119	5.116	4.798	5.073	4.966	5.019	4.860	4.896	4.634	4.742	4.718	4.760	5.527	5.464
Mg	5.079	3.617	3.870	4.187	4.254	6.296	5.830	4.346	4.307	4.776	4.713	5.430	5.432	4.840	4.773	5.030	5.645
Ca	0.001	0.016	0.029	0.003	0.002	0.003	0.020	0.019	0.005	0.025	0.017	0.006	0.004	0.014	0.018	0.003	0.001
Mn	0.014	0.146	0.110	0.050	0.042	0.045	0.050	0.071	0.073	0.077	0.065	0.100	0.092	0.075	0.064	0.096	0.041
Fe^{2+}	3.959	5.886	5.654	5.107	4.971	3.151	3.158	4.899	4.939	4.528	4.467	4.091	4.040	4.693	4.690	3.986	3.428
Na	0.015	0.009	0.005	0.002	0.000	0.001	0.009	0.012	0.000	0.006	0.000	0.005	0.002	0.010	0.002	0.000	0.000
K	0.001	0.015	0.009	0.000	0.003	0.000	0.007	0.005	0.001	0.005	0.015	0.000	0.005	0.002	0.005	0.003	0.001
Total	19.982	20.052	20.012	19.954	19.917	19.949	19.810	19.921	19.918	19.927	19.867	19.978	19.983	19.999	19.970	19.943	19.925
X_{Mg}	0.562	0.381	0.406	0.451	0.461	0.666	0.649	0.470	0.466	0.513	0.513	0.570	0.574	0.508	0.504	0.558	0.622

* matrix crystal; ** crystal from extension gash

Table 14. Representative microprobe analyses of feldspar. Cations based on an 8 oxygen basis..

Feldspar	75261C F1 #2	75261C F4 #6	75302A F2 #22	75302A F2 #27	76111A * F22 #10	76111A* F24 #2	76114C F2 #1 rim	76114C F2 #6 core	76017B F3 #1 rim	76017B F3 #5 core	76017A F4 #8 core	76017A F4 #16 rim	76032C F1 #2	76032D F3 #1	76022B F4 #4	76053A F2 #3
wt.-%																
SiO_2	63.22	62.64	60.12	58.80	65.74	63.40	59.41	61.27	68.48	68.05	68.41	68.06	68.29	68.87	68.99	68.61
Al_2O_3	24.08	24.36	25.88	26.50	21.83	23.33	25.63	24.87	19.59	19.80	19.57	19.46	19.61	19.53	19.62	19.67
CaO	5.24	5.69	7.99	8.88	3.02	4.66	7.60	6.49	0.15	0.14	0.11	0.04	0.04	0.05	0.07	0.04
FeO	0.00	0.11	0.15	0.05	0.06	0.05	0.01	0.02	0.07	0.06	0.02	0.01	0.44	0.19	0.20	0.10
BaO	0.02	0.00	0.03	0.00	0.03	0.07	0.01	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Na2O	9.19	8.47	7.52	6.95	10.29	9.08	7.90	8.48	12.32	12.25	12.59	12.39	12.39	12.24	12.21	12.02
K2O	0.05	0.05	0.08	0.09	0.08	0.04	0.15	0.17	0.06	0.06	0.07	0.05	0.06	0.06	0.04	0.04
Total	101.80	101.32	101.77	101.27	101.06	100.62	100.71	101.33	100.68	100.35	100.78	100.02	100.83	100.95	101.13	100.48
Cations																
Si	2.755	2.742	2.642	2.602	2.868	2.788	2.640	2.696	2.981	2.971	2.977	2.982	2.974	2.988	2.987	2.986
Al	1.237	1.257	1.340	1.382	1.122	1.209	1.342	1.290	1.005	1.019	1.004	1.005	1.006	0.999	1.001	1.009
Ca	0.245	0.267	0.376	0.421	0.141	0.219	0.362	0.306	0.007	0.007	0.005	0.002	0.002	0.002	0.003	0.002
Fe	0.000	0.004	0.005	0.002	0.002	0.002	0.000	0.001	0.003	0.002	0.001	0.000	0.016	0.007	0.007	0.003
Ba	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.777	0.719	0.641	0.596	0.871	0.774	0.681	0.723	1.040	1.037	1.062	1.052	1.046	1.030	1.025	1.014
K	0.003	0.003	0.005	0.005	0.005	0.002	0.008	0.009	0.003	0.003	0.004	0.003	0.004	0.003	0.002	0.002
Total	5.016	4.991	5.011	5.008	5.009	4.996	5.033	5.026	5.038	5.039	5.054	5.044	5.048	5.029	5.026	5.017
Endmembers																
K-feldspar	0.3	0.3	0.5	0.5	0.5	0.2	0.8	0.9	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.2
Albite	75.8	72.7	62.7	58.3	85.6	77.6	64.8	69.6	99.0	99.1	99.1	99.5	99.5	99.5	99.5	99.6
Anorthite	23.9	27.0	36.8	41.2	13.9	22.0	34.4	29.4	0.7	0.6	0.5	0.2	0.2	0.2	0.3	0.2
Celsian	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 14. (Continued)

Feldspar	76057B F1 #2	760210A F3 #4*	760210A F4 #4**	811042C F4 #2	D7626A F2 #2	D7626A F2 #3	D7625A F5 #1 rim	D7625A F5 #5 core
wt.-%								
SiO_2	68.01	68.96	68.86	68.85	60.81	61.53	44.22	45.26
Al_2O_3	20.03	19.90	19.93	19.52	23.97	23.17	35.51	34.76
CaO	0.07	0.05	0.06	0.07	5.17	4.15	18.45	17.51
FeO	0.23	0.06	0.10	0.24	0.08	0.04	0.09	0.01
BaO	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Na2O	11.96	12.13	12.11	12.11	8.95	9.55	0.79	1.54
K2O	0.05	0.05	0.02	0.04	0.05	0.04	0.13	0.01
Total	100.38	101.14	101.08	100.83	99.03	98.48	99.19	99.12
Cations								
Si	2.968	2.982	2.980	2.99	2.728	2.769	2.058	2.102
Al	1.030	1.014	1.017	1.00	1.267	1.229	1.948	1.903
Ca	0.003	0.002	0.003	0.003	0.249	0.200	0.920	0.871
Fe	0.008	0.002	0.004	0.009	0.003	0.002	0.003	0.001
Ba	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.012	1.017	1.017	1.020	0.779	0.833	0.072	0.139
K	0.003	0.003	0.001	0.002	0.003	0.002	0.008	0.000
Total	5.024	5.021	5.020	5.022	5.029	5.035	5.008	5.016
Endmembers								
K-feldspar	0.2	0.2	0.1	0.2	0.3	0.2	0.8	0.0
Albite	99.4	99.5	99.6	99.5	75.6	80.4	7.2	13.7
Anorthite	0.3	0.2	0.3	0.3	24.2	19.3	92.1	86.2
Celsian	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

* matrix crystal; ** crystal from extension gash

Table 15. Representative microprobe analyses of staurolite (24 oxygen basis).

Staurolite	75261C F2 #5	75261C F2 #6
wt.-%		
SiO_2	27.63	27.98
TiO_2	0.71	0.70
Al_2O_3	53.56	53.69
Cr_2O_3	0.00	0.00
MgO	1.91	1.89
CaO	0.00	0.02
MnO	0.03	0.04
FeO	13.12	12.92
Na_2O	0.01	0.00
K_2O	0.01	0.00
Total	96.97	97.23
Cations		
Si	4.022	4.055
Ti	0.078	0.076
Al	9.189	9.171
Cr	0.000	0.000
Mg	0.413	0.408
Ca	0.000	0.002
Mn	0.003	0.005
Fe^{2+}	1.597	1.565
Na	0.003	0.000
K	0.002	0.000
Total	15.308	15.283
X_{Mg}	0.205	0.206

Table 16. Representative microprobe analyses of white micas. Cations based on a 12 oxygen basis. Endmembers follow Schliestedt (1980).

White mica	75261C	75261C	75302A	75302A	75312B	75312B	76111A	76111A	76017B	76017B	76017A	76017A	76032C	76032C	76032D	76032D	76022B	76053A
	F23 #1	F24 #1	F1 #1	F4 #1	F4 #5	F4 #23	F12 #8	F12 #10	F4 #5	F4 #6	F3 #1	F3 #2	F2 #1	F6 #1	F21 #1	F22 #2	F2 #1	F2#3
wt.-%																		
SiO_2	46.75	46.43	51.48	50.01	52.19	51.86	51.33	50.43	49.07	49.40	49.05	48.68	48.27	49.63	50.23	49.31	49.94	49.86
TiO_2	0.38	0.36	0.76	0.68	0.84	1.02	0.79	0.90	0.37	0.31	0.36	0.30	0.28	0.34	0.18	0.21	0.12	0.13
Al_2O_3	36.57	36.25	35.21	34.83	24.55	24.73	27.90	29.15	28.63	27.55	27.98	28.09	27.23	27.53	27.69	27.37	25.71	26.46
MgO	0.49	0.53	1.36	1.30	3.10	3.05	3.03	2.63	2.44	2.73	1.92	1.92	2.33	2.32	1.79	1.73	3.45	3.20
CaO	0.00	0.01	0.01	0.04	0.05	0.06	0.00	0.00	0.01	0.01	0.01	0.00	0.04	0.00	0.00	0.00	0.11	0.02
MnO	0.02	0.03	0.00	0.01	0.02	0.00	0.00	0.01	0.01	0.00	0.04	0.04	0.02	0.01	0.03	0.00	0.06	0.00
FeO	0.68	0.66	1.83	2.16	4.84	4.71	1.98	1.84	3.90	3.99	4.23	4.35	4.91	4.51	5.67	5.36	3.59	4.27
BaO	0.38	0.35	0.17	0.16	0.00	0.09	0.06	0.05	0.46	0.44	0.33	0.29	0.17	0.19	0.53	0.57	0.67	0.90
Na_2O	2.07	2.00	0.33	0.24	0.09	0.10	0.58	0.59	0.50	0.42	0.32	0.37	0.29	0.24	0.18	0.24	0.16	0.23
K_2O	8.37	8.46	10.16	7.48	10.41	10.31	10.23	10.42	10.08	10.26	10.62	10.50	10.28	10.54	10.16	10.50	10.48	10.20
Total	95.71	95.07	101.33	96.91	96.10	95.95	95.92	96.04	95.46	95.12	94.86	94.54	93.82	95.31	96.46	95.28	94.28	95.26
Cations																		
Si	3.070	3.071	3.203	3.208	3.489	3.473	3.392	3.332	3.305	3.344	3.336	3.322	3.326	3.355	3.369	3.358	3.413	3.383
Ti	0.019	0.018	0.035	0.033	0.042	0.052	0.039	0.045	0.019	0.016	0.019	0.016	0.015	0.017	0.009	0.011	0.006	0.007
Al	2.830	2.825	2.582	2.633	1.934	1.952	2.173	2.270	2.273	2.198	2.242	2.259	2.211	2.194	2.189	2.197	2.071	2.116
Mg	0.048	0.052	0.126	0.125	0.308	0.304	0.299	0.259	0.245	0.276	0.195	0.195	0.239	0.234	0.179	0.176	0.352	0.323
Ca	0.000	0.001	0.001	0.003	0.004	0.004	0.000	0.000	0.001	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.008	0.001
Mn	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.002	0.002	0.001	0.000	0.002	0.000	0.003	0.000
Fe^{2+}	0.037	0.037	0.095	0.116	0.270	0.264	0.109	0.102	0.220	0.226	0.241	0.248	0.283	0.255	0.318	0.305	0.205	0.242
Ba	0.010	0.009	0.004	0.004	0.000	0.002	0.002	0.001	0.012	0.012	0.009	0.008	0.005	0.005	0.014	0.015	0.018	0.024
Na	0.264	0.256	0.039	0.030	0.012	0.013	0.074	0.076	0.065	0.055	0.042	0.049	0.039	0.032	0.023	0.032	0.021	0.030
K	0.701	0.714	0.806	0.612	0.888	0.881	0.862	0.878	0.866	0.886	0.921	0.914	0.904	0.909	0.869	0.913	0.914	0.882
Total	6.979	6.984	6.893	6.763	6.950	6.946	6.950	6.964	7.005	7.013	7.007	7.014	7.025	7.001	6.973	7.005	7.012	7.009
Endmembers																		
Margarite	0.0	0.1	0.1	0.4	0.4	0.5	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.9	0.2
Paragonite	27.3	26.4	4.7	4.7	1.3	1.4	7.9	8.0	7.0	5.9	4.4	5.1	4.1	3.4	2.6	3.3	2.2	3.3
Celadonite	7.0	7.1	20.3	20.8	48.9	47.3	39.2	33.2	30.5	34.4	33.6	32.2	32.6	35.5	36.9	35.8	41.3	38.3
Muscovite	65.7	66.5	75.0	74.1	49.3	50.8	52.9	58.8	62.5	59.7	62.0	62.7	62.9	61.1	60.5	60.9	55.6	58.3
X_{Mg}	0.565	0.588	0.569	0.518	0.533	0.535	0.732	0.717	0.527	0.550	0.448	0.440	0.458	0.479	0.361	0.365	0.632	0.572

Table 16 (Continued)

White mica	76053A	76057B	76057B	760210A	760210A	811042C	D7626A	D7626A	D7626A	D7626A
	F2#4	F1 #1	F2 #7	F2 #7*	F3 #4**	F4 #1	F4 #1	F4 #9	F4 #12	F4 #28
wt.-%										
SiO_2	48.71	48.53	47.61	49.41	49.54	48.92	46.37	46.05	46.34	46.16
TiO_2	0.20	0.31	0.08	0.23	0.16	0.16	0.04	0.06	0.32	0.16
Al_2O_3	27.13	24.55	27.57	24.16	23.57	23.91	39.67	39.76	36.82	36.58
MgO	2.86	3.09	2.35	3.25	3.46	3.70	0.06	0.12	0.52	0.51
CaO	0.03	0.04	0.03	0.03	0.00	0.37	0.34	0.28	0.01	0.00
MnO	0.03	0.04	0.03	0.06	0.04	0.04	0.01	0.00	0.03	0.00
FeO	4.17	6.30	5.73	6.31	6.47	6.86	0.21	0.35	0.74	0.72
BaO	0.80	0.50	0.46	0.30	0.26	0.46	0.00	0.00	0.07	0.19
Na_2O	0.25	0.22	0.18	0.20	0.10	0.14	6.95	6.47	1.77	1.75
K_2O	10.22	10.31	10.45	10.60	10.42	10.08	1.05	1.68	8.56	8.54
Total	94.41	93.89	94.50	94.56	94.03	94.63	94.70	94.76	95.18	94.60
Cations										
Si	3.337	3.382	3.284	3.414	3.439	3.389	2.983	2.969	3.054	3.063
Ti	0.010	0.016	0.004	0.012	0.008	0.008	0.002	0.003	0.016	0.008
Al	2.190	2.016	2.241	1.968	1.929	1.952	3.008	3.021	2.860	2.860
Mg	0.292	0.320	0.242	0.335	0.358	0.382	0.005	0.012	0.051	0.051
Ca	0.002	0.003	0.003	0.002	0.000	0.027	0.024	0.019	0.001	0.000
Mn	0.002	0.002	0.002	0.003	0.002	0.002	0.001	0.000	0.002	0.000
Fe^{2+}	0.239	0.367	0.330	0.365	0.376	0.397	0.011	0.019	0.041	0.040
Ba	0.021	0.014	0.012	0.008	0.007	0.012	0.000	0.000	0.002	0.005
Na	0.034	0.030	0.024	0.027	0.013	0.018	0.866	0.808	0.226	0.224
K	0.893	0.917	0.920	0.935	0.923	0.891	0.086	0.139	0.720	0.723
Total	7.021	7.067	7.062	7.071	7.056	7.081	6.987	6.991	6.973	6.973
Endmembers										
Margarite	0.2	0.3	0.3	0.2	0.0	2.9	2.4	2.0	0.1	0.0
Paragonite	3.6	3.2	2.5	2.8	1.4	2.0	88.7	83.7	23.9	23.7
Celadonite	33.7	38.2	28.4	41.4	43.9	38.9	0.0	0.0	5.4	6.3
Muscovite	62.5	58.4	68.8	55.5	54.6	56.2	8.8	14.3	70.6	70.0
X_{Mg}	0.550	0.466	0.423	0.479	0.488	0.490	0.328	0.379	0.559	0.562

* matrix crystal; ** crystal from extension gash

Table 17. Representative microprobe analysis of stilpnomelane (23.8125 oxygen basis, Currie & van Staal, 1999).

Stilpnomelane	75312B		76032D	
	F1 #10	F2 #9	F3 #1	F3 #2
wt.-%				
SiO_2	48.12	47.29	44.50	44.27
TiO_2	0.00	0.01	0.00	0.02
Al_2O_3	5.69	6.04	6.91	7.86
MgO	6.18	6.00	3.41	3.44
CaO	0.24	0.33	0.21	0.23
MnO	1.89	1.75	0.22	0.24
FeO	28.61	27.70	30.85	29.99
BaO	0.05	0.19	0.01	0.14
Na_2O	0.04	0.07	0.28	0.30
K_2O	0.66	0.71	1.37	1.70
Total	91.49	90.08	87.75	88.19
Cations				
Si	8.082	8.054	7.929	7.835
Ti	0.000	0.001	0.000	0.002
Al	1.126	1.213	1.451	1.640
Mg	1.548	1.523	0.905	0.906
Ca	0.043	0.060	0.039	0.044
Mn	0.269	0.253	0.033	0.037
Fe^{2+}	4.018	3.945	4.596	4.438
Ba	0.003	0.013	0.000	0.010
Na	0.012	0.023	0.095	0.103
K	0.141	0.155	0.311	0.384
Total	15.242	15.240	15.360	15.398
X_{Mg}	0.278	0.279	0.165	0.170

Table 18. Representative microprobe analyses of amphibole. Cations based on a 23 oxygen basis. Ferric iron was estimated using the minmax-midpoint method (Schumacher, 1997).

Amphibole	76111A	76111A	760210A	760210A	76017B	76017B	760210A	760210A	76046A	76046A	76045G	76045G	76022B	76053A	760210A	D7625A	D7625A
	F5 #2	F5 #14	F2 #1	F2 #3	(early)	(early)	F5 #9	F5 #9	F1 #1	F1 #1	F3 #7	F3 #14	F3 #1	F2 #2	F2 #1	F8 #1	F8 #11
	rim	core	rim*	core*	F1 #1 rim	F1 #5 core	core**	core**	rim	core	core	rim			rim*	rim	core
wt.-%																	
SiO_2	42.50	42.02	51.94	55.33	43.09	43.30	53.84	55.36	40.51	40.68	40.24	52.66	57.05	53.34	51.34	43.45	42.82
TiO_2	0.77	0.78	0.06	0.05	0.43	0.37	0.03	0.04	2.13	2.04	1.51	0.95	0.02	0.03	0.03	0.39	0.39
Al_2O_3	14.72	15.07	4.00	5.09	15.74	15.15	2.91	5.23	12.92	13.04	13.17	1.77	1.01	2.58	4.58	17.32	18.11
Fe_2O_3	0.01	0.08	10.44	11.35	0.05	0.08	8.23	11.38	0.00	0.02	0.20	0.00	0.00	0.06	10.06	0.11	0.16
Cr_2O_3	0.03	0.01	0.00	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	0.22	0.08
MgO	9.02	9.77	11.45	9.05	6.44	6.22	12.83	9.39	4.99	5.71	6.66	10.60	17.58	12.53	10.53	9.12	8.54
CaO	11.78	11.70	7.87	1.42	10.01	10.07	7.57	1.34	11.38	11.20	11.19	11.93	12.92	11.14	11.14	11.58	11.40
MnO	0.08	0.07	0.35	0.21	0.08	0.17	0.43	0.26	0.46	0.40	0.69	0.61	0.21	0.37	0.37	0.31	0.38
FeO	14.59	13.29	9.00	9.30	18.76	19.46	9.16	8.60	23.21	21.90	19.60	18.21	9.01	15.95	9.95	13.02	13.36
Na_2O	1.42	1.67	3.10	6.54	2.75	2.61	3.04	6.58	1.61	1.68	1.50	0.31	0.13	0.84	3.84	1.19	1.24
K_2O	0.04	0.04	0.20	0.01	0.56	0.61	0.12	0.02	1.33	1.40	1.74	0.18	0.03	0.10	0.10	0.36	0.34
Total	94.96	94.50	98.38	98.37	97.91	98.04	98.18	98.22	98.54	98.07	96.53	97.24	97.94	96.94	98.94	97.07	96.80
Cations																	
Si	6.432	6.363	7.501	7.861	6.444	6.491	7.717	7.853	6.257	6.272	6.264	7.832	8.010	7.839	7.539	6.364	6.299
Ti	0.088	0.089	0.006	0.005	0.049	0.041	0.003	0.005	0.247	0.237	0.177	0.106	0.002	0.003	0.003	0.043	0.043
Al	2.626	2.689	0.681	0.852	2.774	2.677	0.491	0.875	2.352	2.370	2.416	0.310	0.166	0.448	0.848	2.989	3.139
Fe^{3+}	0.001	0.009	1.135	1.214	0.006	0.009	0.887	1.215	0.000	0.002	0.024	0.000	0.000	0.006	1.206	0.013	0.018
Cr	0.004	0.002	0.000	0.001	0.000	0.000	0.003	0.002	0.000	0.000	0.003	0.003	0.000	0.001	0.001	0.025	0.009
Mg	2.034	2.207	2.464	1.916	1.435	1.390	2.742	1.987	1.150	1.311	1.545	2.350	3.680	2.745	2.345	1.992	1.872
Ca	1.911	1.899	1.217	0.217	1.603	1.618	1.162	0.203	1.882	1.849	1.867	1.901	1.943	1.754	1.754	1.818	1.796
Mn	0.010	0.009	0.042	0.026	0.010	0.021	0.053	0.031	0.060	0.053	0.091	0.077	0.025	0.045	0.045	0.038	0.047
Fe^{2+}	1.846	1.684	1.087	1.106	2.346	2.440	1.098	1.020	2.998	2.824	2.552	2.265	1.057	1.960	1.960	1.595	1.644
Na	0.415	0.490	0.867	1.803	0.797	0.759	0.843	1.810	0.482	0.501	0.454	0.089	0.035	0.238	0.838	0.339	0.353
K	0.007	0.007	0.036	0.003	0.106	0.116	0.022	0.003	0.261	0.276	0.346	0.035	0.005	0.019	0.019	0.068	0.064
Total	15.376	15.447	15.036	15.003	15.569	15.562	15.022	15.003	15.691	15.694	15.738	14.967	14.925	15.058	15.058	15.283	15.284
X_{Mg}	0.524	0.567	0.694	0.634	0.379	0.363	0.714	0.661	0.277	0.317	0.377	0.509	0.777	0.583	0.583	0.555	0.533

* matrix crystal; ** crystal from extension gash

Representative analyses of major phases are shown in Tables 11-18.

3.3.3 Bulk-rock geochemistry

Bulk-rock geochemistry was analysed by X-ray fluorescence using a Bruker SRS 3000 WDS-XRF at Basel on fused glass discs made of 300 mg ignited rock powder and 4700 mg ultrapure $Li_2B_4O_7$. Accuracy was checked against USGS, NIM, and SARM standards.

3.3.4 Determination of metamorphic conditions

We obtained data on the metamorphic evolution mainly with the Theriak/Domino-program package (de Capitani & Brown, 1987; de Capitani, 1994; de Capitani & Petrakakis, 2010; http://titan.minpet.unibas.ch/minpet/theriak/theruser.html) that uses Gibbs-free-energy minimisation to calculate equilibrium-assemblages together with the modal proportions and compositions of individual stable phases at given T and P based on bulk-rock composition and thermodynamic models of rock forming minerals. Equilibrium-assemblage and isopleth diagrams showing the compositions of major phases such as garnet, plagioclase, biotite or amphiboles were computed and interpreted by comparing observed assemblages and intersections of isopleths.

For all equilibrium-assemblage calculations, we used the thermodynamic database of Holland & Powell (1998; version tcds55) together with activity models of thermocalc 3.25 and 3.30 (see appendix). Model systems are Na_2O-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (NKFMASH), MnO-TiO_2-Na_2O-CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (MnTNCKFMASH), TiO_2-Na_2O-CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (TNCKFMASH), TiO_2-Na_2O-CaO-K_2O-FeO-Fe_2O_3-MgO-Al_2O_3-SiO_2-H_2O (TNCKFMASHO). Generally, H_2O was in excess.

An essential aspect of the equilibrium-assemblage calculations is the choice of a proper bulk-rock composition for the equilibrium-mineral assemblage. In case of homogeneous samples, we used bulk-rock chemical analysis data. As several accessory phases, which are not considered in the calculation (e.g., apatite, pyrite), contribute to the bulk, the P and S were subtracted from the chemical data before modelling. In samples with distinct compositional layering, we modelled the local chemical composition using microprobe analyses of the equilibrium-mineral assemblage and counting of typically 700 points.

Apart from thermodynamic modelling, we applied phengite-chlorite-quartz-H_2O multi-equilibrium calculations using models of Dubacq et al. (2010) and Vidal et al. (2005) with a_{H_2O} = 1 as well as conventional thermo-barometers.

3.4 Petrography and phase equilibria

3.4.1 The Liuling unit s.st.

The Liuling Unit s.st. comprises Silurian-Carboniferous (meta-)sediments of the Shanyang basin. While at its northern margin mica schists with intercalated fine-grained quartzites and rare metatuffites occur, the majority consists of fine- to medium-grained banded quartzites. Quartzite beds partly preserve sedimentary structures such as cross bedding, sole- and ripple-marks, and grading. Impure limestones were metamorphosed to massive calcite-amphibole-clinopyroxene calcsilicate rocks.

From the north-central Liuling Unit, garnet-staurolite-mica-quartz schist 75261C displays a main foliation (s_2) accentuated by aligned staurolite, muscovite, biotite, and chlorite. Staurolite poikiloblasts up to 3 cm length encase euhedral to subhedral garnet crystals of 0.4-0.9 mm diameter (Fig. 17a), quartz, chlorite, muscovite, ilmenite, plagioclase, and relic paragonite absent in the matrix. Alignment of inclusions suggests syn- to post-s_2 growth. Euhedral garnet crystals also occur within the matrix. The larger garnets show cores with inclusion trails oblique to s_2. Inclusions in garnet rims are aligned parallel to s_2 or display foliation-wrapping around the cores (fig. 17b). Rare plagioclase is concentrated in lens-shaped, s_2-parallel aggregates or grows interstitial with diameters smaller than 0.1 mm. Accessories include ilmenite, apatite, zircon, and tourmaline.

EMP profiles through garnet reveal a discontinuous zoning with cores typical for prograde growth and a distinct increase of grossular at the expense of almandine and pyrope at the rims (Figs. 18a, 18c). Garnet core composition is $Alm_{68}Grs_{08}Prp_{09}Sps_{15}$, intermediate section is $Alm_{76}Grs_{08}Prp_{13}Sps_{04}$, and rim is $Alm_{74}Grs_{13}Prp_{11}Sps_{02}$. Remarkably, these rims with high grossular concentrations are not present at garnet enclosed in the central section of the staurolite, while they occur at garnet inclusions near the rim of

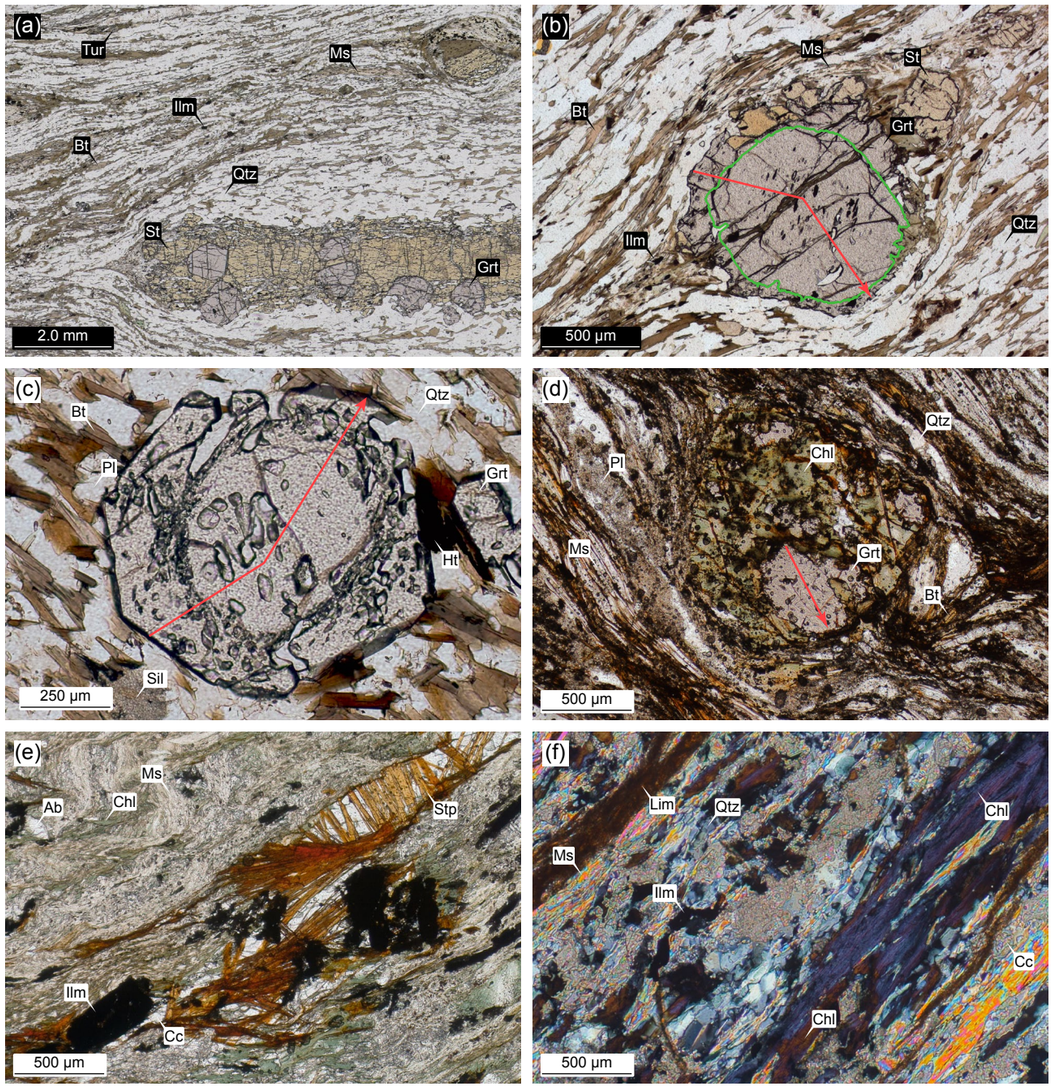


Figure 19. Photomicrographs - plane polarized light. Red arrows mark EMPA profiles (Figs. 20c; 20d; 22a) across garnets. Mineral abbreviations follow Kretz (1983), and Spear (1993).
(a) Needle-shaped staurolite crystal bearing numerous garnet inclusions; garnet-staurolite-mica-schist 75261C.
(b) Garnet porphyroblast from garnet-staurolite-mica-schist 75261C. The green line marks the interface between the garnet core section and the grossular-rich rim. The ilmenite inclusions in the garnet core are oriented oblique to the main foliation.
(c) Euhedral garnet crystal from garnet gneiss 75302A.
(d) Relic garnet porphyroblast together with coarse phengite- and biotite flakes from garnet-mica-schist 76111A.
(e) Assemblage of stilpnomelane-calcite-phengite-chlorite-schist 75312B.
(f) Chlorite- and calcite-rich layers of stilpnomelane-calcite-phengite-chlorite-schist 753011A.

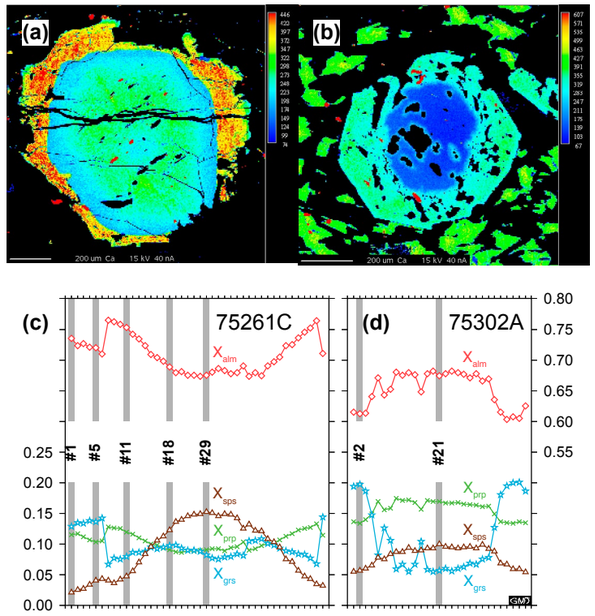


Figure 20. Ca X-ray maps and representative EMP profiles of garnet porphyroblasts from the Liuling Unit. See Figs. 19b and 19c, for location of the profiles. Highlighted points refer to the garnet EMP analysis (Tab. 11) valid for isopleth intersections displayed in the equilibrium assemblage diagrams in Fig. 21.
(a), (c) Garnet-staurolite-mica-schist 75261C.
(b), (d) Garnet gneiss 75302A.

the staurolite. Staurolite is unzoned showing an X_{Mg} (Mg/(Mg+Fe^{2+})) of 0.21. The X_{Mg} of biotite and chlorite is 0.54 and 0.56, respectively. Plagioclase has an X_{An} of 0.24-0.30. Muscovite aligned in the s_2 foliation yields Si contents of ~3.07 p.f.u. and an elevated X_{Na} (=Na/(Na+K)) of 0.24-0.30. Its X_{Mg} varies between 0.46 and 0.55.

According to thermodynamic modelling in MnTNCKFMASH system, garnet growth started at 558 °C and 0.42 GPa (Fig. 21a). The grossular-maximum near the garnet centre (point #18 in fig. 21a) indicates 562 °C and 0.48 GPa while the outer garnet core (point #11 in fig. 21a) implies conditions of 586 °C and 0.56 GPa. The subsequent discontinuous increase in grossular in the garnet rim section could be explained by exhumation and cooling followed by a second phase of burial (see grey arrows in Figs. 21a and 21b, respectively). This is substantiated by the observed distinct change in the stress regime confirmed by the alignment of the inclusion trails. If the rock had moved along a PT-path straight between points #11 and #5 in Figs. 21a and 21b, we would not expect such a discontinuous zoning. Finally, the composition of the outer garnet rim points to temperatures of 580-590°C (point #1 in Fig. 21b). The pressure is constrained by the intersection of the steeply dipping pyrope-, almandine-, and grossular-isopleths with those of the Si-content of muscovite yielding 0.87 GPa (Fig. 21b). The corresponding calculated stable mineral assemblage comprises garnet, muscovite, paragonite, biotite, chlorite, quartz, and ilmenite. During exhumation, the rock again entered the staurolite stability field (Fig. 21b) and the large staurolite crystals continued to grow.

Originating ~70km east of outcrop 75261, the weakly foliated fine-grained gneiss 75302A is mainly composed of plagioclase, quartz, phengite, biotite, and garnet. Accessories include zoisite, rutile, tourmaline, apatite, and zircon. Varying biotite-phengite- and quartz-plagioclase-contents mark irregular compositional heterogeneities. Large subhedral garnet poikiloblasts up to 0.8 mm diameter show a zone of tiny inclusions (Fig. 19c) that coincides with a distinct increase in Ca content separating rounded cores ($Alm_{68}Grs_{09}Prp_{17}Sps_{06}$) from rims ($Alm_{60}Grs_{21}Prp_{14}Sps_{05}$, Figs. 20b, 20d). Small garnet crystals have identical compositions as the rims of large poikiloblasts. While the cores of large garnets encase relic ilmenite, rims bear rutile inclusions. Remarkably, rutile is the only Ti-phase present in the matrix. Plagioclase reveals slightly increasing anorthite content from core (X_{An} 0.37) to rim (X_{An} 0.41). Rarely, it encases relic sillimanite absent in the matrix. Phengite has Si contents of 3.16-3.21 p.f.u. and an X_{Mg} of 0.54-0.60. The X_{Mg} of biotite varies slightly from 0.56-0.58.

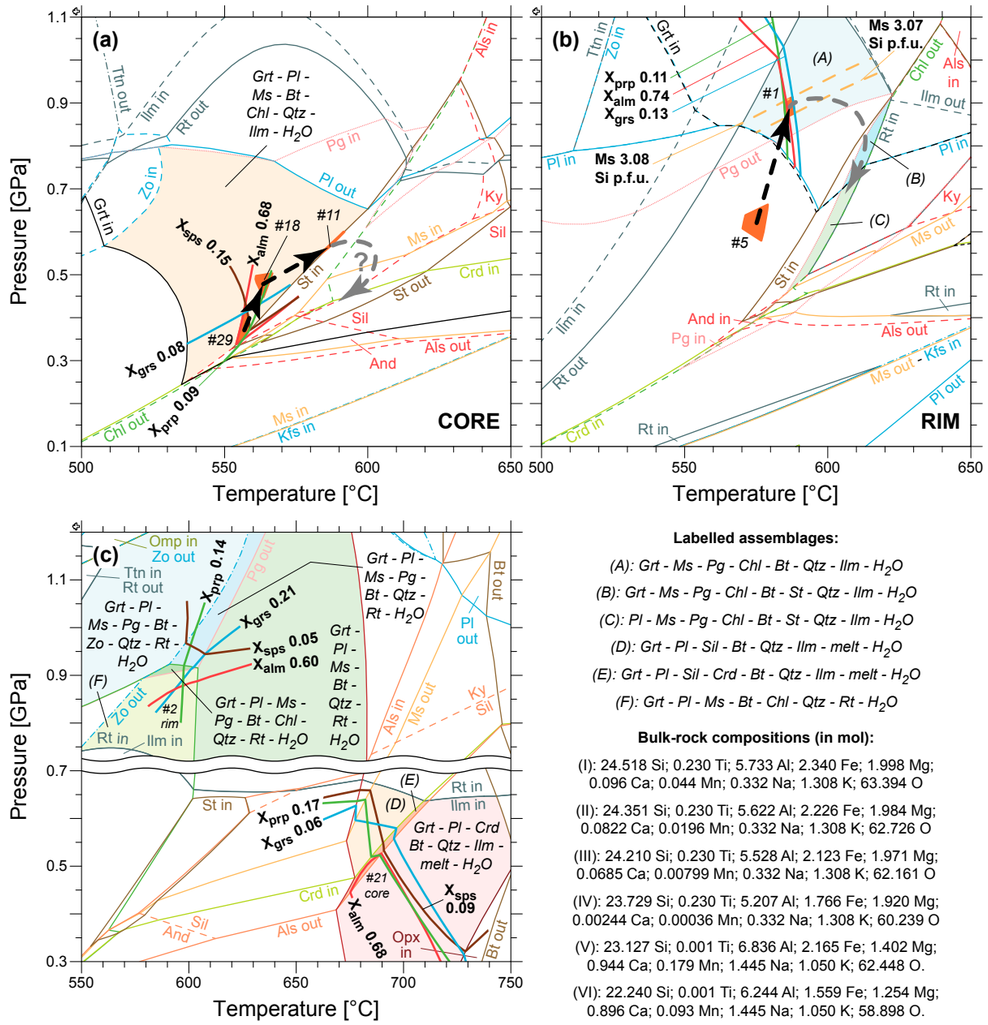


Figure 21. Equilibrium assemblage diagrams of samples from the Liuling Unit. Initial bulk-rock compositions (I) and (V) were derived by point counting, the other were calculated after garnet fractionation (see appendix, for description of the method).

(a) PT evolution of garnet core of sample 75261C. Garnet core isopleths (point #29) and the corresponding equilibrium assemblage diagram were calculated using bulk-rock composition (I). Black arrows highlight the PT path derived from garnet zoning, the grey arrow is constrained by the observed mineral assemblage. Intersection of isopleths of points #18 and #11 (for simplicity, only the intersectional polygons are shown) were calculated using (II), and (III), respectively.

(b) PT evolution of garnet rim of sample 75261C. The diagram is valid for the outermost garnet rim (point #1) and was calculated using (IV). The calculated X_{sps} at these conditions is below 0.01. Isopleths intersecting at point #5 were calculated using the same bulk as for point #11 (III).

(c) Equilibrium assemblage diagram with isopleths of garnet core (lower part) and garnet rim (upper part) of sample 75302A. Bulk-rock composition (in mol) for lower part of the diagram is (V). For the upper part of the diagram, chemical fractionation during garnet growth was assumed resulting in (VI).

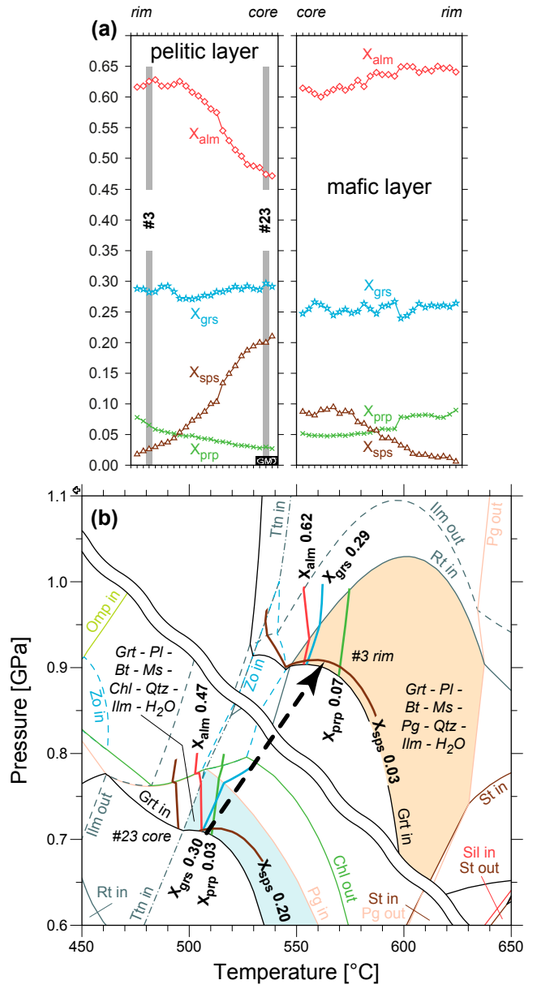


Figure 22. Garnet isopleth thermobarometry applied to sample 76111A.

(a) Representative core-rim EMP profile through relic garnet porphyroblasts. See Fig. 19d, for location of the left one.

(b) Equilibrium assemblage diagrams and garnet isopleth intersections valid for garnet cores (lower left) and rims (upper right). The lower left was calculated using a geochemical bulk-rock analysis (in mol; 22.203 Si; 0.274 Ti; 6.947 Al; 2.225 Fe; 1.614 Mg; 0.367 Ca; 0.042 Mn; 2.101 Na; 1.508 K; 61.427 O). To account for chemical fractionation during garnet growth, the upper right part was calculated by garnet fractionation (see appendix for the method) yielding (in mol) 21.762 Si; 0.274 Ti; 6.653 Al; 1.968 Fe; 1.595 Mg; 0.238 Ca; 0.005 Mn; 2.101 Na; 1.508 K; 59.661 O.

Garnet core isopleths calculated in the MnTNCKFMASH system are subparallel and steeply dipping (#21 in Fig. 21c) at temperatures of 680-730 °C and pressures of 0.3-0.6 GPa, which is in accord with ilmenite included in garnet cores and sillimanite included in plagioclase. Furthermore, early migmatization might explain the irregular heterogeneities in the rock. Garnet rim isopleths intersect at ~600 °C and ~0.9 GPa (#2 in Fig. 21c), conditions within the stability field of rutile and thus in accord with textural observations.

These PT estimates highlight a common, two stage evolution for both Liuling samples with a medium-pressure amphibolite facies event followed by a high-pressure amphibolite facies event.

3.4.2 The Douling complex

The Douling Complex comprises basement rocks formed by felsic, partly migmatic gneisses and mica schists with intercalated amphibolites. Together with their Neoproterozoic cover of clastic metasediments, metatuffites and rare black shales they experienced an intensive folding under low-grade metamorphic conditions.

Blastic garnet mica schist 76111A, which originates from the Douling basement, is made up of coarse aligned phengite and biotite flakes that partly wrap around rounded chlorite aggregates. These aggregates are pseudomorphs after garnet as indicated by enclosed, rare relic garnet grains. The low-grade overprint also caused ubiquitous saussuritization of plagioclase as well as replacement of rutile and ilmenite by titanite. Within a thin layer, pristine amphibole prisms occur together with euhedral garnet, phengite, plagioclase, and quartz. Garnet in the chlorite aggregates shows a prograde zoning (Fig. 22a) with cores of $Alm_{47}Prp_3Grs_{30}Sps_{20}$ and rims of $Alm_{62}Prp_7Grs_{29}Sps_3$. Garnet of the amphibole-bearing layer shows cores of $Alm_{60}Prp_5Grs_{27}Sps_8$ and rims of $Alm_{64}Prp_9Grs_{26}Sps_1$. The composition of phengite varies somewhat across the thin section with Si contents of 3.23-3.39 p.f.u. and X_{Mg} of 0.65-0.73. The X_{Mg} of biotite is 0.52 but low K contents of ~0.74 p.f.u. indicate alteration. Amphibole is tschermakite with an X_{Mg} of 0.52-0.59. The X_{An} of plagioclase is 0.14-0.22. Garnet isopleth geothermobarometry was performed in MnTNCKFMASH system using a bulk-rock analysis as input and assuming an isochemical low-grade overprint. The calculations

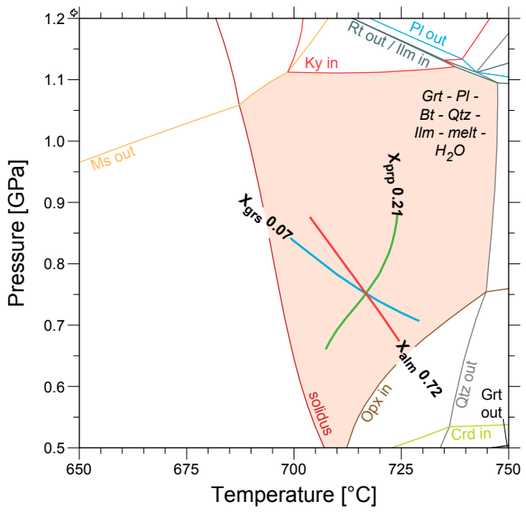


Figure 23. Equilibrium assemblage diagram and garnet isopleths of sample 76114C, calculated in TNCKF-MASH system excess H_2O. Bulk-rock composition (in mol) is 21.823 Si; 0.267 Ti; 7.240 Al; 2.155 Fe; 1.658 Mg; 1.250 Ca; 2.519 Na; 1.150 K; 61.938 O.

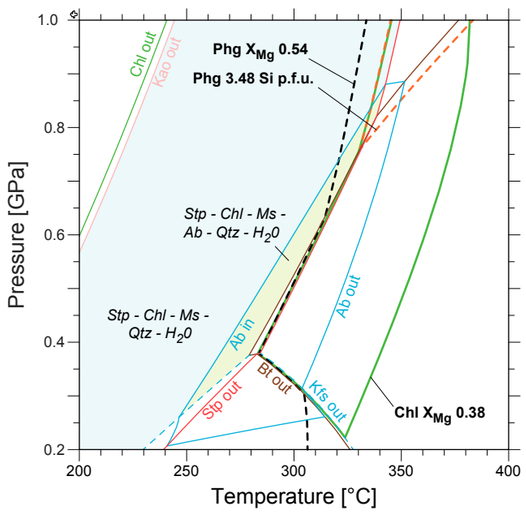


Figure 24. Equilibrium assemblage diagram of sample 75312B. The narrow pale yellow highlighted stability field is that of the observed assemblage. Bulk-rock composition (in mol) is 19.544 Si; 8.732 Al; 4.138 Fe; 2.819 Mg; 3.232 Na; 0.052 K; 60.785 O.

reveal garnet growth starting at 509 °C at 0.71 GPa (Fig. 22b). Garnet rim isopleths point to peak metamorphic conditions of 560 °C at or above 0.91 GPa. This estimate results from the intersection of the flat spessartine-isopleths with the steeply dipping pyrope-, almandine, and grossular-isopleths (Fig. 22b). However, as the modelling does not include kinetic effects such as intergranular diffusion within the garnet crystal or diffusional flux between the matrix and the garnet, and these processes increase the X_{sps} at garnet rims, the derived peak-pressure is considered a minimum value. This is also supported by the presence of rutile in the rock which, according to the modelling, would be stable at pressure above 0.95-1.00 GPa and conventional garnet-amphibole-plagioclase-quartz thermobarometry (Kohn & Spear, 1990; Graham & Powell, 1984) yielding pressures of 1.0-1.2 GPa at 565 °C.

Outcrop 76114 is part of the Douling basement and comprises a successions of banded, medium-grained, partly garnet-bearing gneisses. Individual layers are either dominated by garnet-biotite-plagioclase-quartz, plagioclase-quartz or plagioclase-amphibole-quartz assemblages. A strong low-grade overprint caused intensive growth of chlorite, sericite, epidote and titanite, but peak metamorphic assemblages were preserved in discrete domains. Garnet gneiss sample 76114C is composed of garnet, plagioclase, biotite, quartz, ilmenite, relic rutile, apatite, zircon, tourmaline and pyrite. Poikiloblastic garnet is unzoned -$Alm_{68\text{-}70}Prp_{18\text{-}20}Grs_{6\text{-}8}Sps_{4\text{-}6}$. Plagioclase core composition is $Ab_{72}An_{0.28}$ whereas rim composition is $Ab_{64\text{-}66}An_{0.34\text{-}0.36}$. The X_{Mg} of biotite varies between 0.46 and 0.53. Garnet isopleth geothermobarometry applied in the TNCKFMASH system (Fig. 23) reflects peak metamorphic conditions above the wet solidus at 710-720 °C and 0.75-0.80 GPa within the stability field of the assemblage garnet – plagioclase – biotite – quartz – ilmenite – melt matching the observed one.

The metapelitic schist 75312B from the Neoproterozoic cover displays the mineral assemblage stilpnomelane, chlorite, phengite, calcite, quartz, albite, ilmenite, titanite, and pyrite. While chlorite and phengite form a crenulated slaty cleavage, stilpnomelane flakes often crosscut the foliation or grow together with calcite in microlithons (Fig. 19e). Phengite shows Si contents of 3.43-3.50 p.f.u. and X_{Mg}-values of 0.50-0.54. The X_{Mg} of stilpnomelane and of chlorite are 0.27-0.28 and 0.38-0.42, respectively. The X_{Ab} of feldspar is > 0.99. Thermodynamic modelling (NKFMASH system, Fig. 24) reveals an upper stability limit of stilpnomelane at 310-350°C at 0.6-1.0 GPa. The Si isopleths of phengite suggest minimum pressures of 0.8 GPa at 310 °C while the X_{Mg} isopleths of chlorite and phengite point to temperatures of 300-350 °C. These results are in agreement with conventional thermobarometry, e.g. stilpnomelane-chlorite-phengite-thermobarometry of Currie & van Staal (1999) yielding 300-340 °C at 0.6-0.7 GPa and chlorite-phengite-quartz-H_2O thermobarometry (Dubacq et al., 2010; Vidal et al, 2005) calculating somewhat higher pressures of 0.8-1.0 GPa at 280 °C.

Stilpnomelane-calcite-phengite-chlorite-schist 753011A also originates from the Douling cover and displays distinct compositional banding with calcite-quartz- and chlorite-phengite-quartz-rich layers (Fig. 19f). Albite is a minor component. Within the calcite-rich layers, there are brownish pseudomorphs after stilpnomelane. Accessories include ilmenite, pyrite, apatite, and tourmaline. Phengite shows Si contents of 3.22-3.31 p.f.u. and X_{Mg}-values of 0.42-0.51. Similarly, chlorite has a variable X_{Mg} of 0.41-0.58. Geothermobarometry using multiple phengite-chlorite-quartz-H2O-equilibria (Dubacq et al., 2010; Vidal et al, 2005) reveal that discrete domains equilibrated at 250-320 °C and 0.5-0.9 GPa while other domains highlight a subsequent overprint at 400-420 °C and 0.5 GPa.

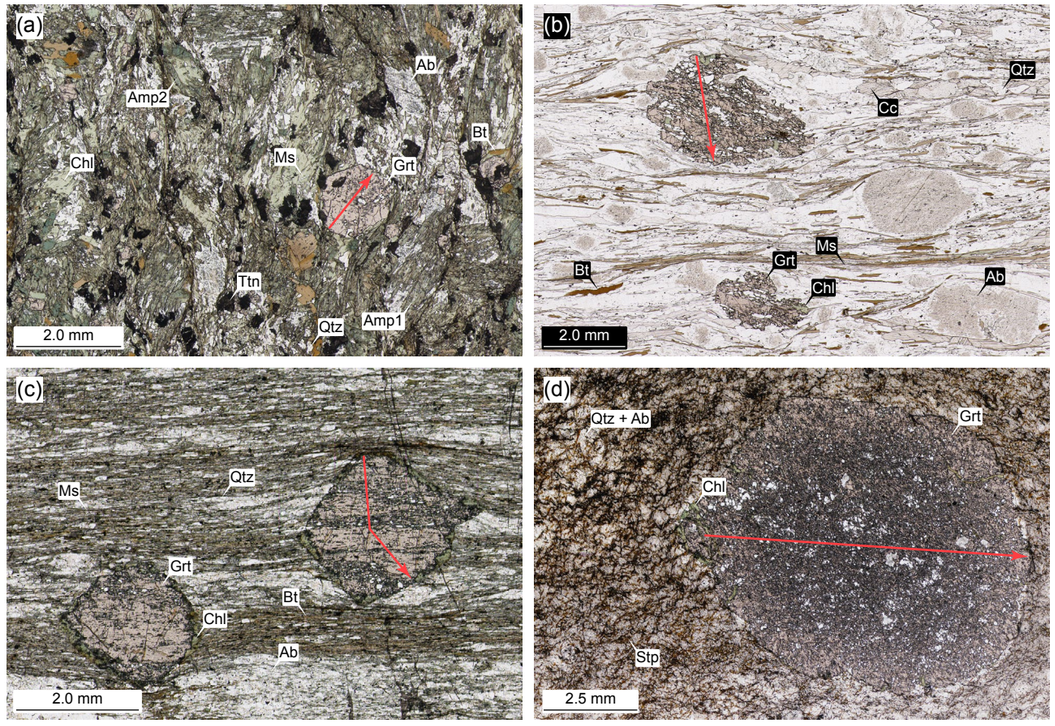


Figure 25. Photomicrographs, plane polarized light. Red arrows mark the EMP profiles shown in Figs. 26, and 28, respectively.
(a) Massive garnet-bearing amphibolite 76017B.
(b) Garnet and albite porphyroblasts within a foliated matrix of micas and qtz; garnet gneiss 76017A.
(c) Post-tectonic garnet porphyroblasts in a biotite-chlorite-phengite-albite-quartz matrix; garnet gneiss 76032C.
(d) Garnet porphyroblast within a recrystallized matrix of albite, stilpnomelane, and quartz; garnet-bearing metapelite 76032D.

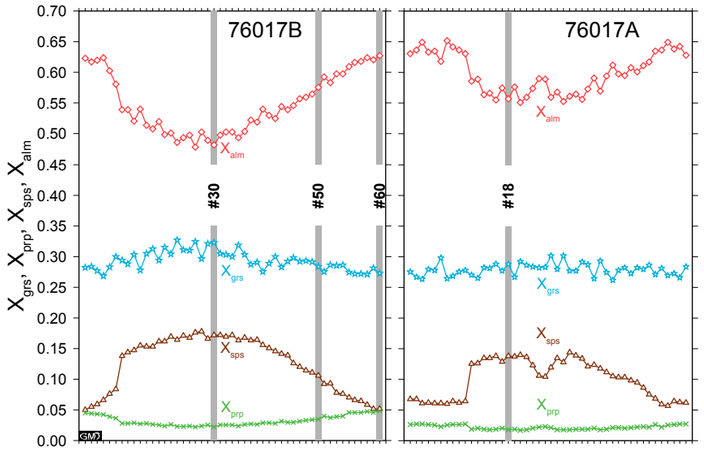


Figure 26. Representative EMP profiles through garnet crystals from outcrop 76017 (central Wudang complex). Highlighted points refer to the garnet EMP analysis (Tab. 11) valid for isopleth intersections displayed in the equilibrium assemblage diagrams in Fig. 27.

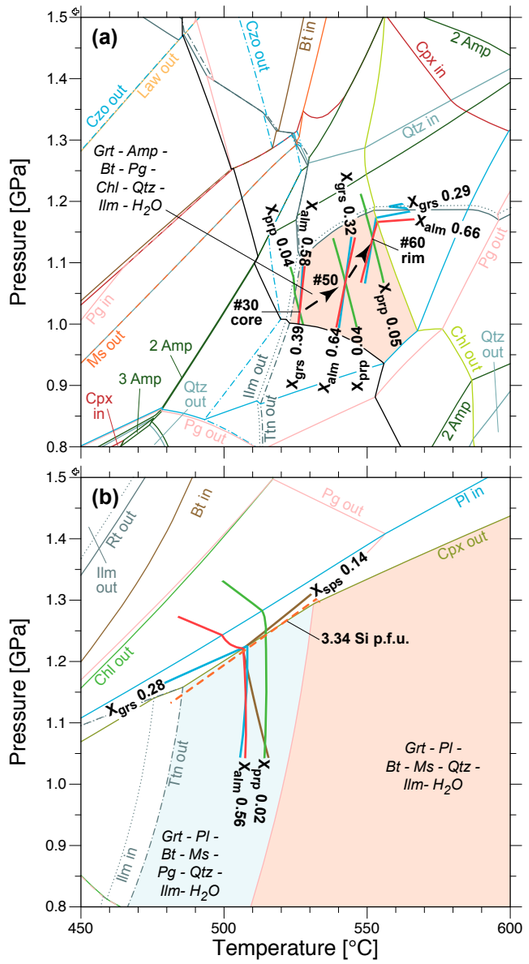


Figure 27. Equilibrium assemblage calculations and garnet isopleth thermo-barometry applied to samples from outcrop 76017 (central Wudang complex).
(a) PT path of sample 76017B highlights garnet growth during simultaneous burial and heating. The effect of chemical fractionation during garnet growth is negligible and was thus omitted. Numbers at the isopleth intersections correspond to EMP analyses given in Tab. 11. Bulk-rock composition (in mol) is 17.343 Si; 0.151 Ti; 8.075 Al; 5.782 Fe; 3.117 Mg; 2.560 Ca; 2.546 Na; 0.373 K; 60.019 O.
(b) Equilibrium assemblage diagram of sample 76017A calculated in the MnTNCKFMASH system with excess H_2O. Garnet core isopleths are shown. The stability field of the observed assemblage is marked in orange. Bulk-rock composition (in mol) is 24.805 Si; 0.076 Ti; 5.591 Al; 2.021 Fe; 0.549 Mg; 0.432 Ca; 0.209 Mn; 2.166 Na; 1.127 K; 63.006 O.

3.4.3 The Wudang complex

The Wudang complex is formed by medium grained garnet-gneisses, garnet mica schists and amphibolites in its central and north-central part, which are often cut by massive metagabbroic dykes. The northern and western parts of the Wudang complex mainly consist of greenschists, blueschists, calc-silicate schists, phyllites and fine-grained mica schists. An exception to this is an isolated occurrence of coarse-grained amphibolites and orthogneisses near the overlying Cambrian-Ordovician carbonates at the northern margin of the complex.

3.4.4 Garnet gneisses and garnet amphibolites from the central and north-central Wudang complex

In the centre of the Wudang Shan in the city of Shiyan, medium grained felsic gneisses with intercalated metabasites occur. Sample 76017B (Fig. 25a) is a massive, weakly foliated garnet-bearing amphibolite consisting of garnet, two amphiboles, chlorite, biotite, phengite, epidote, albite, quartz, calcite, and accessory titanite, apatite, and pyrite. Both amphiboles show a random orientation. The X_{Mg}-value of early, short prismatic crystals of ferrotschermakite is ~0.37 while the one of late blue-green needles of ferro- and magnesiohornblende varies between 0.42 and 0.58. Garnet mainly forms subhedral crystals up to 1 mm in diameter with prograde zoning. The core composition is $Alm_{48}Prp_{2}Grs_{32}Sps_{18}$ while the rim composition is $Alm_{63}Prp_{5}Grs_{27}Sps_{5}$ (Fig. 17a). Bith, syn- and post-tectonic biotite flakes have X_{Mg}-values of 0.58. Large post-tectonic albite porphyroblasts as well as small anhedral grains are unzoned with X_{Ab} >0.99. Chlorite with X_{Mg}-values of 0.44-0.46 forms large aggregates parallel to the foliation, which underwent a strong recrystallization. Phengite yielding Si contents of 3.29-3.34 p.f.u. and X_{Mg}-values of 0.53-0.55 is intergrown with chlorite.

Garnet core isopleths calculated in the TNCKFMASH system intersect at 526 °C and 1.02 GPa while rim isopleths intersect at 552 °C and 1.14 GPa (Fig. 27a) reflecting peak metamorphic conditions. During garnet growth, the calculated stable assemblage comprises garnet, Ca-amphibole, biotite, chlorite, paragonite, quartz, and ilmenite. According to the equilibrium assemblage diagram, the growth of albite at the expense of paragonite and the decomposition of ilmenite to titanite occurred after the peak of metamorphism. The late recrystallized aggregates of chlorite and phengite allow a PT estimate applying chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005), which yield 310-360°C at 0.5-0.7 GPa.

Sample 76017A, an albite-blastic garnet gneiss from the same outcrop shows σ-type garnet and albite porphyroblasts aligned in the main foliation (Fig. 25b). This foliation is furthermore accentuated by aligned biotite, phengite and stretched granular calcite aggregates. Quartz is dynamically recrystallized. Garnet, which contains poikiloblastic inclusions of quartz and albite, has a core composition of $Alm_{56}Prp_{02}Grs_{28}Sps_{14}$ and a rim composition of $Alm_{63}Prp_{3}Grs_{27}Sps_{7}$ (Fig. 26b). Albite porphyroblasts and inclusions in garnet have identical compositions (X_{Ab} >0.99). Biotite has X_{Mg}-values of ~0.30 while phengite yields Si contents of 3.30-3.34 p.f.u. and X_{Mg}-values of 0.42-0.45.

Thermodynamic modelling (MnTNCKFMASH system) reveals PT conditions of 1.15-1.25 GPa and 510 °C based on isopleths using the compositions of the garnet core and syn-tectonic phengite (Fig. 27b).

The calculated peak metamorphic mineral assemblage comprises garnet, albite, biotite, phengite, paragonite, quartz, ilmenite matching the observed except for paragonite whose absence is explained by its later reaction to albite.

Taken ~30 km northwest of outcrop 76017, porphyroblastic garnet gneiss 76032C comprises euhedral post-tectonic garnet crystals with diameters up to 2.5 mm overgrowing a penetratively foliated, fine-grained matrix of white mica, biotite, albite, quartz, and accessory rutile and apatite (Fig. 25c). As a result of retrogression, biotite is extensively chloritised. Other retrograde phases are clinozoisite, calcite, and titanite mantling rutile. Garnet porphyroblasts show a typical prograde zoning with a core composition of $Alm_{48}Prp_{2}Grs_{30}Sps_{20}$ and a rim composition of $Alm_{52}Prp_{2}Grs_{33}Sps_{13}$ (Fig. 28a). Biotite has an X_{Mg} of ~0.48 while phengite yields Si contents of 3.33-3.40 p.f.u. and X_{Mg}-values of 0.43-0.48.

The intersections of garnet core isopleths with those of the Si content of phengite, calculated in the MnTNCKFMASH system are at 505 °C and 1.2 GPa (Fig. 28b). A PT estimate for garnet rim composition is hardly possible due to parallel isopleths.

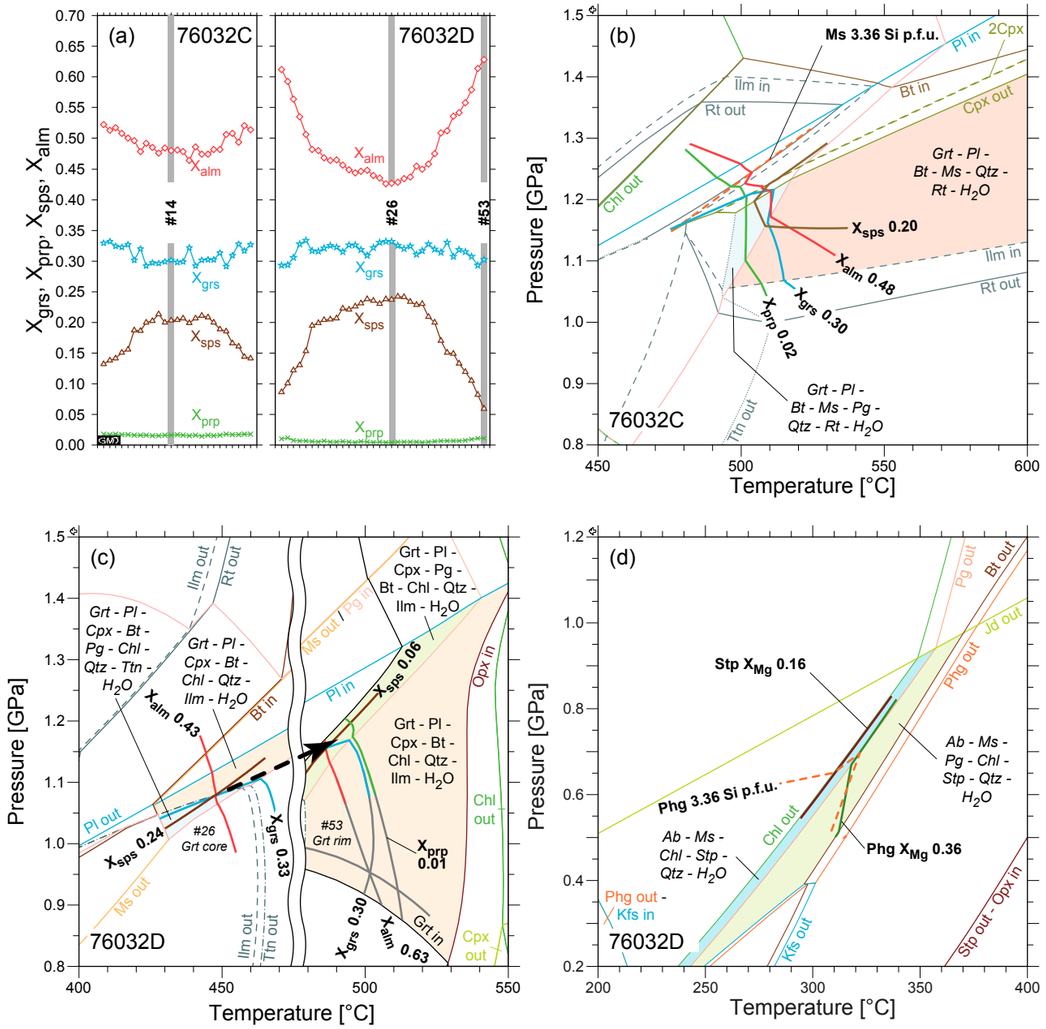
Originating from the same outcrop, massive unfoliated garnet gneiss sample 76032D displays gar-

net porphyroblasts up to 2.5 cm in diameter (Fig. 25d) within a fine-grained, statically recrystallized matrix of albite, quartz, stilpnomelane, phengite, clinozoisite, epidote, and titanite. Rare chlorite formed on garnet rims. Garnet displays a prograde zoning with a core composition of $Alm_{43}Prp_{<1}Grs_{33}Sps_{24}$, and a rim composition of $Alm_{63}Prp_{1}Grs_{30}Sps_{6}$ (Fig. 28a). Other Fe-Mg silicates show low X_{Mg}-values, i.e. stilpnomelane 0.14-0.16, chlorite 0.23, and phengite 0.35-0.39. Phengite has Si contents of 3.35-3.37 p.f.u.

Modelling in MnTNCKFMASH system points to garnet growth from 448 °C at 1.08 GPa to ~490 °C at 1.17 GPa within the stability field of albite and ilmenite (Fig. 28c), which both occur included in garnet. To investigate the low-grade overprint, matrix composition (NKFMASH system) was used. The intersections of the Si isopleths of phengite with those of X_{Mg} in stilpnomelane indicate PT conditions of 320 °C at 0.70 GPa (Fig. 28d). Remarkably, these rocks reveal a very similar PT path as the gneisses from the city of Shiyan.

3.4.5 Low-grade metamorphic schists of the northern Wudang Complex

The fine-grained epidote-chlorite greenschist 76022B contains σ-type, often atoll-shaped aggregates consisting of randomly oriented chlorite flakes



surrounded by granular epidote, which represent former vesicles (Fig. 29a). The shape of the aggregates indicates sinistral shear sense. Epidote also forms subhedral prisms up to 200 μm length in the matrix. Additionally, the matrix consists of chlorite, phengite, quartz, pale green amphibole, rare albite, calcite, titanite, apatite, and ilmenite. Amphibole is actinolite with X_{Mg}-values of 0.76-0.78. Phengite shows Si contents of 3.41 p.f.u. and an X_{Mg} of ~0.63. Chlorite flakes in the former vesicles and aligned chlorite flakes in the matrix have identical composition with X_{Mg}-values of 0.64-0.67 and albite has an X_{Ab} of >0.99. Based on chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005) PT conditions of 280-330 °C at 0.6-0.7 GPa were calculated.

Epidote-amphibole greenschist 76053A (Fig. 29b) is composed of chlorite, quartz, epidote, phengite, amphibole, albite, apatite, titanite, pyrite, and zircon. Amphibole is actinolite with X_{Mg}-values of 0.56-0.64. Phengite shows Si contents of 3.34-3.40 p.f.u. and X_{Mg}–values of 0.53-0.61 while the X_{Mg} of chlorite is 0.47 and albite again shows X_{Ab} > 0.99. Chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005) point to PT conditions of 275-315 °C at 0.8-0.9 GPa (Fig. 34c).

The matrix of greenschist 76057B (Fig. 29c) shows a slaty cleavage mainly consisting of aligned green amphibole, chlorite, minor phengite and snowball epidote indicating a dextral shear sense. Quartz, epidote and albite occur as larger single grains and form elongate lenses and thin layers parallel to the foliation while titanite, magnetite and pyrite are accessory. Remarkable are distinctly blue coloured barroisite prisms enclosed in or in close neighbourhood of large epidote crystals, while most of the aligned green amphibole prisms are actinolite. Both amphiboles have similar X_{Mg}-values of 0.68-0.71. The Si content of phengite varies between 3.28 and 3.38 p.f.u. with X_{Mg}–values of 0.42-0.47. Chlorite's X_{Mg}-values are 0.51-0.52 while albite is > 99% pure. Chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005) yield 270-330 °C at 0.5-0.7 GPa for the syn-tectonic mineral assemblage.

Amphibole-phengite-schist 760210A displays a slaty cleavage interrupted by mm- to cm-wide extension gashes. The mineral assemblage of the schist (Fig. 29d) equals that on the extension gashes: blue amphibole, epidote, chlorite, phengite, albite, minor quartz and accessory titanite and apatite. Larger amphibole prisms reveal distinct zoning (Fig. 29e). According to Leake et al. (1997) the dark blue cores are magnesioriebeckite while bluish-green rims are winchite. The major substitution is $NaAl^{IV}$ <--> CaMg (Fig. 30a). The X_{Mg} increases from the core section (0.61) to the rim (0.74). Phengite has high Si contents of 3.39-3.45 p.f.u. and X_{Mg}-values of 0.45-0.50. Chlorite's X_{Mg} is 0.55-0.58. Conventional thermobarometry using chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005) on

Figure 28 (page 74). Equilibrium assemblage calculations and garnet isopleth thermo-barometry applied to samples from outcrop 76032 (north-central Wudang Complex).
(a) Representative EMP profiles through garnets from samples 76032C and 76032D. Highlighted points refer to the garnet EMP analysis (Tab. 11) valid for isopleth intersections displayed in the equilibrium assemblage diagrams.
(b) Equilibrium assemblage diagram of sample 76032C calculated in the MnTNCKFMASH system with excess H2O. Garnet core isopleths are shown. The stability field of the observed assemblage is marked in orange. Bulk-rock composition (given in mol) is 23.419 Si; 0.101 Ti; 7.412 Al; 1.105 Fe; 0.451 Mg; 0.397 Ca; 0.230 Mn; 2.693 Na; 1.650 K; 62.513 O.
(c) Peak metamorphic stage of sample 76032D. The left hand side of the diagram displays garnet core isopleths and was calculated using a bulk-rock composition (in mol) of 24.709 Si; 0.059 Ti; 5.320 Al; 2.093 Fe; 0.295 Mg; 0.580 Ca; 0.231 Mn; 3.758 Na; 0.221 K; 62.705 O derived by point counting. Chemical fractionation during garnet growth was taken into account before calculation of the right hand side of the diagram which displays garnet rim isopleths. The appropriate bulk-rock composition (in mol) is 23.699 Si; 0.059 Ti; 4.647 Al; 1.632 Fe; 0.290 Mg; 0.261 Ca; 0.006 Mn; 3.758 Na; 0.221 K; 58.664 O. The second intersection of garnet rim isopleths (grey) is unlikely considering PT estimate for sample 76032C.
(d) Low-grade overprint. Bulk-rock composition is the matrix composition of the sample, i.e. 25.786 Si; 4.862 Al; 1.570 Fe; 0.318 Mg; 4.169 Na; 0.245 K; 62.960 O.

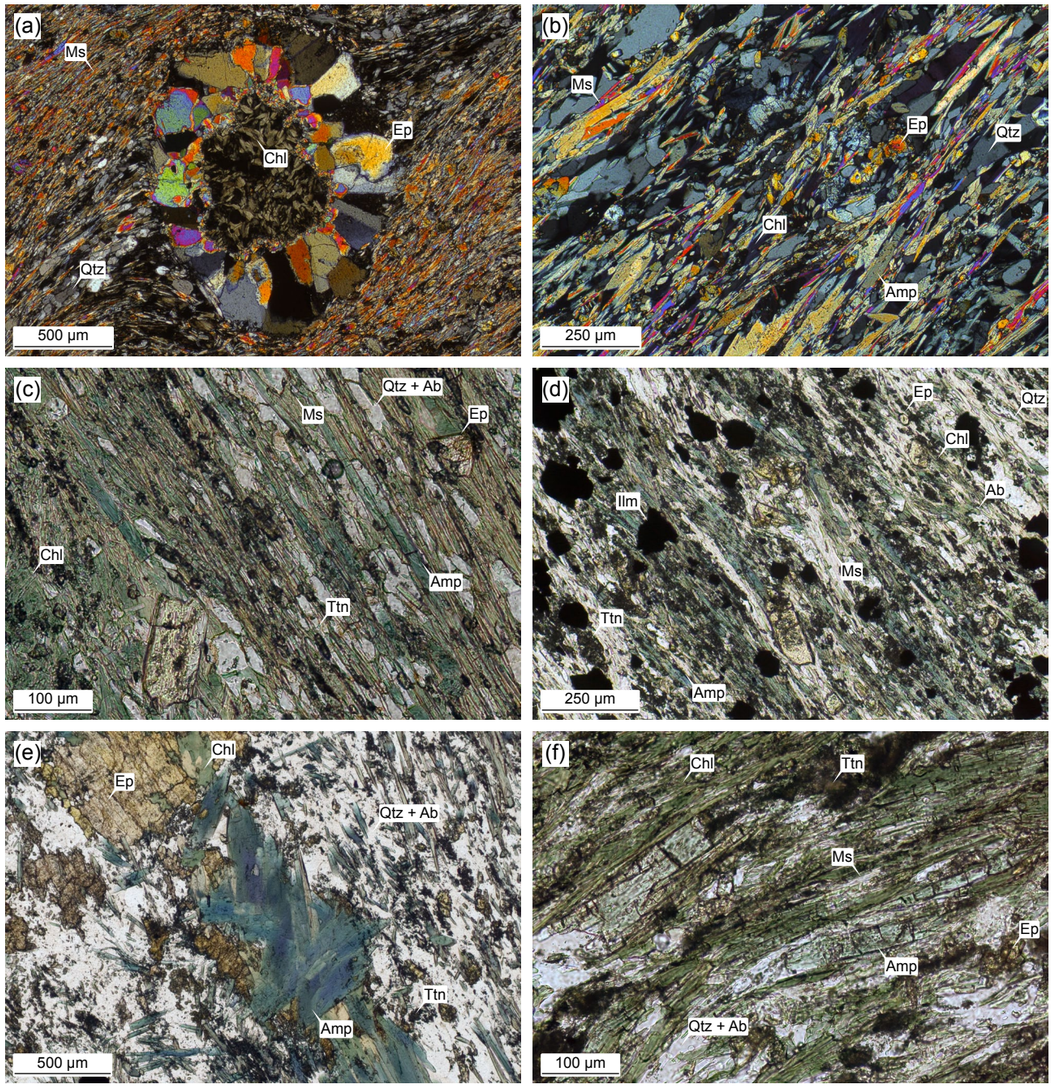


Figure 29. Photomicrographs. (a), (b) cross-polarized light; (c)-(f) plane polarized light.
(a) Former vesicle consisting of epidote and chlorite within a fine-grained matrix; epidote-chlorite-greenschist 76022B.
(b) Assemblage of the amphibole greenschist 76053A.
(c) Strongly aligned Na-amphibole needles together with intergrown chlorite and K white mica of greenschist 76057B.
(d) Matrix assemblage of amphibole-epidote-phengite-greenschist 760210A.
(e) Close-up of zoned Na-amphiboles beneath an epidote crystal within an extension gash of amphibole-epidote-phengite-greenschist 760210A.
(f) Pale green actinolite prisms of calcite-epidote-amphibole-greenschist 811042C.

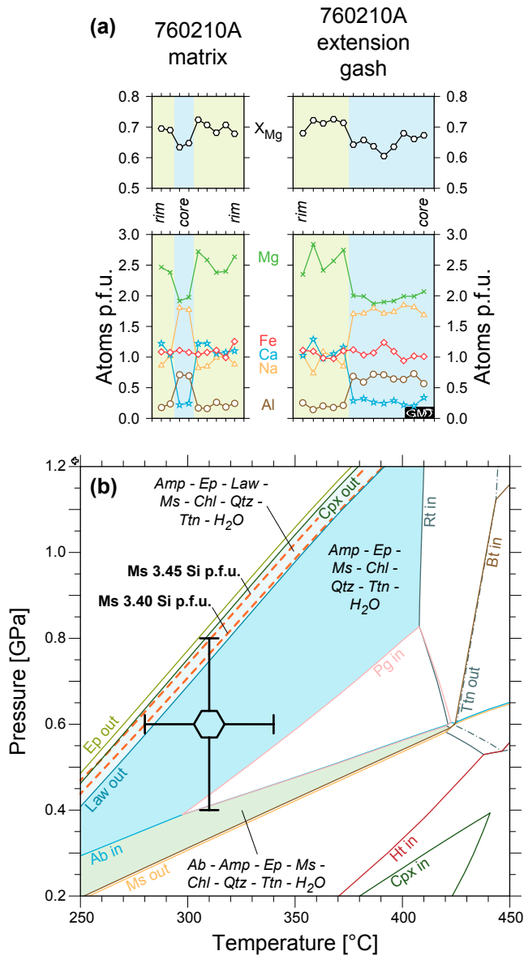


Figure 30. (a) EMP profiles through amphiboles from sample 760210A.
(b) Equilibrium assemblage diagram of sample 760210A, calculated with a bulk-rock composition (in mol) of 20.431 Si; 0.358 Ti; 5.391 Al; 3.904 Fe; 3.615 Mg; 2.559 Ca; 0.079 Mn; 1.868 Na; 0.168 K. O is defined by the hematite-magnetite buffer. The hexagon displays PT conditions calculated using chlorite-phengite-quartz-H_2O-equilibria (a_{H_2O} = 1).

assemblages from tension gashes and from the matrix indicating 300-320 °C at 0.5-0.7 GPa (Fig. 30b). These PT conditions plot within the wide stability field of the assemblage amphibole – epidote – chlorite – phengite – quartz – titanite calculated in the TNCKFMASHO system with hematite-magnetite buffer. Si-isopleths of phengite are located at the upper pressure limit of this field or slightly above but still within the uncertainties of the chlorite-phengite-quartz-H_2O-thermobarometry. The stability of albite at somewhat lower pressures indicate late growth probably together with the winchite rims of amphiboles.

Epidote-carbonate-amphibole greenschist sample 811042C originates from the northwestern margin of the Wudang Complex. It shows a distinctly foliated matrix mainly made up of aligned green amphibole, chlorite, phengite and subordinate epidote, quartz and albite (Fig. 29f). Several former vesicles are filled with granular epidote. A weak compositional banding is revealed by layers with variable calcite content. Accessories are titanite, apatite and limonite. Amphibole is actinolite to winchite with an X_{Mg} of ~0.56. Phengite has Si contents of 3.39-3.44 p.f.u. and X_{Mg}-values of 0.48-0.49. The X_{Mg} of chlorite is ~0.50 and albite is > 99% pure. Chlorite-phengite-quartz-H_2O equilibria (Dubacq et al., 2010; Vidal et al, 2005) calculate PT-conditions of 290-300 °C at 0.4-0.5 GPa.

3.4.6 High-grade metamorphic rocks from Wudang's northern margin

Garnet amphibolite 76046A is a compact, foliated rock, which experienced an intense low-grade metamorphic overprint. Garnet porphyroblasts and aligned brown-green amphibole prisms are enclosed by a fine-grained, retrograde matrix consisting of epidote, chlorite, albite, dynamically recrystallized quartz, and titanite mantling ilmenite (Fig 31a). Calcite is present in strain shadows of garnet crystals. Accessories include pyrite, apatite, and zircon. Microprobe profiles through garnet porphyroblasts reveal a typically prograde zoning with a core composition of $Alm_{52}Grs_{30}Prp_2Sps_{16}$ and a rim composition of $Alm_{62}Grs_{25}Prp_9Sps_3$ (Fig. 32a). According to Leake et al. (1997), amphibole is ferrotschermakite with X_{Mg}-values of 0.26-0.32. Assuming an isochemical low-grade overprint, garnet isopleth thermo-barometry was applied in the NCKFMASH system using a bulk-rock analysis as input. Intersecting garnet isopleths of the core, the intermediate section and the rim reveal simultaneous heating and burial during garnet growth (Fig. 32b) starting at 590 °C and 0.55 GPa. The corresponding calculated stable mineral assemblage comprises garnet, calcic amphibole,

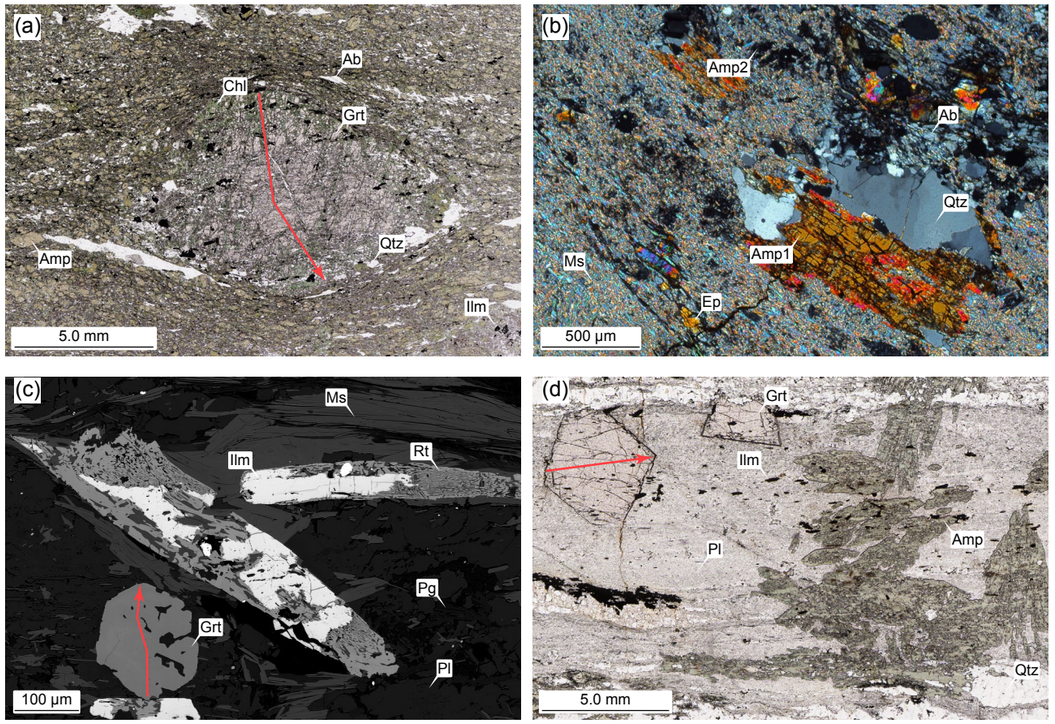


Figure 31. Photomicrographs and BSE image. (a), (c) plane polarized light. (b) cross-polarized light.
(a) Garnet porphyroblast within a retrogressed matrix; garnet amphibolite 76046A.
(b) Zoned amphibole prisms within a retrogressed matrix of amphibole orthogneiss 76045G.
(c) BSE image of garnet-bearing muscovite-paragonite-chlorite-schist D7626A showing ilmenite prisms incompletely replaced by rutile.
(d) Euhedral garnet porphyroblasts and post-tectonic amphibole aggregate of garnet-amphibole-gneiss D7625A.

plagioclase, and quartz. According to the modelling, the rock enters the clinopyroxene stability field at 628 °C and 0.62 GPa. The intersections of garnet rim isopleths reveal peak metamorphic PT conditions of 703 °C and 0.93 GPa within the stability field of the assemblage garnet, calcic amphibole, clinopyroxene, plagioclase, and quartz.

The mylonitized amphibole orthogneiss 76045G displays σ-type alkali-feldspar clasts up to 4 cm and aligned brown amphibole prisms, which show thin pale-green rims. Similar to the garnet amphibolite from the same location, the orthogneiss experienced a thorough low-grade overprint leading to a saussuritization of plagioclase, a sericitization of K-feldspar and growth of epidote, chlorite, white mica, and calcite in the matrix (Fig. 31b). Accessories are titanite, apatite, zircon, and allanite. Amphibole cores are ferrotschermakite having an X_{Mg} of 0.35-0.40 and TiO_2-contents of ~1.5 wt.-% while rims are actinolite to ferro-actinolite with X_{Mg}–values of 0.47-0.52 and minute amounts of TiO_2 (<0.1 wt. %). A combination of Ti-in-amphibole geothermometry (Colombi, 1988) with Al-in-amphibole geobarometry (Anderson & Smith, 1995) yields 770-780 °C at 0.6-0.7 GPa for the core section of the amphibole.

3.4.7 Early Palaeozoic cover of the Yangtze craton

Some 90 km west of the city of Ankang, garnet-bearing muscovite-paragonite-chlorite-schist D7626A was sampled from a Silurian volcano-sedimentary sequence. It displays distinct compositional layering with quartz-chlorite-, plagioclase-chlorite-muscovite-paragonite-garnet-, and almost monomineralic quartz-layers. A penetrative schistosity parallel to this layering is defined by aligned sheet silicate

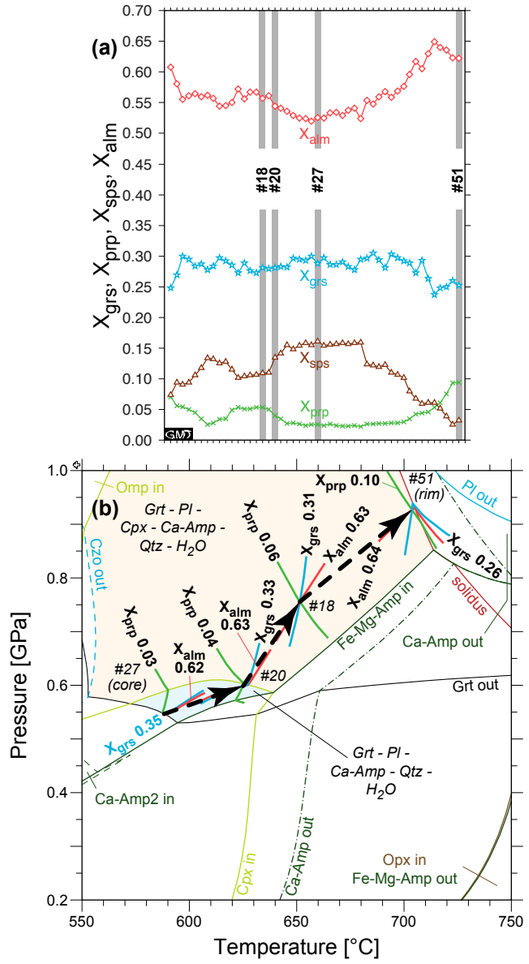


Figure 32. (a) EMP profile through a garnet porphyroblasts of sample 76046A. Highlighted points refer to the garnet EMP analysis (Tab. 3) valid for isopleth intersections displayed in the equilibrium assemblage diagram below.
(b) Equilibrium assemblage diagram of sample 76046A, calculated in the NCKFMASH system with excess H_2O. Chemical fractionation was not taken into account as its effects were negligible. Bulk-rock composition (in mol) is 18.771 Si; 5.660 Al; 4.574 Fe; 2.040 Mg; 3.874 Ca; 0.078 Mn; 1.241 Na; 57.219 O.

as well as elongated quartz and feldspar grains. C'-type shear bands within a sheet silicate-rich layer point to top-S displacement. Accessories are ilmenite mantled by rutile (Fig. 31b), apatite, tourmaline, and zircon. Garnet crystals, which include quartz, plagioclase, ilmenite and rutile, partly reveal an elongate, in some cases skeletal growth with alignment in the foliation. A single mm-thick layer, mainly consisting of chlorite and anhedral plagioclase grains, hosts euhedral spessartine-rich garnet crystals up to 0.2 mm in diameter, which show a prograde zoning (Fig. 33a) with cores of $Alm_{44}Grs_{10}Prp_5Sps_{41}$ and rims of $Alm_{50}Grs_{12}Prp_6Sps_{32}$. The composition of the skeletal grains equals that of the core section of the euhedral garnet crystals. Plagioclase is mostly unzoned with an X_{An} of 0.19-0.24 but sometimes decreasing Ca concentrations are recorded a the rim (X_{An} 0.12). Muscovite occurs subordinately as small flakes in sheet silicate-rich sections and having Si contents of 3.05-3.07 p.f.u., an X_{Na} (=Na/(Na+K)) of 0.20-0.26 and a variable X_{Mg} of 0.47-0.63. Mostly, paragonite is intergrown with muscovite. Its X_{Na} varies between 0.80 and 0.96. Chlorite has a uniform composition with an X_{Mg} of 0.52-0.56.

Using the composition of the garnet bearing layer as input, thermodynamic modelling in MnTNCKFMASH system points to garnet growth from ~520 °C at ~0.5 GPa (core) to ~540 °C at ~0.6 GPa (rim, Fig. 33c). The Si-content of muscovite points to slightly higher pressures of 0.6-0.7 GPa in the stability field of the assemblage garnet – plagioclase – muscovite – paragonite – chlorite – quartz – ilmenite – rutile. Thus, the calculated PT conditions match the textural observation of ongoing ilmenite-breakdown to rutile.

Garnet-amphibole-gneiss D7625A originates from the same unit, some 15 km south of outcrop D7626A. The rock displays distinct compositional banding with medium grained, nearly monomineralic quartz layers and lenses, quartz-feldspar-rich layers and layers showing euhedral garnet and randomly oriented bundles of green amphibole within a fine-grained matrix of quartz, plagioclase, chlorite and muscovite (Fig. 31d). The foliation accentuated by elongated ilmenite grains is oriented parallel or subparallel to these layers and lenses. Some layers contain rare, light brown biotite flakes. Accessories include clinozoisite, ilmenite, zircon, apatite, and tourmaline.

Garnet forms euhedral and subhedral porphyroblasts and contains inclusions of quartz, ilmenite and green hornblende with an orientation parallel to the foliation. Garnet core composition is $Alm_{57}Grs_{20}Prp_7Sps_{16}$ while rim is $Alm_{55}Grs_{26}Prp_8Sps_{11}$ (Fig. 33b). At the outermost rim section, increasing

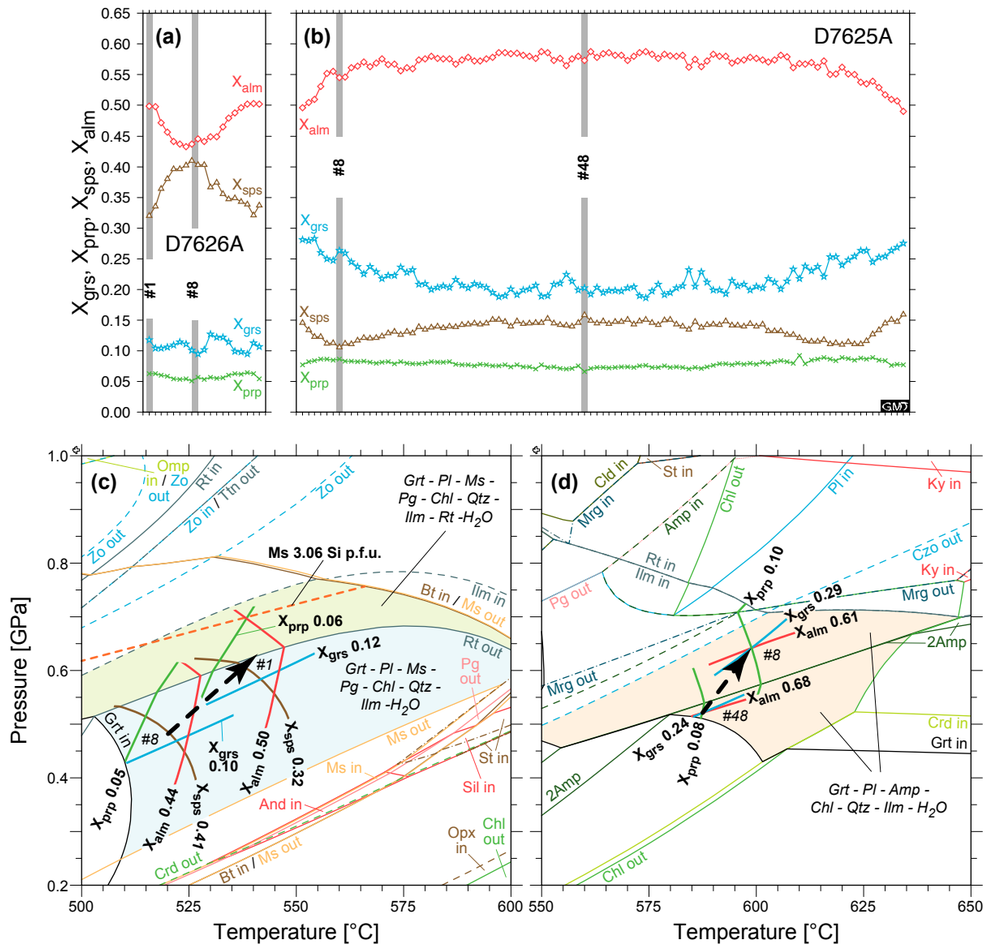


Figure 33. (a) EMP profile through a garnet porphyroblasts of garnet-bearing muscovite-paragonite-chlorite-schist D7626A.
(b) EMP profile through a garnet porphyroblasts of garnet-amphibole-gneiss D7625A.
(c) Equilibrium assemblage diagram of sample D7626A calculated with a bulk-rock composition (mol) of 19.088 Si; 0.492 Ti; 9.743 Al; 1.820 Fe; 1.959 Mg; 1.113 Ca; 0.143 Mn; 4.429 Na; 0.124 K; 61.086 O. The effect of chemical fractionation during garnet growth is negligible and was thus omitted.
(d) Equilibrium assemblage diagram of sample D7625A calculated with a bulk-rock composition (mol) of 21.753 Si; 0.075 Ti; 8.106 Al; 1.844 Fe; 1.315 Mg; 3.597 Ca; 0.433 Na; 62.788 O. The effect of chemical fractionation during garnet growth is negligible and was thus omitted.

Mn- and decreasing Mg-contents highlight retrogression. Matrix plagioclase grains are weakly zoned with X_{An} 0.86-0.92. However, few relic grains, which occur within the matrix as well as inclusions in amphibole show an X_{An} of 0.30-0.38. Amphibole is magnesiohornblende with X_{Mg} values of 0.52 (core) to 0.60 (rim).

Garnet-isopleth thermobarometry (TNCFMASH system, Fig. 33d) yields 587 °C at 0.52 GPa (core) to 599 °C at 0.64 GPa (rim).

3.5 Geochronology

3.5.1 U/Pb zircon geochronology

From the various parametamorphic rocks occurring in the working area we dated multiple samples using U/Pb on zircon with the following results:

The calcite-bearing paragneiss 75305D from the central Liuling Unit gave a youngest age cluster at 448.3 ± 4.4 Ma; others are at 565.8 ± 5.5; 651.6 ± 6.2 and ~850 Ma. The youngest and oldest grains are ~330 Ma and 2786 Ma, respectively. Metapsammite 75308A, taken in the Liuling Unit ~15km south of 75305D shows a youngest cluster (two grains) at 324.6 ± 4.6 Ma. Further age clusters are 344.2 ± 4.8, 383.2 ± 5.8, 402.4 ± 5.6, 688.1 ± 9.4, 759-838, 997 and 1140 Ma. The oldest grain yields ~3783 Ma. The youngest grain of quartz mica schist 76131B from the Juliping Unit shows ~360 Ma, the youngest cluster is at 377.2 ± 4.6 Ma. Other major clusters are at ~400 and ~800 Ma. The oldest grain is at ~3393 Ma.

The retrogressed garnet gneiss 76114C from the Douling Unit bears two youngest grains at 235.5 ± 3.4 Ma. Peaks are at 712.7 ± 6.6, 748.3 ± 5.8, 788.9 ± 4.1, 825 ± 5.6, 864.7 ± 7.7, 915.6 ± 9.3, 947 ± 13, and ~1889. The oldest grain is at ~2411 Ma.

3.5.2 $^{40}Ar/^{39}Ar$ geochronology

Dating biotite of granite sample 76105A of the Douling Unit using the Ar-Laser yields 555 ± 3 Ma.

Amphiboles of sample 76113B, an amphibolite, which shows fresh aligned brownish amphibole in a completely altered matrix, yield a high-temperature plateau at 890 ± 20 Ma and cooling to 298 Ma.

Biotite from retrogressed garnet gneiss 76114C revealed a loss profile from ~762 Ma to ~243 Ma with a high- and intermediate-T flat section at 710 ± 20 Ma

Ar/Ar laser dating of micas of the Liuling Unit yield Permian ages. Phengite from a hydrothermal vein sample 75262C shows an age of 260 ± 3 Ma. Metamorphic biotite of the massive calcite-bearing quartzite 75263B shows a plateau age of 275 ± 5 Ma and a loss profile to ~171 Ma. Phengite of a mica schist layer taken from the same outcrop yields a somewhat younger plateau age of 253.3 ± 1.5 Ma. Biotite from massive amphibole-carbonate-epidote quartzite sample 75264B shows a loss profile from a plateau at 277 ± 1 Ma to ~240 Ma. Some 70 km east of it, biotite of the calcite-bearing gneiss 75305D displays a loss profile from the plateau at 282 ± 3 Ma to ~40 Ma.U/Pb.

3.5.3 Garnet-staurolite geochronology

The discontinuous zoning of garnet crystals of sample 75261C arise the question, weather they are inherited from a previous orogenic cycle or grew earlier on the same orogenic cycle that formed their grossular-rich rims. An U/Pb isochron age of 320 ± 20 Ma was obtained from garnet included in cores of large staurolite porphyroblasts and the staurolite crystal itself. Together with new Ar/Ar ages of biotite and white mica from the same succession (253-277 Ma) this age indicates that the two stages of garnet growth occurred quickly one after the other.

3.6 Discussion

3.6.1 Metamorphic evolution

Metasediments of the Liuling Unit display discontinuous garnet zoning featuring a distinct increase of the grossular component in their rims. In case of sample 75261C, a medium pressure amphibolite facies, clockwise PT-evolution can be deduced for the garnet core whereas the rim section testifies to high-pressure amphibolite facies conditions under similar temperatures. The wide range of geochronologic data from the Liuling (e.g., LA-ICPMS and ion probe dating of detrital zircons proving Archean to Early Carboniferous ages) render it possible that garnet core and rim formed during two discrete Barrovian metamorphic cycles. However, U/Pb geochronology on the garnet core and staurolite yield an age of ~320 Ma while Ar/Ar ages of biotite and white mica from the same succession are at 253-277 Ma, proving that the two stages of garnet growth occurred quickly one after the other. Thus, sample 75261C experienced an at least a two-stage burial-exhumation history during Late Carboniferous-Permian. Such quick successions of burial-exhumation cycles were modelled for several subduction-accretion wedges worldwide (e.g. Gerya et al. 2002) and would thus coincide with the theory the Liuling being a remnant of an accretionary wedge.

The garnet rim of sample 75302A also indicates high-pressure amphibolite facies conditions. Their

garnet core sections, however, point to an early, upper amphibolite facies metamorphism at medium pressures thus to an environment with a high heat flow. Similar PT conditions are known from the Devonian metamorphism of the northerly abutting Qinling Unit (e.g., Bader et al., 2010; You et al., 1993) as well as from the Neoproterozoic metamorphic event in the Yangtze basement (Zhang S et al., 1996 and this study). Therefore, an incorporation of basement from the hanging wall into a younger, Permo-Carboniferous metamorphic cycle cannot be excluded.

Garnet gneiss 76114C from the Douling Complex yields upper amphibolite facies conditions. The 712 Ma zircons age cluster from this rock may date this event and thus coincides with the study of Zhang S et al. (1996) and available Ar/Ar geochronology (see Ratschbacher et al., 2003, for review). However, the two youngest single grains at 235 Ma point to a Triassic thermal event. Conditions of 565 °C at 0.9-1.2 GPa derived from nearby garnet-mica-schist 76111A point to a more pressure-dominated Barrovian overprint that possibly also occurred in the Neoproterozoic. Two schists (753011A and 75312B) from the cover sequence constrain the ubiquitous low-grade overprint of the Douling at ~300 °C and 0.6-1.0 GPa, i.e. blueschist-facies, which was at least locally followed by a greenschist-facies stage at ~400 °C and 0.5 GPa. By analogy with the blueschist-facies overprint in the Wudang, the Sussong, and the Zhangbaling areas, this occurred in the Triassic.

Similar to the Douling complex, Wudang's northern part underwent a blueschist-facies (HP/LT) overprint at ~300 °C and 0.5-1.0 GPa. Its central and north-central part experienced a higher-grade metamorphic overprint at conditions of ~500 °C at 1.0-1.3 GPa (HP/MT), which was followed by a HP/LT overprint at ~310 °C and ~0.6 GPa. Published Ar/Ar ages of 232 Ma (phengite), 216 Ma (riebeckite; Mattauer et al. 1985), 237 Ma (hornblende) and 232 Ma (phengite, Ratschbacher et al. 2003) demonstrate that the HP-metamorphism within the Wudang occurred in Late Triassic.

The upper amphibolite facies garnet amphibolite 76046A from Wudang's northern margin and the amphibole-granodiorite 76045G probably underwent a Barrovian metamorphism in the Neoproterozoic. The lithology and the PT conditions of the early metamorphic overprint closely resemble those of gneisses from the nearby Douling complex (Fig. 18b; Zhang S et al., 1996 and this study). For the retrograde, low-grade overprint a Triassic age may be assumed.

3.6.2 Tectonic framework

The Liuling Unit and its equivalents have been regarded as remnants of a forearc basin (e.g., Ratschbacher et al., 2006; Yan Z et al., 2006b) due to their position south of the Devonian Andean style continental margin and the occurrence of Devonian turbidites. The age spectrum of detrital zircons from the central Liuling (Shanyang basin) shows that the rocks from the Early Palaeozoic Qinling magmatic arc must have delivered at least a part of the material as the arc did not affect the Yangtze craton. However, a contribution of the southern plate cannot be ruled out, as there are also lots of 0.7-0.8 Ga zircons and both, the Yangtze craton and the Qinling Unit experienced the 0.7-0.8 Ga subduction-rifting event. Early Carboniferous (~330 Ma) detrital zircon grains together with U/Pb dating garnet-staurolite dating give just ~10 Ma time span from sedimentation to burial to mid-crustal levels (1st metamorphic stage of sample 75261C) for the Liuling sediments. The second metamorphic stage might have incorporated Qinling basement thus pointing to burial of the hanging wall as the garnet cores of sample 75302A point to a HT/MP event typical for the Qinling arc metamorphics (Bader et al., 2010). Thus, the Carboniferous subduction of the Yangtze plate led to the burial of the Liuling sediments to lower crustal levels at the same time, eclogites formed in the Huwan mélange. Altogether, this proves ongoing subduction along the Qinling-Dabie orogen until Late Carboniferous. Probably, the subduction at the Carboniferous-Permian transition as palaeomagnetic data (Zhao and Coe 1987; Enkin et al. 1992) suggests that the Yangtze and the Sino-Korean cratons moved farther apart in the Middle Permian to Middle–Late Triassic, which, however, also contradicts the deep continental subduction in Dabie. Faure et al. (2008) speculated about Permian-Triassic rifting in the Yangtze craton, but there are no indications for that.

The next prove of ongoing subduction are Dabie's UHP eclogites formed at ~240 Ma resulting from the northward subduction of the leading edge of the Yangtze craton beneath the amalgamated Qinling-Erlangping-Sino-Korean continent. In the central part, the subduction of the leading edge of the

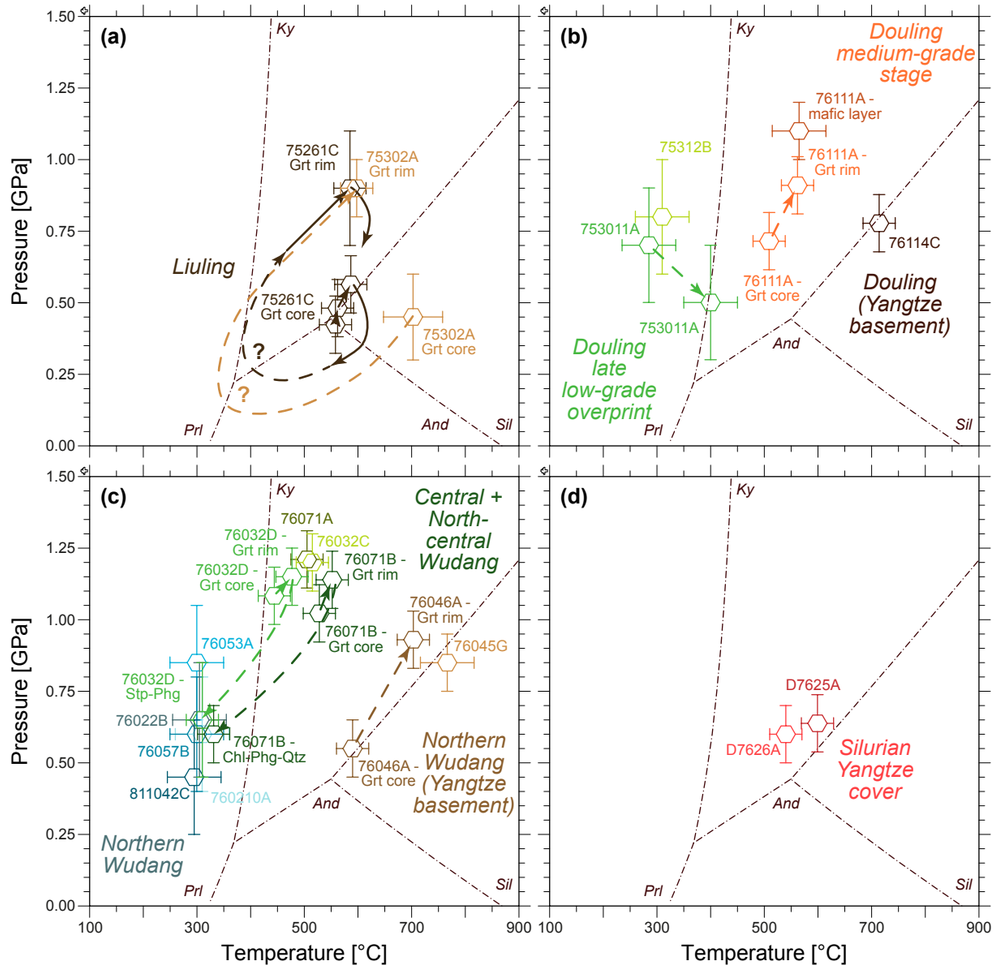


Figure 34. Pressure-temperature evolution of:
(a) the central Liuling unit
(b) the Douling complex
(c) the Wudang complex
(d) the Silurian Yangtze cover

Yangtze craton manifests in the formation of blueschist- and greenschist facies rocks in the Wudang and the Douling Complex (Fig. 18b, 19c) being the continuation of the blueschist-facies Sussong belt south of Dabie.

The HP/MT rocks from the Wudang formed under a subduction setting at a geothermal gradient of ~12 °C/km. One could possibly argue that this also happened during the Neoproterozoic. However, the Yangtze craton was the overriding plate during a southward (todays orientation) trending subduction in the Neoproterozoic. Todays Wudang centre was buried to greater depths although the same geothermal gradient of ~12°C/km is, within errors of geobarometry, also appropriate for the low-grade metamorphic northern Wudang and Douling thus must have been part of the same downgoing slab. Still within the subduction channel nappes now building Wudang's core separated from the slab and ascended. Their HP/LT overprint proves very fast exhumation

along approximately the same geothermal gradient. Thus, the HP/LT overprint may mark the juxtaposition with nappes now forming Wudang's north within the subduction channel and the onset of imbricated nappe stacking along south-verging thrusts (Huang, 1993). Crustal N-S extension (Ratschbacher et al., 2003) finally brought the Wudang Shan to the surface.

3.7 Conclusions

South of the Shangdan fault, the central Qinling unit comprises the Liuling fore-arc basin, the Douling basement wedge, and the Wudang metamorphic core complex. New U/Pb ages of detrital zircons prove Early Palaeozoic Qinling magmatic arc provenance of clastic sediments of the Shanyang basin substantiating the fore-arc basin interpretation. Metamorphics from the Liuling unit experienced a two-stage burial-exhumation history during Late Carboniferous-Permian. Thermodynamic modelling of zoned garnet reveals a first clockwise Barrovian metamorphism, which took place under medium pressure amphibolite facies conditions (560-590 °C at 0.4-0.6 GPa) that was followed by a second stage of high pressure amphibolite facies metamorphism (590 °C at 0.9 GPa).

The basement of the southerly abutting Douling Complex underwent a medium to high-grade metamorphic overprint (560-710 °C at 0.8-1.2 GPa) that likely occurred in the Neoproterozoic. A thorough LT/HP metamorphic overprint (280-340 °C at 0.5-0.9 GPa) of probable Triassic age affected basement as well as cover units.

In the centre of the Wudang Complex, HP/MT metamorphic conditions (500-550 °C at 1.0-1.2 GPa) recorded by garnet gneisses and amphibolites are followed by a HP/LT overprint of 300 °C and 0.6-0.7 GPa. Similar HP/LT metamorphic conditions (~300 °C at 0.4-0.9 GPa) are recorded in blueschists of the northern Wudang Complex.

The HP/MT and HP/LT metamorphics of the Douling and Wudang areas formed by subduction of the Yangtze craton underneath the amalgamated Sino-Korean craton-Qinling-Erlangping-continent in the Triassic.

3.8 Acknowledgement

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3.9 Appendix

3.9.1 Calculation of garnet fractionation

During the growth of chemically zoned garnet porphyroblasts, components are constantly removed from the rock matrix. As the composition of the garnet depends on the chemical composition of the rock and on its thermal evolution, subsequent shells showing different compositions are created during changing PT conditions. Thus, a chemical potential gradient is built up between the garnet core and the rock matrix. Due to low intergranular diffusivity at temperatures below ~700 °C (e.g., Chakraborty & Ganguly, 1992), garnet zoning and thus the chemical potential gradient is preserved. Therefore, central parts of zoned garnet porphyroblasts are in thermodynamic disequilibrium with the rock matrix, which constantly changes its effective composition due to this chemical fractionation. To model the PT conditions during garnet growth, components that are in disequilibrium with the effective bulk-rock composition must be subtracted, because changes in the bulk-rock composition affect the zoning of the porphyroblasts (e.g., Spear, 1988).

To exclude the effect of fractionation in garnet, we use the following method:

During garnet growth, equilibrium between the outermost garnet rim (i.e., the part that is growing) and the rock matrix is assumed. Furthermore, diffusional flux between inner portions of the crystal and the matrix and vice versa is assumed to be negligible.

The program Theriak calculates compositions and amount of individual stable phases of an assemblage at a given PT point. By forward modelling, a PT path is derived from garnet zoning, along which the garnet is thought to grow. Along this path, chemical fractionation is taken into account by subtracting those components, which are incorporated into the garnet from the previous bulk-rock composition. This is done every one degree centigrade along the PT path.

3.9.2 Solution models used to calculate equilibrium assemblage diagrams and isopleths

NKFMASH (sample 75312B): garnet, chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); clinopyroxene, biotite, chlorite: based on Holland & Powell (1998), plagioclase: Holland & Powell (2003); white mica: Coggon & Holland (2002); orthopyroxene: White et al. (2002); stilpnomelane: Massonne & Willner (2008)

MnTNCKFMASH (samples 75261C, 75302A, 76111A, 76017A, 76032C, 76032D, D7626A): garnet, chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); clinopyroxene, biotite, chlorite: based on Holland & Powell (1998), plagioclase: Holland & Powell (2003); white mica: Coggon & Holland (2002); orthopyroxene: White et al. (2002)

TNCKFMASH (samples 76114C, 76017B, 76046A, D7625A): garnet, melt, biotite: White et al. (2007); amphibole: Diener et al. (2007); clinopyroxene: Green et al. (2007); chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); chlorite: based on Holland & Powell (1998); orthopyroxene: White et al. (2002)

TNCKFMASHO (sample 760210A): garnet, melt, biotite: White et al. (2007); amphibole: Diener et al. (2007); clinopyroxene: Green et al. (2007); chloritoid, staurolite, cordierite, epidote, ilmenite: Holland & Powell (1998); chlorite: based on Holland & Powell (1998); orthopyroxene: White et al. (2002)

Non-solution phases: all other included into the database of Holland & Powell (1998)

3.10 References

Anderson, J.L., Smith, D.R., 1995. The effects of temperature and fO2 on the Al-in-hornblende barometer. Am. Mineral. 80, 549-559.

Bader, T., Franz, L., de Capitani, C., Ratschbacher, L., Hacker B.R., Weise, C., Wiesinger, M., Popp, M., New insights into the Early Palaeozoic history of the multistage Qinling orogen (East central China). 88th annual meeting of the German Mineralogical Society, Abstract S03-T02

Chakraborty, S., Ganguly, J., 1992. Cation diffusion in aluminosilicate garnets: experimental determination in spessartine–almandine diffusion couples, evaluation of effective binary, diffusion coefficients, and applications. Contrib. Mineral. Petrol. 111, 74-86.

De Capitani, C., 1994. Gleichgewichts-Phasendiagramme: Theorie und Software. Berichte der Deutschen Mineralogischen Gesellschaft, Beih. Europ. J. Mineral. 48, 6.

De Capitani, C. & Brown, T. D., 1987, The computation of chemical equilibrium in complex systems containing non-ideal solutions. Geochimica et Cosmochimica Acta, 51, 2639-2652.

De Capitani, C. & Petrakakis, K., 2010, The computation of equilibrium assemblage diagrams with Theriak/Domino software. American Mineralogist, 95, 1006-1016.

Diener, J.F.A., Powell, R., White, R. W. & Holland, T.J.B., 2007, A new thermodynamic model for clino- and orthoamphiboles in the system Na2O-CaO-FeO-MgO-Al2O3-SiO2-H2O-O. Journal of metamorphic Geology, 25, 631-656.

Diwu, C.R., Sun, Y., Liu, L., Zhang, C.L. & Wang, H.L., 2010. The disintegration of Kuanping Group in North Qinling orogenic belts and Neo-Proterozoic N-MORB. Acta Petrologica Sinica, 26, 2025-2038 (in Chinese with English abstract).

Chen D., Liu, L., Sun, Y., Zhang, A., Zhang, C., Liu, X. & Luo, J., 2004a. Determination of the Neoproterozoic Shicaogou Syn-collisional Granite in the Eastern Qinling Mountains and Its Geological Implications. Acta Geologica Sinica, 78, 73-82

Chen, D., Liu, L., Sun, Y., Zhang, A., Liu, X. & Luo, J., 2004b. LA-ICP-MS zircon U-Pb dating for high-pressure basic granulite from North Qinling and its geological significance. Chinese Science Bulletin, 49, 2296-2304.

Chen, Y., Li, D., Zhou, J., Zhang, H., Liu, F., Nie, F., Jiang, L., Liu, X., 2008. U-Pb Ages of Zircons in Western Qinling Shan, China, and Their Tectonic Implications. Earth Science Frontiers 15, 88-107.

Chen, Q., Chen, N., Wang, Q., Sun, M., Wang, X., Li, X. & Shu, G., 2006. Electron microprobe chemical ages of monazite from Qinling Group in the Qinling Orogen: Evidence for Late Pan- African

metamorphism? Chinese Science Bulletin, 51, 2645-2650.

Chen, Z., Lu, S., Li, H., Zhou, H., Xiang, Z. & Guo, J., 2004. Age of the Fushui intermediate-mafic intrusive complex in the Qinling orogen: new zircon U-Pb and whole-rock Sm and Nd isotope chronological evidence. Geological Bulletin China, 23, 322-328 (in Chinese with English abstract).

Chen, Z., Lu, S., Li, H., Li, H., Xiang, Z., Zhou, H. & Song, B., 2006. Constraining the role of the Qinling orogen in the assembly and break-up of Rodinia: Tectonic implications for Neoproterozoic granite occurrences. Journal of Asian Earth Sciences, 28, 99-115.

Colombi, A., 1988. Métamorphisme et géochimie des roches mafiques des Alpes ouest-centrales (géoprofil Viège Domodossola-Locarno): Ph.D. thesis, University Lausanne (CH), 216 p.

Currie, K.L. & van Staal, C.R. 1999: The assemblage stilpnomelane–chlorite– phengitic mica: a geothermobarometer for blueschist and associated greenschist terranes. J. metamorphic Geol. 17, 613-620.

Dong, Y., Genser, J., Neubauer, F., Zhang, G., Liu, X., Yang, Z. & Heberer, B., 2011a. U-Pb and 40Ar/39Ar geochronological constraints on the exhumation history of the North Qinling terrane, China. Gondwana Research, in press

Dong, Y., Zhang, G., Hauzenberger, C., Neubauer, F., Yang, Z. & Liu, X., 2011b. Palaeozoic tectonics and evolutionary history of the Qinling orogen: Evidence from geochemistry and geochronology of ophiolite and related volcanic rocks. Lithos, 122, 39-56.

Dong, Y., Zhang, G., Neubauer, F., Liu, X., Genser, J. & Hauzenberger, C., 2011c. Tectonic evolution of the Qinling orogen, China: Review and synthesis. Journal of Asian Earth Sciences, 41, 213-237.

Druschke, P., Hanson, A.D., Yan, Q., Wang, Z. & Wang, T., 2006. Stratigraphic and U-Pb SHRIMP Detrital Zircon Evidence for a Neoproterozoic Continental Arc, Central China: Rodinia Implications. The Journal of Geology, 114, 627-636.

Dubacq, B., Vidal, O. & de Andrade, V., 2010, Dehydration of dioctahedral aluminous phyllosilicates: thermodynamic modelling and implications for thermobarometric estimates. Contributions to Mineralogy and Petrology, 159, 159-174.

Eide, E.A: & Liou, J.G., 2000. High-pressure blueschists and eclogites in Hong'an: a framework for addressing the evolution of high- and ultrahigh-pressure rocks in central China. Lithos, 52, 1-22.

Enkin, R.J., Yang, Z., Chen, Y., and Courtillot, V., 1992, Palaeomagnetic constraints on the geodynamic history of the major blocks of China from Permian to present: Journal of Geophysical Research, v. 97, p. 13953–13989.

Faure, M., Lin, W. & Le Breton, N., 2001. Where is the North China–South China block boundary in eastern China? Geology, 29, 119-122.

Faure, M., Lin, W., Monié, P., Meffre, S., 2008. Palaeozoic collision between the North and South China blocks, Triassic intracontinental tectonics, and the problem of the ultrahigh-pressure metamorphism. C. R. Geoscience 340, 139–150

Gao, S., Zhang, B.-R., Wang, D.-P., Ouyang, J.-P. & Xie, Q.-L., 1996. Geochemical evidence for the Proterozoic tectonic evolution of the Qinling Orogenic Belt and its adjacent margins of the North China and Yangtze cratons. Precambrian Research, 80, 23-48.

Gerya, T., Stöckhert, B., Perchuk, A.L. 2002. Exhumation of high-pressure metamorphic rocks in a subduction channel: a numerical simulation. Tectonics 21, 1056.

Graham, C.M., Powell, R., 1984. A garnet-hornblende geothermometer: Calibration, testing, and application to the Pelona Schist, southern California. J. metam. Geol. 2, 13-21.

Green, E., Holland, T.J.B. & Powell, R., 2007. An order-disorder for omphacitic pyroxenes in the system jadeite-diopside-hedenbergite-acmite, with applications to eclogitic rocks. American Mineralogist, 92, 1181-1189.

Hacker, B.R., Ratschbacher, L. & Liou, J.G., 2004, Subduction, collision and exhumation in the ultrahigh-pressure Qinling-Dabie orogen. in Malpas, J., Fletcher, C.J.N., Ali, J.R., and Aitchison, J.C., eds., Aspects of the Tectonic Evolution of China: Geological Society of London Special Publication, 226, 157-175.

Hacker, B.R., Wallis, S.R., Ratschbacher, L., Grove, M. & Gehrels, G., 2006. High- temperature geochronology constraints on the tectonic history and architecture of the ultrahigh-pressure Dabie-Sulu Orogen. Tectonics, 25, TC5006.

Holland, T. J. B. & Powell, R., 1998, An internally consistent thermodynamic data set for phases of

petrological interest. Journal of metamorphic Geology, 16, 309-343.

Hu, N., Yang, J., An, S., Hu J., 1993. Metamorphism and tectonic evolution of the Shangdan fault zone, Shaanxi, China. J. metam. Geol. 11, 537-548.

Huang, W., 1993, Multiphase deformation and displacement with- in a basement complex on a continental margin: the Wudang Complex in the Qinling Orogen, China. Tectonophysics, 224, 305 – 326.

Kohn, M.J., Spear, F.S., 1990. Two new geobarometers for garnet amphibolites, with applications to southeastern Vermont. Am. Mineral. 75, 89-96.

Kretz, R., 1983, Symbols for rock-forming minerals. American Mineralogist, 68, 277-279.

Kröner, A., Compston, W., Zhang, G.W., Guo, A.L. & Todt, W., 1988. Age and tectonic setting of late Archean greenstone gneiss terrane in Henan province, China, as revealed by single-grain zircon dating. Geology, 16, 211 –215.

Lai, S.-C., 2007. Geochemistry and Tectonic Significance of the Ophiolite and Associated Volcanics in the Mianlüe Suture, Qinling Orogenic Belt, China. Journal of the Geological Society of India, 70, 217-234.

Li, Z.X., Li, X.H., Kinny, P.D., Wang, J., Zhang, S., Zhou, H., 2003. Geochronology of Neoproterozoic syn-rift magmatism in the Yangtze Craton, South China and correlations with other continents: evidence for a mantle superplume that broke up Rodinia. Prec. Res. 122, 85-109.

Ling, W., Gao, S., Ouyang, J., Zhang, B. & Li, H., 2002. Time and tectonic setting of the Xixiang Group: Constraints from zircon U-Pb geochronology and geochemistry. Science China (Series D), 45, 818-831.

Massonne, H.-J. & Willner, A.P., 2008. Phase relations and dehydration behavior of psammopelite and mid-ocean ridge basalt at very-low-grade to low-grade metamorphic conditions. Eur. J. Mineral. 20, 867-879.

Mattauer, M., Matte, P., Malavieille, J., Tapponnier, P., Maluski, H., Xu, Z.Q., Lu, Y.L., Tang, Y.Q., 1985, Tectonics of the Qinling belt: build-up and evolution of eastern Asia. Nature, 317, 496–500.

Meng, Q.-R. & Zhang, G.-W., 1999. Timing of collision of the North and South China blocks: Controversy and reconciliation. Geology, 27, 123-126.

Meng, Q.-R. & Zhang, G.-W., 2000. Geologic framework and tectonic evolution of the Qinling orogen, central China. Tectonophysics, 323, 183-196.

Niu, B., Liu, Z., & Ren, J., 1993. The tectonic relationship between the Qinling Mountains and Tongbai–Dabie Mountains with notes on the tectonic evolution of the Hehuai Basin. Bull. Chin. Acad. Geol. Sci. 26, 1–12.

Pouchou, J. L. & Pichoir, F., 1985. 'PAP' φ(ρZ) procedure for improved quantitative microanalysis. In: Armstrong, J. T., Microbeam Analysis 1985, San Francisco Press, San Francisco, California, 104-106

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Ratschbacher, L., Franz, L., Enkelmann, E., Jonckheere, R., Pörschke, A., Hacker B. R., Dong, S., & Zhang, Y., 2006, The Sino-Korean–Yangtze suture, the Huwan detachment, and the Palaeozoic–Tertiary exhumation of (ultra)high-pressure rocks along the Tongbai–Xinxian–Dabie Mountains. In: Hacker, B. R., McClelland, W. C. & Liu, J. G., eds., Ultrahigh pressure metamorphism: Deep continental subduction. Geological Society of America Special Paper, 403, 44-75.

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Romer, R.L., 2001. Lead incorporation during crystal growth and the misinterpretation of geochronological data from low-238U/204Pb metamorphic mineral. Terra Nova 13, 258-263.

Romer, R.L., Rötzler, J., subm. The role of element distribution for the isotopic dating of metamorphic minerals. Eur. J. Mineral.

Shi, Y., Liu, D., Zhang, Z., Miao, L., Zhang, F., Xue, H., 2007. SHRIMP Zircon U-Pb Dating of Gabbro and Granite from the Huashan Ophiolite, Qinling Orogenic Belt, China: Neoproterozoic Suture on the Northern Margin of the Yangtze Craton. Acta Geol. Sin. 81, 239-243.

Spear, F.S., 1988. Metamorphic fractional crystallization and internal metasomatism by diffusional ho-

mogenization of zoned garnets. Contrib. Mineral. Petrol. 99, 507–517.

Spear, F.S., 1993. Metamorphic phase equilibria and pressure temperature time paths. Mineralogical Society of America Monographs, 799 pp.

Sun, W., Li, S., Sun, Y., Zhang, G., Li, Q., 2002a. Mid-Palaeozoic collision in the north Qinling: Sm-Nd, Rb-Sr and 40Ar/39Ar ages and their tectonic implications. J. Asian Earth Sciences 21, 69-76

Sun, W., Li, S., Chen, Y. & Li, Y., 2002b. Timing of Synorogenic Granitoids in the South Qinling, Central China: Constraints on the Evolution of the Qinling-Dabie orogenic Belt. The Journal of Geology, 110, 457-468.

Vidal, O., Parra, T. & Viellard, P., 2005. Thermodynamic properties of the Tschermak solid solution in Fe-chlorite: Application to natural examples and possible role of oxidation. American Mineralogist, 90, 347-358.

Wang, T., Wang, X. & Li, W., 2000. Evaluation of multiple emplacement mechanisms: the Huichizi granite pluton, Qinling orogenic belt, central China. Journal of Structural Geology, 22, 505-518.

Wang, T., Pei, X-Z, Wang, X-X, Hu, N-G., Li, W-P & Zhang, G-W., 2005, Orogen-Parallel Westward Oblique Uplift of the Qinling Basement Complex in the Core of the Qinling Orogen (China): An Example of Oblique Extrusion of Deep-Seated Metamorphic Rocks in a Collisional Orogen. Journal of Geology, 113, 181-200.

Wang, X.-C., Li, X.-H., Li, W.-X. Li, Z.-X., Liu, Y., Yang, Y.-H., Liang, X.-R. & Tu, X.-L., 2008. The Bikou basalts in the northwestern Yangtze block, South China: Remnants of 820-810 Ma continental flood basalts? Geological Society of America Bulletin, 120, 1478-1492.

Wei, C., Yang, C., Zhang, S. & Li, R., 1998. Discovery of granulite from the Fuping area in southern Qinling Mountains and its geological significance. Chinese Science Bulletin, 43, 1358-1362.

Xue, F., Kröner, A., Reischmann, T., Lerch, F., 1996a. Palaeozoic pre- and post-collision calc-alkaline magmatism in the Qinling orogenic belt, central China, as documented by zircon ages on granitoid rocks. Journal of the Geological Society (London), 153, 409–417.

Yan, Q., Hanson, A.D., Wang, Z., Druschke, P.A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou, H., & Jiang, C., 2003. SHRIMP Age and Geochemistry of the Bikou Volcanic Terrane: Implications for Neoproterozoic Tectonics on the Northern Margin of the Yangtze Craton. Acta Geologica Sinica, 77, 479-490

Yan, Q., Hanson, A. D., Wang, Z., Druschke, P. A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou, H. & Jiang, C., 2004. Neoproterozoic Subduction and Rifting on the Northern Margin of the Yangtze Plate, China: Implications for Rodinia Reconstruction. International Geology Review, 46, 817-832.

Yan, Q., Wang, Z., Yan, Z., Xiang, Z., Chen, J. & Wang, T., 2007. SHRIMP analyses for ophiolitic - mafic blocks in the Kangxian - Mianxian section of the Mianxian - Lueyang melange: their geological implications. Geology Review, 53, 755-764 (in Chinese with English abstract)

Yan, QR., Chen, JL., Wang, ZQ, Yan, Z., Wang, T., Li, QG., Zhang, ZQ. & Jiang, CF, 2008, Zircon U-Pb and geochemical analyses for leucocratic intrusive rocks in pillow lavas in the Danfeng Group, north Qinling Mountains, China. Science in China Series D, 51, 249-262

Yan, Z., Wang, Z., Wang, T., Yan, Q., Xiao, W. & Li, J., 2006a. Provenance and tectonic setting of clastic deposits in the Devonian Xicheng basin, Qinling orogen, central China. Journal of Sedimentary Research, 76, 557-574

Yan, Z., Wang, Z., Yan, Q., Wang, T., Xiao, W., Li, J., Han, F., Chen, J. & Yang, Y., 2006b. Devonian Sedimentary Environments and Provenance of the Qinling Orogen: Constraints on Late Palaeozoic Southward Accretionary Tectonics of the North China Craton. International Geology Review, 48, 585-618.

Yang, J., Xu, Z., Dobrzhinetskaya, L. F., Green II, H.W., Pei, X., Shi, R., Wu, C., Wooden, J.L., Zhang, J., Wan, Y., Li, H., 2003. Discovery of metamorphic diamonds in central China: an indication of a > 4000-km-long zone of deep subduction resulting from multiple continental collisions. Terra Nova, 15, 370-379.

You, Z., Han, Y., Suo, S., Chen, N., Zhong, Z., 1993. Metamorphic history and tectonic evolution of the Qinling Complex, eastern Qinling Mountains, China. Journal of metamorphic Geology, 11, 549-560.

Zhang, C., Li, M., Wang, T., Yuan, H., Yan, Y., Liu, X., Wang, J. & Liu, Y., 2004, U-Pb Zircon Geochronology and Geochemistry of Granitoids in the Douling Group in the Eastern Qinling. Acta Geologica Sinica, 78, 84-96.

Zhang, S., Wei, C., Zhao, Z. & Shen, J., 1996, Formation and metamorphic evolution of the Douling Complex from the East Qinling Mountains. Science in China, series D 39 supplement, 80-86.

Zhao, Z. & Coe, R.S., 1987, Palaeomagnetic constraints on the collision and rotation of North and South China: Nature, v. 327, p. 141–144.

Zhou, G., Liu, Y.J., Eide, E.A., Liou, J.G. & Ernst, W.G., 1993. High-pressure/low-temperature metamorphism in northern Hubei Province, central China. Journal of metamorphic Geology, 11, 561-574.

Zhou, M.-F., Ma, Y., Yan, D.-P., Xia, X., Zhao, J.-H. & Sun, M., 2006. The Yanbian Terrane (Southern Sichuan Province, SW China): A Neoproterozoic arc assemblage in the western margin of the Yangtze Block. Precambrian Research, 144, 19-38.

4 The heart of China revisited, part II: Triassic post-collisional overprint in the Qinling orogen

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4.1 Abstract

Located between the amalgamated Sino-Korean craton – Erlangping – Qinling continent in the north and the Yangtze craton in the south, a Devonian fore-arc basin (Liuling unit), a Late Palaeozoic turbidite sequence (Baishuijiang group) and a tectonic mélange (Mianlüe mylonite zone) were intruded by numerous post-tectonic granitoids. Along a north-south profile across the Baishuijiang group and the Mianlüe mylonite zone petrological invesigations reveal amphibolite facies PT conditions of 590 °C at 0.6 GPa in the northern part and upper amphibolite facies conditions of 760 °C at ~0.7 GPa along with the migmatisation of felsic gneisses in the centre of the profile. Further south, Theria_g modeling applied to garnet from a garnet-staurolite gneiss point to a rather fast prograde clockwise evolution with pronounced heating along with minor burial and nearly isothermal exhumation. The southermost sample (chloritoid-bearing quartzite Q68B) gives evidence for medium to upper greenschist-facies conditions.

The age of this metamorphic overprint is constrained by Th/Pb monazite ages of 205.8 ± 2.8 Ma and 194.1 ± 2.1 Ma as well as Ar/Ar ages of 192-207 Ma while Ar/Ar ages from adjacent magmatics give a somewhat larger timespan of 186-227 Ma as the younger ages originate from pegmatites and reflect late magmatic activities. Published and new U/Pb zircon arges highlight Triassic – Early Jurassic magmatism spanning ~50 Ma with a major cluster at ~225-205 Ma.

Alltogether, these findings highlight a Triassic tectono-metamorphic event in the middle to lower crust of the western Qinling orogen which was strongly influenced by the intensive syn- and post-tectonic magmatic activity.

Triassic-Early Jurassic Ar/Ar ages from the Mianlüe mylonite zone reflect a Mesozoic metamorphic overprint. However, new and recently published U/Pb zircon ages from mafic rocks prove a Neoproterozoic origen of ophiolite blocks. Thus, there are no indications for the existence of a Late Palaeozoic Myanlüe ocean and the hypothesis of the existence of a "Mianlüe suture" stretching all through the northern Yangtze craton is falsified.

4.2 Introduction

Stretching for > 2000 km between the Sino-Korean craton in the north and the Yangtze craton in the South (Fig. 35), the Qinling-Tongbai-Hong'an-Xinxian-Dabie-Sulu-Imjingang orogen is the centrepiece of Chinese geology. Revealing its complex multistage history provides a major contribution to the understanding of the geological evolution of east-central Asia.

The Late Palaeozoic-Triassic evolution of the orogen is characterized by northward Palaeo-Tethys subduction and collision of the Yangtze craton with the amalgamated Sino-Korean craton – Erlangping – Qinling continent (north China block, NCB). In the first part of the study (chapter 3 of this thesis), we extended the picture Ratschbacher et al. (2006) created for the Tongbai-Hong'an-Dabie area into the central Qinling by studying the pressure-temperature-time (PTt) evolution of the Liuling fore-arc basin, the Douling complex, and the Wudang complex.

However, it is more suitable to address one of the most outstanding controversies of the belt regarding the continuation of the Triassic suture into the Qinling area in the western part of the orogen, i.e. at the locus typicus of the "Mianlüe suture", which is a hypothetic fault zone thought to stretch all through the northern Yangtze craton (e.g., Meng & Zhang, 1999; 2000). Its existence has been proposed more than ten years ago based on the occurrence of ophiolitic blocks not dated at this time. Questioning this theory, recent SHRIMP U/Pb zircon dating (Yan Q. et al., 2007; Shi et al., 2007; Wang T et al., 2011) demonstrates a Neoproterozoic age of these ophiolites.

Beside, a Late Permian-Triassic greenschist to amphibolite facies metamorphic overprint has been reported from the western Qinling area (Wei et al., 1999). However, these metamorphics have not yet seen a modern profound petrographic investigation and their relation to numerous Triassic granitoids intruding this area (e.g, Dong et al., 2011c; Sun et al., 2002) is unknown.

Here, these points are addressed by combining detailed petrological studies including equilibrium assemblage analysis with tectonic investigations and geochronology and interpreting these findings in context with data from the literature.

4.3 Regional geological overview

From north to south, the Qinling Belt comprises the following tectono-metamorphic units (Fig. 36):

4.3.1 Sino-Korean craton, its cover and the Kuanping unit

The basement of the Sino-Korean craton consists of the 2.0-2.6 Ga old Taihua gneiss (Kröner et al., 1988) and the Xiong'er Group (Ratschbacher et al., 2006). Low- to medium-grade greenschists, micaschists, amphibolites and marbles form its southern margin, the Kuanping unit. Detrital zircon from several clastic metasediments bear youngest grains at ~600 Ma (Diwu et al., 2010). The lack of ~0.7-0.8 Ga grains indicates Sino-Korean provenance. Based on a meta-basalt with N-MORB signature yielding a concordant U/Pb zircon age of 943 ± 6 Ma (Diwu et al., 2010), Dong et al. (2011c) regarded the Kuanping unit as Neoproterozoic back-arc basin. This contradicts other studies interpreting the Kuanping unit as passive continental margin or accretionary wedge (e.g., Ratschbacher et al., 2003).

4.3.2 Erlangping unit

The ophiolitic Erlangping unit comprises greenschist to amphibolite facies metamorphic gabbros, pillow lavas, sheeted dikes, andesites, rhyolites, ultramafics, cherts, turbidites and marbles (Meng and Zhang, 2000; Dong et al., 2011c; Xue et al., 1996b). Radiolaria suggest a Cambrian-Silurian age of the cherts (Niu et al., 1993; Wang N., 1989). The Erlangping unit has been regarded as an Early Ordovician intra-oceanic arc (Xue et al., 1996a) and as remnant of a back-arc basin (Dong et al.; 2011c).

4.3.3 Qinling unit and Early Palaeozoic continental Qinling arc

The basement of the Qinling unit is built up by a Proterozoic volcano-sedimentary sequence of siliciclastics, marbles and mafic rocks that has been intruded by a suite of Late Proterozoic (~890-960 Ma) syn-collisional, peraluminous S-type granitoids (Chen D et al., 2004; Chen Z et al., 2006; Wang T et al., 2005a). Beside these Jinningian plutons, published U/Pb zircon ages from mafic and felsic intrusives also reflect a ~0.7-0.8 Ga event, i.e. continental

arc magmatism and rifting processes affecting the Yangtze craton. Their absence in the Sino-Korean craton ties the basement of the Qinling unit to the Yangtze craton. Subsequently, the Qinling unit rifted away from the Yangtse craton forming a narrow east-west stretching microcontinent (Ratschbacher et al., 2006).

In the central part of the orogen, felsic gneisses and eclogites underwent a Cambrian ultra-high pressure metamorphism proven by the presence of micro-diamond inclusions in zircon (Yang et al., 2003).

During the Early Palaeozoic, the southern margin of the Qinling microcontinent faced a northward trending subduction zone and a magmatic arc set up. Subsequently, numerous often multi-stage granitoid plutons (e.g., Wang T et al., 2000) intruded the Qinling, Erlangping and Kuanping units (e.g., Ratschbacher et al., 2003 and therein). Rocks of the central and southern Qinling unit experienced an upper amphibolite facies metamorphic overprint at mid-crustal levels that came along with migmatization of felsic gneisses (see chapter 2 of the thesis).

The southern boundary of the magmatic arc is the Shangdan fault zone, which can be traced from the Nanyang basin in the east to the Guanzizhen County in the west, where it vanishes below Cretaceous-Cainozoic sediments.

4.3.4 Shangdan ophiolites (Danfeng Group and equivalents)

Along the Shangdan fault zone, numerous greenschist-facies ophiolite bodies in the Danfeng, Heihe, Xieyuguan, Caotangou, and Guanzizhen areas comprise Cambrian-Silurian cherts, ultramafic and mafic rocks, pillow lavas, radiolarian cherts, and intermediate-acidic intrusions.

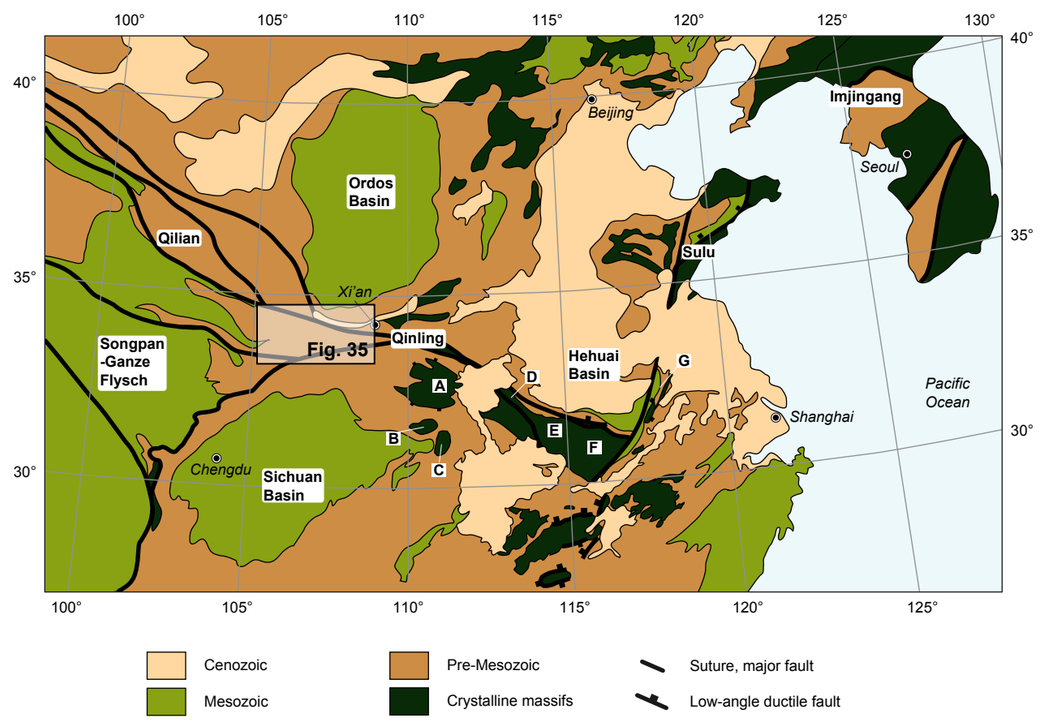


Figure 35. The Qilian– Qinling–Tongbai– Hong'an–Dabie –Sulu– Imjingang orogenic belt of eastern Asia (Ratschbacher et al. 2003 and therein)
A: Wudang complex; B: Shennong; C: Kongling; D: Tongbai; E: Hong'an; F: Dabie Shan; G: Zangbaling.

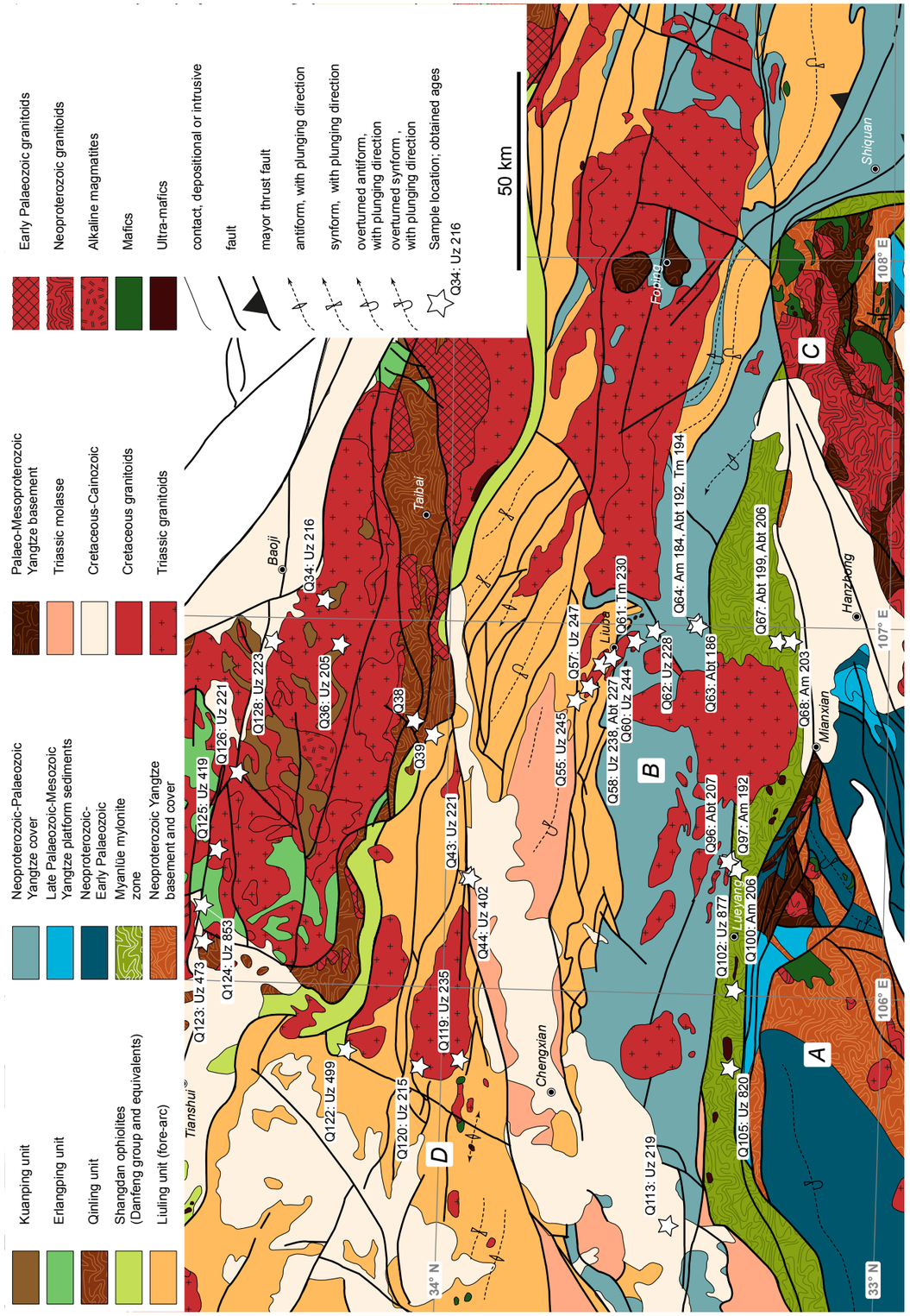


Table 19. Sample locations

Sample	Rock type	Unit	Latitude (N)	Longitude (E)
Q34	Orthogneiss	Triassic granitoid	34°17.311'	107°03.310'
Q36	Syenite	Triassic granitoid	34°14.836'	106°56.149'
Q38	Quartzite	Liuling Unit	34°14.836'	106°56.149'
Q39	Quartzite	Liuling Unit	34°14.836'	106°56.149'
Q43	Granite	Triassic granitoid	33°56.876'	106°18.007'
Q44	Meta-volcanoclastic rock	Liuling Unit	33.94132	106.29748
Q55	Granodiorite	Triassic granitoid	33°42.945'	106°47.103'
Q57	Tonalite	Triassic granitoid	33°41.587'	106°48.197'
Q58	Tonalite	Triassic granitoid	33°40.84'	106°49.862'
Q60	Granodiorite	Triassic granitoid	33°38.064'	106°54.381'
Q61E	Garnet-staurolite-mica schist	Baishuijiang Group	33°34.535'	106°57.373'
Q62	Granodiorite	Baishuijiang Group	33°32.338'	106°58.743'
Q63A	Pegmatite	Baishuijiang Group	33°26.307'	106°59.852'
Q63B	Diopside-hornblende syenogranite	Baishuijiang Group	33°26.307'	106°59.852'
Q64A	Pegmatite	Baishuijiang Group	33°26.573'	106°00.089'
Q64B	Pegmatite	Baishuijiang Group	33°26.573'	106°00.089'
Q64C	Garnet-biotite gneiss	Baishuijiang Group	33°26.573'	106°00.089'
Q64D	Garnet-biotite gneiss	Baishuijiang Group	33°26.573'	106°00.089'
Q64E	Garnet amphibolite	Baishuijiang Group	33°26.573'	106°00.089'
Q67A	Garnet-mica schist	Mianlüe mylonite zone	33°15.184'	106°57.379'
Q67D	Diorite dyke	Mianlüe mylonite zone	33°15.184'	106°57.379'
Q67F	Garnet-staurolite gneiss	Mianlüe mylonite zone	33°15.184'	106°57.379'
Q68B	Phengite-chloritoid quartzite	Mianlüe mylonite zone	33°13.636'	106°57.678'
Q68C	Quartzite	Mianlüe mylonite zone	33°13.636'	106°57.678'
Q68E	Vein	Mianlüe mylonite zone	33°13.636'	106°57.678'
Q96	Two-mica granite	Triassic granitoid	33°21.698'	106°21.673'
Q97	Quartz-phyllite	Mianlüe mylonite zone	33°21.437'	106°21.672'
Q100	Phyllite	Mianlüe mylonite zone	33°19.587'	106°21.040'
Q102	Meta-volcanoclastic rock	Mianlüe mylonite zone	33°20.090'	106°00.422'
Q105	Meta-volcanic rock	Mianlüe mylonite zone	33°20.571'	105°48.372'
Q113	Fine conglomerate	Cretaceous red bed	33°28.262'	105°21.860'
Q119	Granodiorite	Triassic granitoid	33°57.529'	105°47.412'
Q120	Granodiorite	Triassic granitoid	34°03.158'	105°45.494'
Q122	Metavolcanite	Erlangping Unit	34°13.118'	105°48.056'
Q123	Diorite	Qinling Unit	34°32.555'	106°06.239'
Q124	Orthogneiss	Qinling Unit	34°32.781'	106°11.538'
Q125	Syenite	Triassic granitoid	34°30.770'	106°21.671'
Q126	Syenite	Triassic granitoid	34°28.436'	106°34.160'
Q128	Diorite	Triassic granitoid	34°23.622'	106°55.813'

Figure 36 (page 94). Geological overview of the working area, sample locations (Tab. 19) and results of geochronology (redrawn from Zhang et al., 1996).
Dating methods: Uz: U/Pb zircon; Tm: Th/Pb monazite; Am: Ar/Ar muscovite; Abt: Ar/Ar biotite
Tectono-metamorphic units: A: Bikou block; B: Baishuijiang group; C: Hannan arc; D: Xicheng basin

Published emplacement models either suggest that the Shangdan ophiolites were part of a large nappe with Erlangping Group origin thrust over the entire Qinling unit (Faure et al., 2001; 2008; Ratschbacher at al., 2003) or were emplaced during the closure of the Shangdan ocean (e.g., Dong et al., 2011b). See chapter 2 of the thesis, for review.

4.3.5 Liuling unit

Southerly abutting sedimentary basins are put together as Liuling unit. Toward the east, the Liuling unit can be correlated with the Nanwan unit of Xinxian, and the Foziling unit of the Dabie Shan. It comprises metamorphic Cambrian-Carboniferous sandstones, turbidites, conglomerates, greenschists, volcanics, cherts, recrystallized limestones and black shales (Yan Q et al., 2004; Yan Z et al. 2006a and therein), which partly have been dated by biota. The Devonian Xicheng basin represents a former fore-arc for that Qinling Group provenance has been proven (Yan Z et al., 2006a; 2006b; Chen Y et al., 2008). South of it, Lower-Upper Triassic clastic sediments show Sino-Korean provenance (Chen Y et al., 2008) and neither indication of input from the Devonian Qinling arc nor Yangtze's 0.7-0.8 Ga arc formation and rifting events. For the northern part of the central Liuling unit (Shanyang basin), Hu et al. (1993) reported an amphibolite facies overprint at 612 °C and 0.8 GPa.

4.3.6 Baishuijiang Group

The Baishuijiang Group is a suite of turbidites with minor chert, volcanic rocks, and carbonates. Biota yield Cambrian, Ordovician, Devonian, and Carboniferous ages while a basalt yields 822 ± 22 Ma. This mélange has been interpreted as accretionary wedge (Yan Z et al., 2006b and therein) due to the location south of the Liuling forearc basin.

4.3.7 Mianlüe mylonite zone

The Mianlüe mylonite zone is a tectonic mélange of thrust slices imbricated on south-directed faults. The lithology comprises ophiolitic fragments, i.e. chert, ultramafic rocks and metabasites that are embedded in poorly dated greenschist facies metasediments. Garnet-clinopyroxene granulite occurs near the western margin of the Guangtoushan pluton (Li S et al., 2000; Zhang Z et al., 2002).

Metabasites in the Mianlüe zone include tholeiites as well as intermediate calc-alkaline volcanic rocks and have been classified as depleted MORB, OIB and OAB (Lai, 2007). Early Carboniferous radiolaria were reported from a chert (Feng et al., 1996) while mafic rocks yield Neoproterozoic and Early Palaeozoic U/Pb zircon ages of 808-841 Ma (Yan Q et al., 2007b), 771-778 Ma and 667 ± 10 Ma (Wang T et al., 2011), 446 ± 6 Ma and 455 ± 5 Ma (Wang T et al., 2009b). The common interpretation of the Mianlüe mylonite zone being a Triassic suture (e.g., Meng & Zhang, 1999; 2000) is contradicted by these new geochronological data. However, Sm/Nd and Rb/Sr whole rock isochron ages of 242 ± 21 and 221 ± 13 (Li S-G, 1996), respectively, as well as 40Ar/39Ar ages of 202 ± 2 Ma (Zhang Z et al., 2002), 227 ± 1, 223 ± 2 Ma (Chen H et al., 2010) and 220 ± 1 Ma (Li J, 1999) obtained on metamorphic white micas manifest a Triassic metamorphic overprint.

4.3.8 Yangtze craton and cover

In the Shennong and Kongling areas, gneissic trondhjemites of the Archean Yangtze basement have been dated at ~2.9 Ga (U/Pb zircon; Gao et al., 1996 and therein). Proterozoic Yangtze basement also crops out in the Douling, Wudang and Xixian complexes (see above) as well as in the Foping area, where two-pyroxene granulites (720-780 °C at ~0.6 GPa; Wei et al., 1998) occur. Abundant Neoproterozoic granitoid and mafic are remnants of three distinct events:

(1) Syn-collisional granites (~950-895 Ma U/Pb zircon) and the emplacement of the Huashan ophiolite (Shi et al., 2007) reflect collision of continental blocks during assemblage of the Precambrian supercontinent Rodinia, i.e. the Jinningian orogeny (e.g., Ling et al., 2002).

(2) A magmatic arc set up at the western and north-western margin of the Yangtze craton in Xixian, Yanbian and likely the Bikou block, whose mafic rocks alternatively might be remnants of continental flood basalts (Wang XC et al., 2008). Published U/Pb zircon ages obtained from mafic intrusives range from ~846 to 776 Ma (e.g., Yan Q et al., 2003; 2004; Zhou et al., 2006). Turbidites of the Hengdan group in the north-western part of the Bikou block show magmatic arc provenance as they contain 700-850 Ma old detrital zircons (Druschke et al., 2006). The Hengdan group has thus been regarded as fore-arc basin although the youngest detrital grains prove sedimentation at least ~75 Ma after emplacement of the youngest known arc magmatites.

(3) The widespread intrusion of mafic dyke swarms reflects the Neoproterozoic break-up of Rodinia. Li ZX et al. (2003) discriminated two discrete periods at 830-795 Ma and 780-745 Ma on samples from the southern and western Yangtze craton.

The sedimentary cover comprises ~12 km thick Mesoproterozoic to Triassic sediments. The Meso- to Neoproterozoic volcano-sedimentary sequences of the Wudang, Bikou, and Yaolinghe Groups comprise spilite, basalt, andesite, tuffites, volcanoclastic rocks and greywacke (e.g., Gao et al, 1996; Wang XC et al., 2008), which underwent a greenschist to blueschist facies overprint. Phanerozoic sediments include siliciclastites and platform to shelf carbonates as well as Permian coals and phosphorites (see Ratschbacher et al. 2003, for review), which are mostly low-grade to unmetamorphosed. However, in the Ankang-Fuping-Liuba areas, a greenschist- to amphibolite facies overprint was reported. (Wei et al., 1999).

Subduction of the Yangtze craton and abutting oceanic crust underneath the amalgamated Sino-Korean craton – Erlangping – Qinling continent yielded creation and exhumation of Carboniferous (~310 Ma, Sun et al., 2002c) and Triassic (~220-240 Ma, e.g. Hacker et al., 2006) HP and UHP metamorphic rocks cropping out in the Dabie, Hong'an, Tongbai and Wudang areas (for review, see Hacker et al. 2004; 2006; Liu X et al., 2008; Ratschbacher et al., 2006).

4.3.9 Triassic granitoids

In the western part of the orogen, the Qinling unit, the Devonian forearc, and, remarkably, the Sino-Korean craton, i.e., the downgoing plate, have been intruded by a series of granitoids including quartz diorite, adamellite, tonalite, granodiorite and granites. Partly, they show an adakitic signature. U/Pb zircon dating yield Triassic ages of 205-220 Ma (Dong et al., 2011c, Sun et al., 2002; Qin et al., 2008).

4.4 Methods

4.4.1 Sampling

We collected 200 samples mainly along north-south trending traverses covering the working area (Fig. 37; Tab. 19).

4.4.2 Microprobe analysis

Six samples were analysed with the electron microprobe (EMP) at GFZ Potsdam, TU Freiberg, and UCSB. The operation conditions were as follows: (1) Four-spectrometer CAMECA SX-100 at Potsdam: 15 kV accelerating voltage; 20 nA beam current; 1-15 μm beam diameter; 10–20 s major and 20–40 s minor elements peak-counting time. (2) Five-spectrometer JEOL JXA-8900R at Freiberg: 15 kV accelerating voltage; 20 nA beam current; Si, Al, Mg, Ca, Sr, Ba, and K 20 s and Fe, Ni, Na, Cr, Mn, Ti 30 s peak-counting time. (3) Five-spectrometer CAMECA SX50 at Santa Barbara: 15 kV accelerating voltage; 15 nA beam current; 10–20 s major and 20–40 s minor elements peak-counting time. We used natural and synthetic mineral standards of the Smithsonian Institute, MAC™, and CAMECA. Raw intensity data were corrected with the PAP program (Pouchou & Pichoir, 1985). Representative analyses of major phases are shown in Tables 20-27.

4.4.3 Bulk-rock geochemistry

Bulk-rock geochemistry was analysed by X-ray fluorescence using a Bruker SRS 3000 WDS-XRF at Basel on fused glass discs made of 300 mg ignited rock powder and 4700 mg ultrapure $Li_2B_4O_7$. Accuracy was checked against USGS, NIM, and SARM standards.

4.4.4 Determination of metamorphic conditions

We obtained data on the metamorphic evolution mainly with the Theriak/Domino-program package (de Capitani & Brown, 1987; de Capitani, 1994; de Capitani & Petrakakis, 2010; the program package is available at http://titan.minpet.unibas.ch/minpet/theriak/theruser.html) that uses Gibbs-free-energy minimisation to calculate equilibrium-assemblages together with the modal proportions and compositions of individual stable phases at given T and P based on

Table 20. Representative EMP analyses of garnet. Cations based on a 12 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

Garnet	Q61E	Q61E	Q61E	Q64D	Q64D	Q64D	Q64E	Q64E	Q64E	Q64E	Q64E	Q67F	Q67F	Q67F	Q67F	Q67F
	#5 rim	#6	#12 core	#2 rim	#18 core	#25 rim	#6 rim	#7	#12	#21	#23 core	#1 rim	#9	#34 core	#54	#72 rim
wt. %																
SiO_2	37.01	36.88	36.74	37.94	37.52	37.35	38.28	38.09	37.96	37.65	37.66	37.46	36.90	36.55	37.06	36.81
TiO_2	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.03	0.02	0.06	0.07	0.07	0.15	0.14	0.13	0.07
Al_2O_3	21.40	21.51	21.32	21.17	20.52	20.61	21.21	21.13	21.14	20.90	21.10	21.29	21.19	21.13	21.21	20.98
Cr_2O_3	0.00	0.06	0.00	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.00	0.03	0.03	0.02
Fe_2O_3	1.76	1.53	1.54	0.00	0.23	0.45	0.43	0.25	0.22	0.32	0.66	0.00	0.40	1.42	0.82	1.90
MgO	3.42	3.34	3.36	4.31	3.48	4.55	3.81	3.67	2.49	1.49	1.48	2.90	2.21	1.53	1.79	3.02
CaO	2.50	2.25	1.35	1.11	1.01	1.13	7.97	7.60	8.49	10.37	10.49	5.26	6.42	7.52	7.33	5.22
MnO	2.58	2.94	5.12	2.12	2.24	2.03	0.81	0.80	0.83	1.94	2.16	1.75	2.80	5.59	4.63	1.56
FeO	32.35	32.30	31.04	33.94	34.95	33.05	27.91	28.48	29.26	27.16	26.82	31.17	29.17	25.80	27.16	30.43
Na_2O	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Total	101.02	100.79	100.47	100.62	100.02	99.21	100.48	100.08	100.42	99.91	100.44	99.91	99.27	99.71	100.17	100.01
Cations																
Si	2.944	2.942	2.946	3.012	3.020	3.007	3.005	3.007	3.006	3.003	2.989	2.993	2.974	2.944	2.966	2.948
Ti	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.003	0.004	0.004	0.009	0.009	0.008	0.004
Al	2.006	2.022	2.015	1.981	1.947	1.956	1.963	1.966	1.972	1.966	1.974	2.005	2.012	2.006	2.001	1.980
Cr	0.000	0.003	0.000	0.001	0.001	0.002	0.001	0.002	0.001	0.001	0.000	0.000	0.000	0.002	0.002	0.002
Fe3+	0.105	0.092	0.093	0.000	0.014	0.028	0.026	0.015	0.013	0.019	0.039	0.000	0.024	0.086	0.049	0.114
Mg	0.405	0.397	0.401	0.510	0.418	0.546	0.446	0.432	0.293	0.177	0.176	0.345	0.266	0.184	0.213	0.361
Ca	0.213	0.192	0.116	0.094	0.087	0.097	0.670	0.643	0.720	0.887	0.892	0.450	0.555	0.650	0.628	0.448
Mn	0.174	0.199	0.348	0.143	0.153	0.138	0.054	0.054	0.056	0.131	0.145	0.119	0.191	0.381	0.314	0.106
Fe^{2+}	2.152	2.154	2.082	2.253	2.353	2.225	1.832	1.880	1.937	1.812	1.780	2.083	1.966	1.738	1.818	2.038
Na	0.000	0.000	0.000	0.000	0.005	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
Total	8.000	8.000	8.000	7.996	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmembers																
Pyrope	13.8	13.5	13.6	17.0	13.9	18.2	14.8	14.4	9.8	5.9	5.9	11.5	8.9	6.2	7.2	12.2
Almandine	73.1	73.2	70.7	75.1	78.2	74.0	61.0	62.5	64.4	60.3	59.5	69.5	66.0	58.9	61.1	69.0
Spessartine	5.9	6.8	11.8	4.8	5.1	4.6	1.8	1.8	1.9	4.4	4.8	4.0	6.4	12.9	10.6	3.6
Grossular	7.2	6.5	3.9	3.1	2.9	3.2	22.3	21.4	24.0	29.5	29.8	15.0	18.6	22.0	21.1	15.2

Table 21. Representative microprobe analyses of feldspar. Cations based on an 8 oxygen basis.

Feldspar	Q61E	Q61E	Q63B	Q63B	Q63B	Q63B	Q64D	Q64D	Q64E	Q64E	Q64E	Q64E	Q67F	Q67F	Q67F	Q67F
	#2 Pl rim	#6 Pl core	#7 Pl rim	#13 Pl core	#1 Kfs rim	#8 Kfs core	#1 Pl rim	#6 Pl core	#3 Pl	#6 Pl core	#12 Pl im	#13 Pl rim	#1 Pl rim	#4 Pl rim	#17 Pl core	#24 Pl core
wt. %																
SiO_2	64.23	64.30	59.82	57.63	65.08	65.34	61.77	61.57	48.32	48.16	48.30	67.95	55.32	57.55	58.26	58.20
Al_2O_3	22.90	22.57	26.00	27.60	19.26	19.39	23.88	24.46	32.67	32.36	32.92	19.34	28.17	26.85	26.14	26.05
CaO	3.48	3.50	6.74	8.49	0.00	0.06	4.66	5.25	16.25	16.07	16.11	0.16	10.67	9.01	8.24	8.11
FeO	0.04	0.05	0.08	0.06	0.02	0.07	0.04	0.00	0.07	0.09	0.15	0.23	0.02	0.03	0.00	0.01
BaO	0.00	0.00	0.00	0.00	0.30	0.35	0.02	0.02	0.05	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Na2O	9.90	10.18	7.52	6.42	0.33	0.79	8.97	8.28	2.31	2.34	2.35	10.72	5.77	6.84	7.47	7.20
K2O	0.07	0.05	0.17	0.15	14.66	14.06	0.21	0.29	0.00	0.01	0.04	1.31	0.08	0.10	0.07	0.08
Total	100.63	100.66	100.32	100.35	99.65	100.06	99.54	99.87	99.68	99.06	99.91	99.72	100.04	100.40	100.21	99.68
Cations																
Si	2.818	2.823	2.654	2.568	2.992	2.988	2.751	2.733	2.220	2.226	2.214	2.992	2.493	2.573	2.605	2.613
Al	1.184	1.168	1.360	1.450	1.044	1.045	1.254	1.280	1.769	1.762	1.779	1.004	1.496	1.415	1.378	1.378
Ca	0.164	0.165	0.321	0.405	0.000	0.003	0.222	0.250	0.800	0.796	0.792	0.008	0.515	0.432	0.395	0.390
Fe	0.001	0.002	0.003	0.002	0.001	0.003	0.002	0.000	0.003	0.004	0.006	0.009	0.001	0.001	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.005	0.006	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Na	0.842	0.866	0.647	0.555	0.029	0.070	0.774	0.713	0.205	0.209	0.209	0.915	0.504	0.593	0.648	0.626
K	0.004	0.003	0.009	0.008	0.860	0.820	0.012	0.016	0.000	0.001	0.002	0.073	0.004	0.006	0.004	0.005
Total	5.013	5.027	4.994	4.989	4.931	4.935	5.015	4.992	4.998	4.998	5.002	5.001	5.014	5.019	5.032	5.014
Endmembers																
K feldspar	0.4	0.3	1.0	0.9	96.1	91.2	1.2	1.7	0.0	0.1	0.2	7.4	0.4	0.6	0.4	0.5
Albite	83.4	83.8	66.2	57.3	3.3	7.8	76.7	72.8	20.4	20.8	20.8	91.9	49.3	57.5	61.9	61.3
Anorthite	16.2	15.9	32.8	41.8	0.0	0.3	22.0	25.5	79.5	79.1	78.9	0.8	50.3	41.9	37.7	38.2
Celsian	0.0	0.0	0.0	0.0	0.6	0.7	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0

Table 22. Representative microprobe analyses of white micas. Cations based on a 12 oxygen basis. Water was iteratively estimated assuming F + Cl + OH = 2. Endmembers follow Schliestedt (1980).

White mica	Q61E	Q61E	Q61E	Q64D	Q64D	Q67F	Q67F	Q68B	Q68B	Q68B	Q68B
	#12	#13	#18	#1	#2	#2	#3	#1	#21	#27	#33
wt.-%											
SiO_2	46.14	45.23	45.39	46.67	46.90	46.67	46.45	47.53	46.72	48.52	46.84
TiO_2	0.79	0.74	0.56	1.30	1.04	0.60	0.52	0.28	0.92	0.26	0.64
Al_2O_3	35.65	36.10	36.67	34.65	35.70	36.95	37.06	34.70	35.68	34.12	36.19
Cr_2O_3	0.04	0.03	0.05	0.07	0.03	0.02	0.02	0.00	0.00	0.00	0.00
MgO	0.84	0.63	0.49	1.08	0.94	0.76	0.63	0.90	0.60	1.07	0.48
CaO	0.02	0.03	0.02	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.00
MnO	0.00	0.00	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00
FeO	1.18	1.00	0.82	1.68	1.64	1.08	1.08	1.73	0.99	1.51	1.13
Na_2O	1.71	1.49	2.00	0.18	0.22	0.70	0.79	0.77	0.98	0.89	1.28
K_2O	8.87	9.11	8.36	10.07	10.15	8.92	9.04	10.02	9.74	9.39	9.40
H_2O	4.53	4.48	4.50	4.53	4.58	4.58	4.57	4.54	4.55	4.57	4.57
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Total	99.77	98.84	98.87	100.25	101.22	100.34	100.17	100.50	100.17	100.31	100.53
Cations											
Si	3.056	3.025	3.022	3.088	3.071	3.055	3.048	3.135	3.082	3.187	3.076
Ti	0.039	0.037	0.028	0.065	0.051	0.030	0.026	0.014	0.046	0.013	0.032
Al	2.783	2.845	2.878	2.702	2.755	2.850	2.867	2.698	2.774	2.642	2.801
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.083	0.063	0.049	0.106	0.091	0.074	0.062	0.088	0.059	0.104	0.047
Ca	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.001	0.000
Mn	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	0.065	0.056	0.045	0.093	0.090	0.059	0.059	0.095	0.055	0.083	0.062
Na	0.220	0.193	0.258	0.022	0.028	0.089	0.101	0.099	0.125	0.113	0.163
K	0.749	0.777	0.710	0.850	0.848	0.745	0.757	0.843	0.819	0.787	0.787
Total	6.996	6.999	6.992	6.928	6.936	6.905	6.920	6.973	6.958	6.929	6.967
Anions											
OH	2.000	2.000	2.000	2.000	2.000	2.000	2.000	1.998	2.000	2.001	2.000
F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cl	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Endmembers											
Margarite	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0
Paragonite	22.6	19.9	26.6	2.6	3.2	10.6	11.7	10.4	13.3	12.6	17.1
Celadonite	5.5	2.5	2.2	8.7	7.1	5.5	4.8	13.5	8.1	18.7	7.6
Muscovite	71.7	77.4	71.0	88.5	89.6	83.7	83.4	76.0	78.6	68.6	75.3
X_{Mg}	0.561	0.529	0.521	0.533	0.503	0.556	0.512	0.481	0.518	0.556	0.431

bulk-rock composition and thermodynamic models of rock forming minerals. Equilibrium-assemblage and isopleth diagrams showing the compositions of major phases such as garnet, plagioclase, phengite, biotite or amphiboles were computed and interpreted by comparing observed assemblages and intersections of isopleths.

For all equilibrium-assemblage calculations, we used the thermodynamic database of Holland & Powell (1998; version tcds55) together with activity models of thermocalc 3.25 and 3.30 (see appendix). Model systems are Na_2O-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (NKFMASH), MnO-TiO_2-Na_2O-CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (MnTNCKFMASH), and

Table 23. Representative microprobe analyses of biotite. Cations based on a 12 oxygen basis. Water was iteratively estimated assuming F + Cl + OH = 2.

Biotite	Q61E	Q61E	Q64D	Q64D	Q67F	Q67F
	#2 rim	#4	#1 rim	#5	#1 rim	#3
		core		core		core
wt.-%						
SiO_2	35.51	35.87	34.21	34.13	35.99	35.22
TiO_2	1.48	1.61	4.32	4.45	1.41	1.52
Al_2O_3	20.30	19.89	19.37	19.38	20.23	19.87
Cr_2O_3	0.01	0.03	0.04	0.02	0.02	0.04
MgO	10.83	11.22	7.76	7.82	11.50	11.89
CaO	0.03	0.00	0.00	0.00	0.02	0.06
MnO	0.05	0.00	0.13	0.12	0.04	0.02
FeO	19.59	19.30	20.48	20.93	18.01	18.61
Na_2O	0.16	0.10	0.05	0.13	0.15	0.08
K_2O	7.99	8.13	9.47	9.42	8.84	8.14
H_2O	3.78	3.77	3.64	3.66	3.70	3.66
F	0.48	0.53	0.60	0.58	0.70	0.71
Cl	0.00	0.02	0.03	0.03	0.01	0.00
Total	100.00	100.24	99.85	100.43	100.34	99.54
Cations						
Si	2.657	2.675	2.611	2.596	2.676	2.644
Ti	0.083	0.090	0.248	0.255	0.079	0.086
Al	1.790	1.748	1.742	1.737	1.773	1.757
Cr	0.001	0.002	0.003	0.001	0.001	0.003
Mg	1.209	1.247	0.883	0.887	1.275	1.331
Ca	0.003	0.000	0.000	0.000	0.002	0.005
Mn	0.003	0.000	0.008	0.008	0.002	0.001
Fe^{2+}	1.226	1.204	1.307	1.331	1.120	1.168
Na	0.023	0.015	0.008	0.019	0.022	0.012
K	0.763	0.773	0.922	0.914	0.839	0.780
Total	7.757	7.754	7.733	7.747	7.788	7.787
Anions						
OH	1.886	1.873	1.852	1.856	1.835	1.832
F	0.114	0.125	0.144	0.140	0.164	0.168
Cl	0.001	0.002	0.004	0.004	0.001	0.000
X_{Mg}	0.496	0.509	0.403	0.400	0.532	0.533
X_{Ti}	0.028	0.030	0.089	0.091	0.027	0.029

TiO_2-Na_2O-CaO-K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O (TNCKFMASH).

An essential aspect of the equilibrium-assemblage calculations is the choice of a proper bulk-rock composition for the equilibrium-mineral assemblage. In case of homogeneous samples, we used bulk-rock chemical analysis data. As several accessory phases, which are not considered in the calculation (e.g., apatite, pyrite), contribute to the bulk, the P and S were

Table 24. Representative microprobe analyses of staurolite (24 oxygen basis).

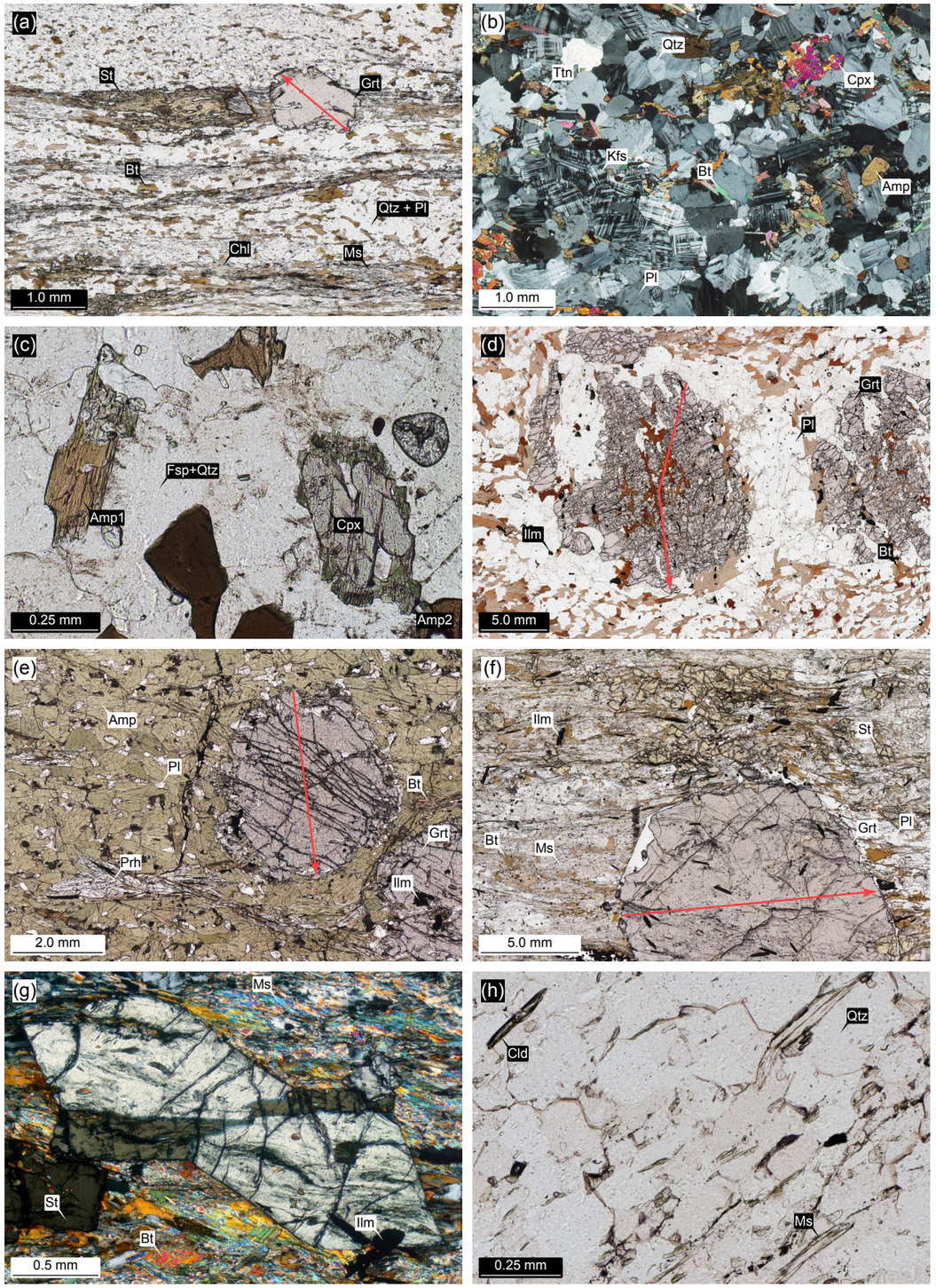
Staurolite	Q61E	Q61E	Q61E	Q67F	Q67F	Q67F
	#1	#2	#3	#2	#3	#4
wt.-%						
SiO_2	27.05	27.09	26.35	27.33	27.40	27.69
TiO_2	0.65	0.85	1.06	0.58	0.62	0.61
Al_2O_3	54.06	54.49	53.96	52.63	52.65	52.59
Cr_2O_3	0.02	0.02	0.00	0.03	0.03	0.03
MgO	1.52	1.61	1.64	1.81	1.86	1.84
CaO	0.00	0.01	0.00	0.00	0.00	0.00
MnO	0.08	0.09	0.05	0.10	0.11	0.08
FeO	13.67	13.42	13.64	13.12	13.19	13.13
Na_2O	0.19	0.13	0.16	0.00	0.03	0.00
K_2O	0.01	0.00	0.00	0.00	0.00	0.00
Total	97.24	97.73	96.85	95.59	95.89	95.98
Cations						
Si	3.943	3.924	3.863	4.039	4.040	4.074
Ti	0.071	0.093	0.116	0.064	0.069	0.068
Al	9.289	9.304	9.321	9.170	9.150	9.120
Cr	0.003	0.002	0.000	0.003	0.003	0.004
Mg	0.331	0.349	0.358	0.399	0.408	0.404
Ca	0.000	0.001	0.000	0.000	0.000	0.000
Mn	0.010	0.011	0.006	0.012	0.014	0.010
Fe^{2+}	1.666	1.626	1.671	1.621	1.626	1.616
Na	0.053	0.038	0.046	0.000	0.008	0.000
K	0.001	0.000	0.000	0.001	0.000	0.000
Total	15.367	15.349	15.383	15.311	15.318	15.296
X_{Mg}	0.166	0.177	0.177	0.198	0.201	0.200

subtracted from the chemical data before modelling. In samples with distinct compositional layering, we modelled the local chemical composition using microprobe analyses of the equilibrium-mineral assemblage and counting of typically 700 points.

4.5 Petrography, mineral chemistry, and phase equilibria

4.5.1 Garnet-staurolite mica schist Q61E

Garnet-staurolite mica schist Q61E is compositionally banded and crenulated. Individual layers contain either equigranular quartz and plagioclase or strongly aligned sheet silicates with porphyroblastic garnet and staurolite. We selected a layer with the assemblage garnet-staurolite-



muscovite-biotite-chlorite-plagioclase-quartz and accessory ilmenite, apatite, tourmaline, graphite, zircon, and monazite (Fig. 37a) for EMP analysis and in-situ monazite dating (see below). The inclusion-free subhedral garnet porphyroblasts (Fig. 37a) reveal a compositional zoning (Fig. 38a) with a bell-shaped spessartine pattern, distinctly increasing almandine and slightly increasing grossular and pyrope contents from core ($Alm_{71}Grs_4Prp_{13}Sps_{12}$) to rim ($Alm_{73}Grs_7Prp_{14}Sps_6$). Plagioclase is unzoned with slight variations from grain to grain (An13–17). Muscovite shows low Si contents of 3.02-3.06 p.f.u. and an elevated X_{Na} (Na/(Na+K)) of 0.20-0.27. Biotite has an average X_{Mg} (Mg/(Mg+Fe^{2+})) of 0.51. Like the micas, the Fe-rich staurolite is unzoned with an X_{Mg} of 0.17-0.18 (Tab. 24).

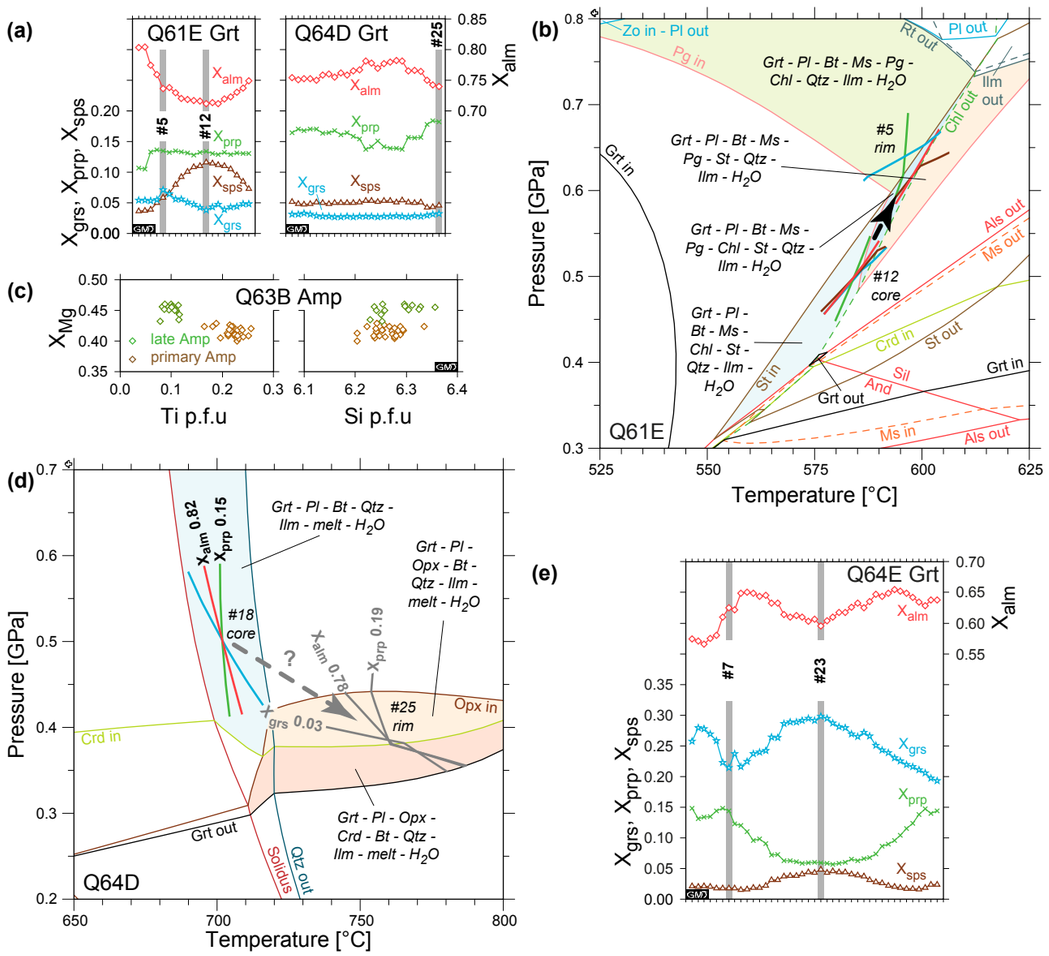
Figures 38b and A35 (appendix) display the results of thermodynamic modelling. The intersection of the almandine, pyrope, grossular, and spessartine isopleths of the garnet core indicates PT conditions of 585°C and 0.50 GPa. The calculated mineral assemblage during garnet-core growth is garnet-plagioclase-staurolite-biotite-chlorite-muscovite-quartz-ilmenite, matching the observed. The intersection of the isopleths for the garnet-rim composition plots at 590°C and 0.57 GPa, which reflects burial and slight heating and implies paragonite stability in the equilibrium-mineral assemblage. The lack of paragonite in the peak metamorphic mineral assemblage may be due its decomposition during retrogression or that the effective bulk-rock composition was not exactly used.

4.5.2 Diopside-hornblende syenogranite Q63B

The magmatic assemblage of massive diopside-hornblende syenogranite Q63B comprises K-feldspar, plagioclase, clinopyroxene, quartz, brown amphibole, biotite, titanite, and allanite (Fig. 37b). Primary brown amphibole is titanian ferrotschermakite (classification of Leake et al., 1997) while late, light greenish ferrotschermakite with slightly elevated X_{Mg}-values occurs as anhedral matrix grains and forms rims around clinopyroxene (Figs. 37c; 28c; Tab. 26). Clinopyroxene is augite (Morimoto, 1988) with an average composition of $Wo_{42}En_{33}Fs_{25}$. Plagioclase reveals normal zoning with An_{42} (core) to An_{32} (rim). K-feldspar shows perthitic lamellae and a composition of $Ab_{3-8}An_{<1}Or_{91-96}$ outside the unmixing lamellae. Part of the rock is hydrothermally altered, showing euhedral scapolite, calcite, clinozoisite, and hematite.

Crystallization temperatures and pressures were calculated using magmatic amphibole and clinopyroxene. For primary titanian ferrotschermakite, the Ti-in-amphibole geothermometer (Colombi, 1988) and the Al-in-amphibole geobarometer (Schmidt, 1992) yield 850°C at 0.7 GPa. The single clinopyroxene geothermometer (Nimis & Taylor, 2000) and the clinopyroxene geobarometer (Nimis, 1999; MA calibration) calculate 725°C at 0.7 GPa; due to the absence of orthopyroxene, these temperatures have to be regarded as minimum values. The further evolution of the rock is mirrored by green ferrotschermakite intergrown with the rim sections of the plagioclase; Colombi's (1988) geothermometer

Figure 37 (page 102). Photomicrographs. (a), (c), (d), (e) and (f) plane polarized light, (b) cross-polarized light. EMPA profiles across garnet porphyroblasts are marked. Mineral abbreviations are taken from Kretz (1983) and Spear (1993).
(a): Posttectonic garnet and staurolite porphyroblasts in a well foliated mica-chlorite-quartz matrix, sample Q61E.
(b): Granular texture of massive Diopside-hornblende syenogranite Q63B.
(c): Late green ferrotschermakite grows on rims of magmatic augite and highlights subsolidus reactions; sample Q63B.
(d): Garnet poikiloblasts encasing numerous biotite flakes, garnet-biotite gneiss Q64D.
(e): Garnet porphyroblasts in a mid-grained matrix mainly consisting of amphibole, garnet amphibolite Q64E. Prehnite flakes in the lower left result from retrogression.
(f): Euhedral garnet porphyroblast (garnet-staurolite gneiss Q67F) encasing numerous ilmenite crystals. Its rim is intergrown with posttectonic staurolite. The matrix is mainly composed of muscovite.
(g) Euhedral staurolite twin, garnet-staurolite gneiss Q67F. Opaque inclusion trails point to posttectonic growth.
(h): Aligned chloritoid and muscovite flakes in sample Q68B.



and the amphibole-plagioclase-quartz-geobarometer of Bhadra & Bhattacharya (2007) yielded 680–710°C at 0.69–0.75 GPa, highlighting subsolidus cooling in the lower crust.

4.5.3 Garnet gneiss Q64D

Coarse-grained garnet-gneiss Q64D yields granular migmatic mobilisates of plagioclase and quartz, and contains the peak metamorphic assemblage garnet-plagioclase-biotite-quartz with accessory ilmenite, zircon, and monazite. Aligned biotite flakes mark a rough main foliation (s_2). Post-tectonic decussate biotite aggregates are intergrown with late muscovite. Garnet forms centimetre-sized poikiloblasts (Fig. 37d) and small, irregularly shaped matrix grains. The rim sections of the poikiloblasts are corroded and mantled by coronae of granoblastic plagioclase; these coronae, deflecting the main foliation, indicate garnet resorption. Core sections of the poikiloblasts include numerous aligned biotite flakes and ilmenite tablets, displaying an earlier foliation (s_1). Garnet shows prograde zoning with increasing X_{Mg}-values from core ($Alm_{78}Prp_{14}Grs_3Sps_5$) to rim ($Alm_{74}Prp_{18}Grs_3Sps_5$). Plagioclase shows slightly decreasing anorthite contents from core (An25) to rim (An23). Ti-rich biotite has X_{Mg}-values of 0.58–0.61 and decreasing X_{Ti}-values (Ti/octahedral sum) from core (0.090) to rim (0.065).

Thermodynamic calculations in the TNCKFMASH system with excess H_2O (Figs. 38d and A36) reveal an intersection of the almandine, grossular, and pyrope isopleths of garnet cores above the wet solidus at 702 °C and 0.51 GPa. The calculated stable assemblages at these PT conditions is garnet-plagioclase-biotite-quartz-ilmenite-melt matching the observed.

Garnet rim isopleths intersect at ~765 °C and 0.38 GPa. As garnet does not grow along the implied PT path (grey arrow; Figs. 38d; A36), the zoning is created by diffusion and garnet rim PT data derived via the isopleth method should be taken with caution (see chapter 2 of the thesis) although the temperature is substantiated by the X_{Ti}-isopleths of biotite cores (Fig. A35).

Figure 38 (page 104). (a) Compositional profile of garnets of samples Q61E and Q64D. The location of the profiles is marked in Figs. 38a and 38c, respectively. Highlighted points refer to the garnet EMP analysis (Tab. 20) used for isopleth intersections displayed in the equilibrium assemblage diagrams. Spacing of the microprobe spots is ~50 μm (Q61E) and ~500 μm (Q64D), respectively.
(b) Equilibrium assemblage diagram of sample Q61E calculated in MnTNCKFMASH, excess H_2O and SiO_2. The bulk-rock composition (in mol) derived by point counting is Si 24.342; Ti 0.195; Al 6.218; Fe 2.051; Mg 1.630; Ca 0.173; Mn 0.033; Na 0.893; K 1.153; O 63.311. Important stable assemblages are highlighted. The displayed isopleths of garnet core (point #12) are X_{alm} (red) 0.71; X_{grs} (blue) 0.04; X_{prp} (green) 0.13; X_{sps} (brown) 0.12, those of garnet rim (point #5) X_{alm} 0.73; X_{grs} 0.07; X_{prp} 0.14; X_{sps} 0.06, respectively. A different representation of the equilibrium assemblage diagram as well as the entire isopleth plots are shown in Fig. A35.
(c) Differences of primary and late amphiboles of sample Q63B.
(d) Equilibrium assemblage diagram of sample Q64D, calculated in the TNCKFMASH system with excess H_2O. The bulk rock composition (in mol) is Si 20.707; Ti 0.526; Al 7.358; Fe 2.859; Mg 1.241; Ca 1.009; Na 2.774; K 1.287; O 60.6425. A different representation of the equilibrium assemblage diagram as well as the entire isopleth plots are shown in Fig. A36.
(e) Representative compositional profile of garnet of sample Q64E. The location is shown in Fig. 38d. On the left side, the garnet profile crosscuts a small neighbouring grain.
(f) Equilibrium assemblage diagram of sample Q64E calculated in TNCFMASH with excess H_2O and SiO_2. Garnet grew along the PT path indicated by the black arrow. A different representation of the equilibrium assemblage diagram as well as the entire isopleth plots are shown in Fig. A37. Bulk rock chemistry (in mol) derived by point counting is Si 25.640; Ti 0.361; Al 6.732; Fe 5.613; Mg 4.798; Ca 4.544; Na 0.663; O 77.3865.
(g) Equilibrium assemblage diagram of the retrograde stage of the metamorphic evolution of sample Q64E, calculated with the same bulk rock chemistry. The stability field of the most prominent retrograde phase prehnite is highlighted; the blue areas likely limit the P-T conditions of retrogression as plagioclase shows albite rims.

Table 25. Representative microprobe analyses of amphibole. Cations based on a 23 oxygen basis. Ferric iron was estimated using the minmax-midpoint method (Schumacher, 1997).

Amphibole	Q63B #11 brown amp core	Q63B #12 brown amp rim	Q63B #2 late amp	Q63B #12 late amp	Q64E #1 late amp	Q64E #2 late amp	Q64E #1 matrix amp rim	Q64E #12 matrix amp core
wt.-%								
SiO_2	40.76	40.69	41.64	41.41	42.32	42.00	41.92	40.86
TiO_2	2.18	2.22	0.72	1.00	0.46	0.57	1.15	1.12
Al_2O_3	11.76	11.49	12.07	11.83	14.52	14.05	13.48	14.70
Fe_2O_3	3.16	3.52	4.83	4.98	5.06	6.10	5.84	6.04
Cr_2O_3	0.01	0.01	0.00	0.02	0.02	0.02	0.01	0.02
MgO	7.17	7.38	7.78	7.77	8.73	8.88	10.05	9.66
CaO	11.58	11.67	11.91	12.05	11.42	11.33	11.47	11.43
MnO	0.30	0.28	0.29	0.29	0.15	0.19	0.09	0.09
FeO	18.56	18.20	16.54	16.39	13.10	12.72	11.86	11.64
Na_2O	0.95	0.96	0.80	0.67	0.89	0.96	0.91	0.89
K_2O	1.72	1.67	1.51	1.48	0.42	0.46	1.04	1.27
Total	98.15	98.10	98.10	97.88	97.09	97.28	97.83	97.72
Cations								
Si	6.247	6.240	6.328	6.311	6.312	6.273	6.228	6.088
Ti	0.251	0.256	0.082	0.114	0.051	0.064	0.128	0.126
Al	2.125	2.077	2.162	2.125	2.552	2.472	2.361	2.581
Fe^{3+}	0.364	0.407	0.552	0.571	0.569	0.686	0.653	0.677
Cr	0.001	0.002	0.000	0.002	0.002	0.002	0.001	0.002
Mg	1.639	1.688	1.763	1.764	1.942	1.977	2.225	2.146
Ca	1.903	1.918	1.940	1.968	1.825	1.813	1.826	1.825
Mn	0.040	0.037	0.037	0.037	0.019	0.024	0.012	0.012
Fe^{2+}	2.379	2.333	2.103	2.089	1.634	1.589	1.473	1.450
Na	0.282	0.286	0.236	0.197	0.258	0.278	0.263	0.258
K	0.336	0.326	0.293	0.287	0.079	0.088	0.197	0.242
Total	15.566	15.568	15.497	15.467	15.244	15.266	15.367	15.406
X_{Mg}	0.408	0.420	0.456	0.458	0.543	0.554	0.602	0.597

4.5.4 Garnet amphibolite Q64E

Foliated, fine-grained layers of garnet amphibolite Q64E show aligned amphibole and biotite together with porphyroblastic garnet while coarse-grained sections lack a foliation. The peak metamorphic assemblage comprises garnet, amphibole, plagioclase, quartz, biotite, and accessory ilmenite (Fig. 37e). Garnet is sometimes replaced by a fine-grained aggregate of plagioclase, amphibole, and quartz. Prehnite, epidote, muscovite, chlorite, and albite replace plagioclase and amphibole in retrograde layers. EMP-profiles of garnet reveal a prograde zoning with core composition of $Alm_{60}Prp_6Grs_{30}Sps_4$ and rim composition of $Alm_{62}Prp_{14}Grs_{22}Sps_2$ (Fig. 38e). Plagioclase is $An_{79\text{-}81}$ and often shows asymmetric albite rims. Primary matrix amphibole is brown tschermakite showing irregular zoning with decreasing Ti-contents (0.20–0.07 p.f.u.) and X_{Mg}-values (0.63–0.54) from core to rim. Amphibole replacing garnet is greenish tschermakite with Ti-contents of 0.05–0.07 p.f.u. and an X_{Mg} of 0.55 showing a composition similar to the outermost rims of the matrix grains (Tab. 25).

Equilibrium assemblage calculations in the TNCFMASH system (Figs. 38f; and A37) highlight garnet growth from medium- to high-grade metamorphic conditions. For the garnet cores, almandine, grossular, and pyrope isopleths intersect at 570 °C and 0.55 GPa, slightly above the garnet-in isograde. The calculated stable assemblage at these PT conditions comprises garnet, amphibole, plagioclase, chlorite, quartz, and ilmenite. Garnet growth continued during heating and burial crossing the chlorite-out isograde at ~590 °C. Peak conditions of 761 °C at 0.73 GPa are recorded for the intersection of the garnet rim isopleths in the stability field of garnet, amphibole, clinopyroxene, plagioclase, quartz, and ilmenite. Within the uncertainty of the isopleth method (±30 °C, ±0.1 GPa), this position overlaps with the stability field of the observed peak metamorphic mineral assemblage.

Table 26. Representative microprobe analyses of clinopyroxene. Cations based on a 6 oxygen basis. Ferric iron was estimated using the method of Droop (1987). Endmembers were calculated following Lindsley (1983).

Clinopyroxene	Q63B #1 rim	Q63B #2 im	Q63B #3 core
wt.-%			
SiO_2	49.78	49.94	49.72
TiO_2	0.07	0.16	0.12
Al_2O_3	1.09	1.09	1.03
Cr_2O_3	0.00	0.04	0.02
Fe_2O_3	4.87	3.86	3.96
MgO	9.26	9.36	9.25
CaO	23.13	22.28	22.49
MnO	0.34	0.37	0.37
FeO	12.04	13.14	12.83
Na_2O	0.21	0.24	0.22
K_2O	0.03	0.00	0.01
Total	100.81	100.48	100.02
Cations			
Si	1.912	1.923	1.924
Ti	0.002	0.005	0.003
Al	0.049	0.049	0.047
Fe^{3+}	0.141	0.112	0.115
Cr	0.000	0.001	0.001
Mg	0.530	0.537	0.533
Ca	0.952	0.919	0.932
Mn	0.011	0.012	0.012
Fe^{2+}	0.387	0.423	0.415
Na	0.016	0.018	0.017
K	0.001	0.000	0.000
Total	4.000	4.000	4.000
Endmembers			
Wollastonite	42.1	42.1	42.5
Enstatite	33.5	32.4	32.4
Ferrosillite	24.4	25.5	25.2
X_{Mg}	0.578	0.559	0.562

Retrograde garnet breakdown to amphibole, plagioclase, and quartz took place at ~ 620 °C and <0.6 GPa, indicated by the equilibrium-assemblage diagram and Ti-in-amphibole thermometry (Colombi, 1988) on secondary amphibole. Prehnite, the most conspicuous secondary phase, is stable below 330 °C and ~0.4 GPa (Fig. 38g), indicating further retrogression at lower to sub-greenschist facies conditions.

4.5.5 Garnet-staurolite-gneiss Q67F

Garnet-staurolite-gneiss Q67F shows a penetrative main foliation s_1, formed by aligned muscovite and chlorite. Garnet porphyroblasts display syntectonic cores with curved trails of opaque inclusions and abundant zoisite; the latter is absent in the matrix. Post-tectonic, euhedral garnet rims overgrow s_1 (Fig. 37f); further post-tectonic minerals are staurolite (Fig. 37g), often intergrown with garnet rims, biotite, and late chlorite. Ilmenite forms subhedral laths in the matrix and in garnet rim sections. Other accessories include tourmaline, magnetite, apatite, and zircon.

Compositional zoning of garnet (Fig. 39a) features increasing almandine and pyrope contents at the expense of grossular and spessartine from core ($Alm_{59}Prp_6Grs_{22}Sps_{13}$) to rim ($Alm_{70}Prp_{12}Grs_{15}Sps_3$). Fe-rich staurolite is unzoned with an average X_{Mg}-value of 0.20. Biotite yields average X_{Mg}-values of 0.53. Core sections of plagioclase show anorthite contents of An_{38}; the outermost rims have An_{50}.

Thermobarometric information was obtained by garnet-growth modelling using the THERIA_G program (Gaidies et al., 2008a). It models garnet growth along a given PTt path by calculating a spherical shell of newly formed garnet of a fixed radius (the step size) with a combination of (1) Gibbs-free-energy minimization to obtain equilibrium-assemblage relations and proportions of stable phases, and (2) intragranular multi-component diffusion calculation in garnet assuming thermodynamic equilibrium between garnet rim and the rock matrix, and spherical garnets lacking cracks and inclusions. Chemical fractionation during garnet growth and component flux between garnet rim and the rock matrix are considered. Diffusion constants are taken from Chakraborty & Ganguly (1992). In the model, the garnet population of the sample Q67F is represented by its crystal-size frequency distribution (CSD,

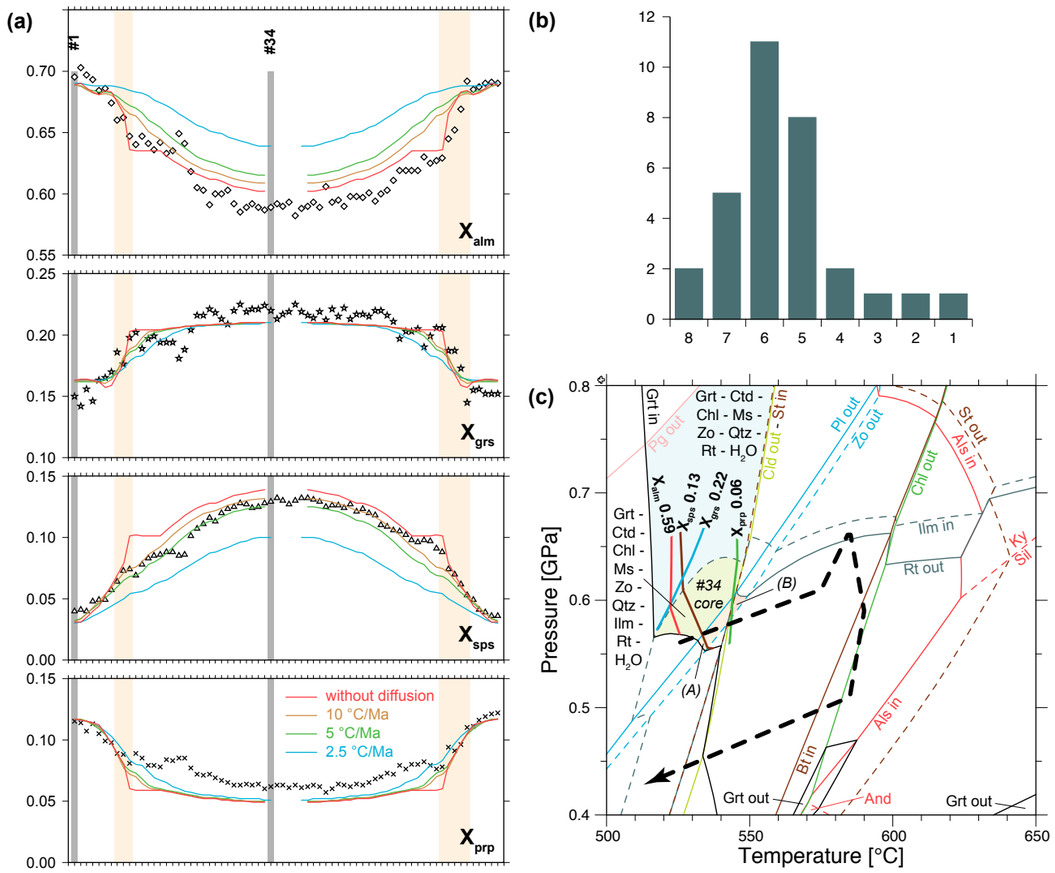


Fig. 39b), estimated by crushing the sample and measuring the diameter of all 34 crystals. Individual garnet crystals are assigned to radius classes representing the amount of garnet crystals of a specified space range in a given rock volume. Here, we used a radius class size of 50 μm and 10 μm step size. The PT path (Figs. 38c; 38d; A38; A39) was derived by stepwise forward modelling: for discrete fractionation steps, intersection of isopleths was checked and the previously assumed PT path was adopted.

Garnet growth started at 530 °C and 0.56 GPa (Figs. 38c; A38), where it coexists with muscovite, chlorite, chloritoid, zoisite, ilmenite, rutile, and quartz. Growth continued during simultaneous heating and burial. At 535 °C and 0.57 GPa, the rock entered plagioclase stability field and at 542 °C and 0.58 GPa, staurolite started to grow. The step in X_{grs} from 0.20 to 0.16 near the garnet rim (highlighted orange in Fig. 39a) can only be reproduced, if a kink in the prograde PT path is introduced. Garnet growth terminated at the pressure peak of the PT loop at 585 °C and 0.67 GPa. Biotite formed later during nearly isothermal decompression, after passing the biotite-in isograde at 586 °C and 0.52 GPa (Figs. 38d, A39). This PT path satisfactorily reproduces the observed garnet zonation and provides agreement of the calculated assemblage with the petrographic observations: zoisite was stable during growth of garnet cores as indicated by numerous inclusions; post-tectonic staurolite, plagioclase, and biotite coexist with the garnet rim. According to textural observations, the deformation that produced s_1 terminated prior to the onset of staurolite and plagioclase growth, i.e. at ~540 °C. Furthermore, the rock never overstepped the chlorite-out isograde as indicated by syn- and post-tectonic chlorite flakes. This outlines a rapid, nearly isothermal exhumation.

Figure 39a compares the measured garnet EMP-profile with garnet zoning profiles calculated with different heating-cooling rates, which control the duration of intergranular diffusion in the garnet crystal and thus the amount of modification to the original zoning. The comparison shows, that a heating-cooling rate of 10 °C/Ma (corresponding to a time span of 25 Ma between the onset of garnet growth and cooling below 400 °C) and a calculation without considering diffusion (0 Ma or infinite heating-cooling rate) give the best fit. At lower heating-cooling rates

Figure 39 (page 108). (a) Comparison of calculated garnet zoning of generation 3 garnet with an EMPA profile across the centre of a garnet of sample Q67F. Symbols represent measured values. The spacing of the microprobe spots is ~50 μm. Grey highlighted points refer to the garnet EMP analysis (Tab. 20) valid for isopleth intersections displayed in the equilibrium assemblage diagrams. The ochre highlights mark a distinct degrease in X_{grs} near the rims.

(b) CSD used for garnet growth modelling.

(c) Initial equilibrium assemblage diagram of sample Q67F calculated using the bulk rock chemistry in MnTNCKFMASH with excess H_2O. Garnet growth was modelled along the PT path represented by the black arrow. The bulk rock composition (in mol) is Si 15.713; Ti 0.460; Al 14.781; Fe 2.310; Mg 1.342; Ca 0.660; Mn 0.045; Na 0.942; K 2.621; O 60.656.

Labelled assemblages:

(A): garnet - plagioclase - cloritoid - chlorite - muscovite - zoisite - ilmenite - rutile

(B) garnet - plagioclase - staurolite - chlorite - muscovite - zoisite - ilmenite

(d) Simplified equilibrium phase diagram of sample Q67F for the fractionation step valid for garnet rim calculated in MnTNCKFMASH with excess H_2O. The bulk rock composition (in mol) is Si 15.303; Ti 0.460; Al 14.508; Fe 1.949, Mg 1.295; Ca 0.561; Mn 0.00471; Na 0.942, K 2.621; O 60.016. A different representation of the equilibrium assemblage diagrams as well as the entire isopleth plots are shown in Fig. A38 (garnet core) and Fig. A39 (garnet rim).

Labelled assemblages:

(A): garnet - plagioclase - staurolite - chlorite - muscovite - rutile

(B): garnet - plagioclase - staurolite - chlorite - muscovite - ilmenite - rutile

(C): garnet - plagioclase - staurolite - chlorite - muscovite - biotite - rutile

(e) Equilibrium assemblage diagram of sample Q68B. The bulk rock composition (in mol) is Si 29.6367; Al 2.1175; Fe 0.7082; Mg 0.1077; Na 0.0136; K 0.0635; O 78.3041.

Table 27. Representative microprobe analyses of chloritoid. Cations based on a 12 oxygen basis.

Chloritoid	Q68B #1	Q68B #2	Q68B #3	Q68B #4	Q68B #5
wt.-%					
SiO_2	24.94	24.92	25.08	24.88	25.05
TiO_2	0.00	0.00	0.00	0.00	0.02
Al_2O_3	40.26	40.14	39.73	40.06	39.92
Cr_2O_3	0.04	0.00	0.00	0.01	0.02
MgO	1.86	1.91	1.83	1.94	1.93
CaO	0.01	0.00	0.02	0.00	0.01
MnO	0.24	0.20	0.24	0.22	0.24
FeO	22.87	23.03	22.27	22.80	22.23
Na_2O	0.00	0.00	0.02	0.01	0.01
K_2O	0.01	0.00	0.00	0.00	0.01
Total	90.23	90.20	89.18	89.93	89.43
Cations					
Si	2.090	2.090	2.120	2.091	2.111
Ti	0.000	0.000	0.000	0.000	0.001
Al	3.976	3.968	3.957	3.969	3.964
Cr	0.003	0.000	0.000	0.001	0.001
Mg	0.232	0.239	0.231	0.243	0.242
Ca	0.001	0.000	0.001	0.000	0.001
Mn	0.017	0.014	0.017	0.016	0.017
Fe^{2+}	1.603	1.616	1.574	1.603	1.567
Na	0.000	0.000	0.003	0.001	0.001
K	0.001	0.000	0.000	0.000	0.001
Total	7.922	7.926	7.903	7.925	7.907
X_{Mg}	0.127	0.129	0.128	0.132	0.134

(longer and thus stronger influence of the diffusion) the fit in the almandine and spessartine contents gets distinctly worse. This suggests a rapid metamorphic evolution. Slight differences between calculated and observed garnet zonation are likely effects of uncertainties of the method, i.e. unfulfilled assumptions (see above) and/or uncertainties in the bulk composition. As pointed out by Gaidies et al. (2008b), garnet isopleth thermobarometry is less sensitive to uncertainties than the garnet growth modelling incorporating diffusion. A difference of 20 °C or 0.02 GPa between individual isopleths of grossular, almandine, spessartine, and pyrope is negligible for isopleth thermobarometry, as it is well within the uncertainty of the modelling itself, but may cause differences as large as 0.03 mole-% in fit during growth modelling using THERIA_G, especially when the path crosses areas in PT space having high isopleth density.

4.5.6 Muscovite-chloritoid quartzite Q68B

The muscovite-chloritoid quartzite Q68B is fine-grained and equigranular, consisting of quartz and minor chloritoid, muscovite, chlorite, and kyanite; accessories include tourmaline, rutile, ilmenite, apatite, zircon, and monazite. Quartz grains display tessellated textures without a shape-preferred orientation. Aligned chloritoid prisms and muscovite flakes outline a foliation (Fig. 37h). The muscovite shows X_{Mg}-values of 0.42–0.56 and Si contents of 3.08-3.19. Fe-rich chloritoid yields a uniform composition with X_{Mg}-values of ~0.13.

Equilibrium-assemblage calculations in the NKFMASH–system (Fig. 39e) yielded minimum pressures of ~0.3 GPa and maximum temperatures of 500-550 °C at 0.4-1.0 GPa for the observed assemblage chloritoid-muscovite-kyanite. At higher temperature kyanite would have been replaced by staurolite and at lower pressures by andalusite. This stability field agrees with X_{Mg}-isopleths of muscovite that plot between 480 and 530 °C and X_{Mg}-isopleths of chloritoid that are constant at 0.13 in this PT range (Fig. A40).

4.6 Geochronology

4.6.1 Th/Pb monazite geochronology

Two samples were selected for in-situ Th/Pb monazite dating.

As petrographic observations of garnet-staurolite-mica schist Q61E indicate syn-kinematic growth of garnet, staurolite and sheet silicates, we suppose that monazite grains also grew syn-kinematically. Seven monazite grains yield 205.8 ± 2.8 Ma whereas two grains yield 230.3 ± 8.5 Ma likely representing detrital relics or a first monazite generation formed early on the prograde PT path.

Monazites of sample Q64C, a garnet-biotite gneiss showing identical textures as sample Q64D yield 194.1 ± 2.1 Ma which is interpreted to represent peak metamorphism.

4.6.2 U/Pb zircon geochronology

From various Early Mesozoic felsic intrusions and orthogneisses occurring in the working area we dated multiple samples using U/Pb on zircon with the

following results: Syenite Q126 from the NCB shows an older cluster of three grains at 220.7 ± 3.7 Ma and a younger of six grains at 194.3 ± 2.4 Ma while nearby diorite dyke Q128B yields 223.4 ± 3.3 Ma. Two-feldspar orthogneiss Q34 taken 10 km south of the city of Baoji yields a concordant age of 216.0 ± 5.5 Ma but also shows inherited zircons at ~656 and 820 Ma. Originating another 10 km to the southwest, the undeformed syenite Q36 yields a slightly younger concordant age of 204.9 ± 4.2 Ma. It shows inherited zircons at ~420 Ma. Several parts of a large pluton in the west-central part of the Liuling Unit were probed. Porphyric granite Q119 shows a cluster at 234.9 ± 3.1 Ma and a single grain at 514.7 ± 16.1 Ma. Granodiorite Q120, taken some 10 km north of the previous yields 214.6 ± 2.0 Ma. Granite Q43C from the eastern margin of this pluton has been weakly affected by a sinistral ductile deformation. It yields a concordant age of 221.3 ± 3.2 Ma. These three samples indicate that at least this magmatic body is not a uniform batholite but has been formed by multistage intrusions. A concordia age of 244.7 ± 4.5 Ma has been derived from sample Q55 from a granodiorite intruding the Liuling Unit some 50 km east-southeast of the previous one. However, individual zircons scatter around a broad range in the upper 200ish and some show Pb-loss in the lower 200ish. Two tonalite samples Q57 and Q58 taken from the Liuling unit in the centre of the Baoji – Hanzhong section yield concordia ages of 246.7 ± 4.1 Ma and 237.6 ± 4.8 Ma, respectively. The nearby meta-granodiorite Q60 shows clusters at 737 ± 47 Ma and 244 ± 14 Ma. We interpret the former as protolith age and the latter as age of a metamorphic overprint. Granodiorite Q62 yields a concordia age of 228.1 ± 2.2 Ma.

These data highlight a strong Triassic – Early Jurassic magmatic activity affecting all tectono-metamorphic units in the working area. The dated intrusions span ~40 Ma with a major cluster at ~240-228 Ma. Altogether, our data strengthen ages published by Sun et al. (2002) and Qin et al. (2008) although their data are somewhat younger.

Some 30 km west of the city of Baoji several Palaeozoic magmatic rocks of the NCB have been dated. Metavolcanic sample Q122B yields a youngest cluster at 499.4 ± 9.3 Ma which is likely the age of emplacement. Inherited zircons are at ~810, ~990, ~1074 and 2186 Ma. Diorite Q123, which shows a greenschist facies overprint, yields a concordia age of 473.2 ± 6.8 Ma. Two-feldspar orthogneiss Q124 shows a major cluster of at 853 ± 17 Ma and inherited zircons at ~901, ~941, ~1025, and ~1284 Ma. Syenite Q125 shows a cluster at 418.6 ± 6.6 Ma, older grains at ~476 and 545 Ma and the youngest grain at ~345 Ma.

Detrital zircons taken from weakly metamorphic turbidites, i.e. laminated metasiltstones and quartzites of outcrops Q38 and Q39 show ages ranging 367 ± 4 to ~2693 Ma. The youngest cluster is at 435 ± 8.5 Ma with next younger grains at ~413 and 376.1 ± 3.5 Ma implying Qinling provenance. From the Liuling Unit Devonian meta-volcanoclastic rock sample Q44A yield a youngest cluster at 401.8 ± 5.5 Ma. The youngest zircon is at 390.6 ± 4.2 Ma which is significantly younger as there are several a bit older zircons. These data also clearly prove Qinling provenance.

Taken from the Mianlüe mylonite zone, metavolcanoclastic rock sample Q102 shows a younger age cluster of 877 ± 24 Ma likely reflecting a magmatic event. Meta-volcanic rock Q105 yield a major cluster of 820 ± 11 Ma that gives that gives the age of the magmatite and inheritance at ~1852 and 2667 Ma. Both samples highlight the Neoproterozoic arc formation and rifting events that affected the Yangtze craton. The lack of younger zircons is consistent with SHRIMP zircon dating of metamorphic mafic blocks, metagabbro, and one meta-plagiogranite by Yan Q et al. (2007).

Detrital zircons extracted from the Cretaceous conglomerate Q113 show a dominating age cluster of 219.4 ± 3.3 Ma and small clusters are at 321 ± 7, 417 ± 30, 156 ± 28, and ~2622 Ma thus proving major provenance of Triassic magmatites.

4.6.3 $^{40}Ar/^{39}Ar$ geochronology

$^{40}Ar/^{39}Ar$ ages were obtained by dating micas from meta-sediments and magmatic rocks from the Liuling Unit, the Baishuijiang Group and the Mianlüe mylonite zone.

Biotite from tonalite sample Q58 yields a mid-T plateau at 226 ± 5 Ma. Biotite of pegmatite vein Q63A yields a plateau age of 186.3 ± 2.0 Ma. Muscovite from pegmatite vein Q64A and metamorphic biotite from Q64B, both of which taken from the outcrop with the highest peak metamorphic conditions, i.e. 740-765 °C, yield 183.6 ± 1.7 Ma and 191.9 ± 1.4 Ma, respectively. Considering the ~3 Ma from peak metamorphic conditions, i.e. Th/Pb monazite ages, to

cool through biotite closure samples from this location prove fast cooling of ~100 °C/Ma or more.

Few kilometres farther south, located in the Mianlüe mylonite zone, biotite of metapelite Q67A yields 199.6 ± 1.5 Ma. Biotite from diorite dyke Q67D from the same outcrop reveals Ar loss from 213 to 202 Ma and a low-T flat section at 206 ± 5 Ma. Muscovite separated from quartzite Q68C and vein Q68E yields 203.4 ± 1.1 Ma and 204.3 ± 1.2 Ma, respectively. Further west in the Mianlüe mylonite zone, muscovite of two phyllites Q97C and Q100 yield ages of 192.1 ± 1.8 Ma and 206.7 ± 1.3 Ma. An age of 207.2 ± 4.2 Ma was obtained by dating biotite from the two-mica granite Q96A. These data are in agreement with Ar/Ar ages (227-195 Ma) of Li J et al. (1999) but somewhat younger than published whole-rock isochron ages (Sm/Nd: 242 ± 21 Ma; Rb/Sr: 221 ± 13 Ma; Li S et al.; 1996).

4.7 Discussion

4.7.1 Metamorphic evolution

The investigated profile from the northern margin of the Mianlüe mylonite zone across the Baishuijiang Unit between the cities of Hangzhong and Baoji reveals increasing P-T conditions from the southern to the central part and slightly decreasing P-T conditions towards the northern part.

In the southern part, chloritoid-bearing quartzite Q68B gives evidence for medium to upper greenschist-facies conditions. 2.5 km north of it, garnet-staurolite gneiss Q67F testifies to lower amphibolite facies peak metamorphic conditions. Modelling of the garnet zoning of the garnet-staurolite gneiss reveals prograde clockwise evolution with pronounced heating along with minor burial. After the pressure peak at 0.66 GPa and 585 °C the rock was nearly isothermally exhumed, indicated by the termination of garnet growth and the preservation of syntectonic chlorite, i.e. the rock did not overstep the chlorite-out isograde at ~590 °C. The centre of the profile displays peak metamorphic conditions of the upper amphibolite facies (cf. samples Q64D and Q64E) coming along with the migmatization of felsic gneisses. The P-T path of sample Q64E points to heating from ~570 °C to 760 °C during slight burial. Just north of outcrop Q64, a hornblende-diopside monzogranite dike reveals P-T conditions of ~725°C at 0.7 GPa for crystallization of clinopyroxene and magmatic amphibole. These P-T data and the lack of deformation point to a post-tectonic intrusion in the middle to lower crust. Late amphibole and plagioclase from this dike point to isobaric subsolidus cooling at P-T conditions similar to those derived from the surrounding metamorphic rocks, i.e. at 680–710 °C and 0.69–0.75 GPa. The northernmost sample in the profile (i.e. garnet-staurolite schist Q61E) again reveal medium amphibolite facies conditions.

The derived clockwise P-T paths (Fig. 40) outline a Barrovian metamorphic evolution of this area starting with burial and pronounced heating followed by fast exhumation. This is substantiated by thermodynamic modelling that incorporates inter-granular, multi-component diffusion in garnet (cf. sample Q67F) and constrained by geochronology: peak metamorphic monazite and metamorphic biotite from location Q64 indicate just ~3 Ma for cooling from peak metamorphic temperatures (~760 °C) through biotite closure.

This very fast cooling reflects decreasing heat flow together with the ceasing of the magmatic activity. It coincided with quick exhumation, e.g. by tectonic unroofing during post-collisional collapse, as shown by the P-T path derived from sample Q67F.

4.7.2 Postorogenic magmatites

The outlined Triassic metamorphic evolution was strongly affected by magmatic activity as indicated by diopside-hornblende monzogranite Q63B intruding the metasediments in the middle to lower crust. Our field surveys show that major granitoid intrusions in the working area are characterized by a lack of ductile deformation, which implies that magmatic activity mostly took place after ceasing of the major ductile deformation in the Triassic. Remarkably, the granitoids also intruded the Yangtze craton, i.e. the downgoing plate (e.g., Zhang et al., 1996). New and published U/Pb zircon geochronology (Fig. 381) reflect a magmatic activity spanning ~50 Ma with a major activity at ~208-222 Ma postdating UHP formation in Dabie (i.e., Hacker et al., 2006).

Looking at the geologic map, one may argue, that the plutons are large batholiths. However, distinctly different ages of several samples from the same magmatic body prove, that the plutons were formed by multiple magmatic pulses. For example, samples Q119 and Q120 taken from the same pluton just

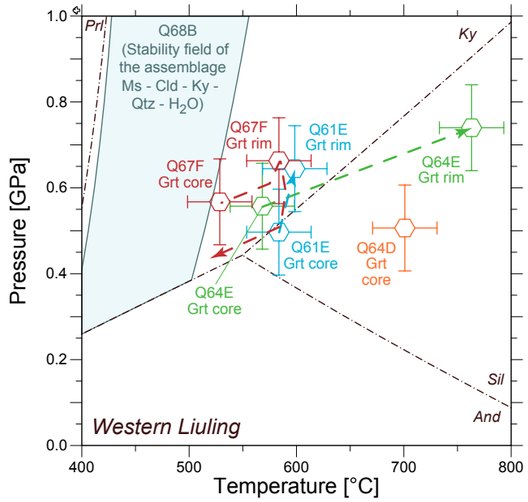


Figure 40. Summary of the metamorphic evolution of the Baoji-Hanzhong profile.

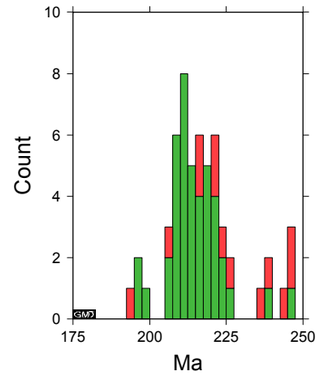


Figure 41. Summary of published (Dong et al., 2011c and therein; green) and new (red) U/Pb zircon ages from Triassic-Early Jurassic granitoids

~10km apart reveal an age difference of 20 Ma. The adakitic signature of granitoids implies their formation by partial melting of thickened lower crust (Qin et al., 2008). Based on that as well as geochemistry of associated mafic enclaves, Qin et al. (2008) proposed that asthenospheric upwelling following a slab-breakoff at shallow depths caused the magmatic activity.

4.7.3 Implications on the Mianlüe mylonite zone

One of the most outstanding controversies of the Qinling belt concerns the Mianlüe suture (e.g. Meng and Zhang, 1999; 2000) and its relationship to the Triassic suture along the Liuling–Nanwan–Foziling complexes. Meng and Zhang (2000) hypothesized that this suture stretches all through the northern Yangtze craton from the Mianlüe mylonite zone (its locus typicus) to the Tanlu fault at the southern tip of the Dabie HP-UHP terrane and that it formed during subduction of a Devonian-Permian "Mianlüe ocean". The major argument for the existence of this ocean is the occurrence of numerous ophiolitic blocks along this suture. Based on an Early Carboniferous age of an associated chert dated by radiolaria (Feng, 1996) it has been speculated that these remnants of ocean floor are of Late Palaeozoic age. However, recent U/Pb zircon dating (Shi et al., 2007; Yan Q. et al., 2007; Wang T et al., 2011; this study) demonstrates a Neoproterozoic age. Thus we suggest that the ophiolitic blocks of the Mianlüe mylonite zone constitute the remnants of a Neoproterozoic oceanic basin, which is geodynamically connected with the Neoproterozoic arc and rift magmatism on the northern Yangtze craton. Therefore, the existence of a Mianlüe-ocean that formed in the Devonian as part of the Palaeo-Tethys (e.g. Lai et al., 2008) is rather unlikely. During the Triassic orogeny, these ophiolites were part of the Yangtze craton, i.e. the downgoing plate. As there are no ophiolites of matching age known along the entire "Mianlüe suture" we conclude that the continuation of the Triassic suture between the amalgamated Sino-Corean craton – Erlangping – Qinling – continent and the Yangtze craton outlined in the Tongbai-Xinxian-Dabie area by Ratschbacher et al. (2006) must be located somewhere else. However, Late Mesozoic-recent faulting hampers its recognition. Speculatively, the suture may continue south of the Shanyang and Xicheng basins and north of the Baishuijiang Unit.

The formation of the tectonic mélange (the Mianlüe mylonite zone) nowadays hosting the ophiolites as well as Middle-Late Palaeozoic sediments is bracketed between the age of the youngest known sediments (Lower Carboniferous; Feng, 1996) and the Late Triassic metamorphic overprint outlined above. It may thus coincide with the Permian Barrovian metamorphism in the central Liuling Unit (chapter 3 of the thesis).

4.8 Conclusions

(1) Key aspects of the Triassic postorogenic evolution of the western Qinling belt are:

- Intensive magmatism at ~190-247 Ma with a peak activity at ~208-222 Ma.
- A fast greenschist to upper amphibolite facies metamorphic overprint along a clockwise PT path characterized by strong heating and minor burial.
- Strong influence of the metamorphic overprint by the magmatic activity.

(2) The Mianlüe mylonite hosts remnants of Neoproterozoic ocean floor. The mayor argument for the existence of a Triassic "Mianlüe suture" as well as a Late Palaeozoic "Mianlüe ocean" is thus disproved.

4.9 Acknowledgement

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4.10 Appendix

Solution models used to calculate equilibrium assemblage diagrams and isopleth plots

NKFMASH (sample Q68B): garnet, chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); clinopyroxene, biotite, chlorite: Holland & Powell (1998), plagioclase: Holland & Powell (2003); white mica: Coggon & Holland (2002); orthopyroxene: White et al. (2002)

MnTNCKFMASH (samples Q61E, Q67F): garnet, chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); clinopyroxene, biotite, chlorite: Holland & Powell (1998), plagioclase: Holland & Powell (2003); white mica: Coggon & Holland (2002); orthopyroxene: White et al. (2002)

TNCKFMASH (sample Q64D, Q64E): garnet, melt, biotite: White et al. (2007); amphibole: Diener et al. (2007); clinopyroxene: Green et al. (2007); chloritoid, staurolite, cordierite, ilmenite: Holland & Powell (1998); chlorite: Holland & Powell (1998); orthopyroxene: White et al. (2002)

Non-solution phases: all not mentioned above

4.11 References

Bader, T., Franz, L., de Capitani, C., Ratschbacher, L., Hacker B.R., Weise, C., Wiesinger, M. & Popp, M., 2010. New insights into the Early Palaeozoic history of the multistage Qinling orogen (East central China), European Journal of Mineralogy, 22, Beiheft 1, 22.

Bhadra, S. & Bhattacharya, A., 2007. The barometer tremolite + tschermakite + 2 albite = 2 pargasite + 8 quartz; constraints from experimental data at unit silica activity, with application to garnet-free natural assemblages. American Mineralogist, 92, 491-502.

Chakraborty, S. & Ganguly, J., 1992, Cation diffusion in aluminosilicate garnets: experimental determination in spessartine–almandine diffusion couples, evaluation of effective binary, diffusion coefficients, and applications. Contributions to Mineralogy and Petrology, 111, 74-86.

Chen, D., Liu, L., Sun, Y., Zhang, A., Liu, X. & Luo, J., 2004. LA-ICP-MS zircon U-Pb dating for high-pressure basic granulite from North Qinling and its geological significance. Chinese Science Bulletin, 49, 2296-2304.

Chen, H., Hu, J.M., Wu, G.L. & Gao, W., 2010. Study on the intracontinental deformation of the Mian-Lue suture belt, western Qinling. Acta Petrologica Sinica, 26, 1277-1288 (in Chinese with English abstract).

Chen, Y., Li, D., Zhou, J., Zhang, H., Liu, F., Nie, F., Jiang, L., Liu, X., 2008. U-Pb Ages of Zircons in Western Qinling Shan, China, and Their Tectonic Implications. Earth Science Frontiers, 15, 88-107.

Chen, Z., Lu, S., Li, H., Li, H., Xiang, Z., Zhou, H. & Song, B., 2006. Constraining the role of the Qinling orogen in the assembly and break-up of Rodinia: Tectonic implications for Neoproterozoic granite occurrences. Journal of Asian Earth Sciences, 28, 99-115.

Colombi, A., 1988. Métamorphisme et géochimie des roches mafiques des Alpes ouest-centrales (géopofil Viège Domodossola-Locarno): Ph.D. thesis, University Lausanne (CH), 216 p.

Coggon, R. & Holland, T. J. B., 2002. Mixing properties of phengitic micas and revised garnet-phengite thermobarometers. Journal of Metamorphic Geology, 20, 683–696.

De Capitani, C., 1994, Gleichgewichts-Phasendiagramme: Theorie und Software. Berichte der Deutschen Mineralogischen Gesellschaft, European Journal of Mineralogy, 48, Beiheft, 6.

De Capitani, C. & Brown, T. D., 1987, The computation of chemical equilibrium in complex systems containing non-ideal solutions. Geochimica et Cosmochimica Acta, 51, 2639-2652.

De Capitani, C. & Petrakakis, K., 2010, The computation of equilibrium assemblage diagrams with Theriak/Domino software. American Mineralogist, 95, 1006-1016.

Diener, J.F.A., Powell, R., White, R. W. & Holland, T. J. B., 2007, A new thermodynamic model for clino- and orthoamphiboles in the system Na_2O–CaO–FeO–MgO–Al_2O_3–SiO_2–H_2O–O. Journal of metamorphic Geology, 25, 631-656.

Diwu, H.L., 2010. The disintegration of Kuanping Group in North Qinling orogenic belts and Neo-Proterozoic N-MORB. Acta Petrologica Sinica, 26, 2025-2038 (in Chinese with English abstract).

Dong, Y., Genser, J., Neubauer, F., Zhang, G., Liu, X., Yang, Z. & Heberer, B., 2011a. U-Pb and 40Ar/39Ar geochronological constraints on the exhumation history of the North Qinling terrane, China. Gondwana Research, in press

Dong, Y., Zhang, G., Hauzenberger, C., Neubauer, F., Yang, Z. & Liu, X., 2011b. Palaeozoic tectonics and evolutionary history of the Qinling orogen: Evidence from geochemistry and geochronology of ophiolite and related volcanic rocks. Lithos, 122, 39-56.

Dong, Y., Zhang, G., Neubauer, F., Liu, X., Genser, J. & Hauzenberger, C., 2011c. Tectonic evolution of the Qinling orogen, China: Review and synthesis. Journal of Asian Earth Sciences, 41, 213-237.

Dong Y., ,Zhang G.,·Lai, S., Zhou, D. & Zhu, B., 1999. An ophiolitic tectonic melange first discovered in Huashan area, south margin of Qinling orogenic belt, and its tectonic implications. Science in China (Series D), 42, 292-302.

Droop, G.T.B. (1987): A general equation for estimating Fe^{3+} concentrations in ferromagnesian silicates and oxides from microprobe analyses, using stoichiometric criteria. Mineralogical Magazine, 51, 431-435.

Druschke, P., Hanson, A.D., Yan, Q., Wang, Z. & Wang, T., 2006. Stratigraphic and U-Pb SHRIMP Detrital Zircon Evidence for a Neoproterozoic Continental Arc, Central China: Rodinia Implications. The Journal of Geology, 114, 627-636.

Peter Druschke, Andrew D. Hanson, Quanren Yan,1,2 Zhongqi Wang,1 and Tao Wang1

Faure, M., Lin, W. & Le Breton, N., 2001. Where is the North China–South China block boundary in eastern China? Geology, 29, 119-122.

Faure, M., Lin, W., Monié, P. & Meffre, S., 2008. Palaeozoic collision between the North and South China blocks, Triassic intracontinental tectonics, and the problem of the ultrahigh-pressure metamorphism. C. R. Geoscience, 340, 139-150.

Feng, Q., Du, Y., Yin, H., Sheng, J. & Xu, J., 1996. Carboniferous radiolarian fauna firstly discovered in Mian-Lüe ophiolitic melange belt of South Qinling Mountains. Science in China Series D, 39 Suppl., 87-92.

Gao, S., Zhang, B.-R., Wang, D.-P., Ouyang, J.-P. & Xie, Q.-L., 1996. Geochemical evidence for the Proterozoic tectonic evolution of the Qinling Orogenic Belt and its adjacent margins of the North China and Yangtze cratons. Precambrian Research, 80, 23-48.

Gaidies, F., de Capitani, C. & Abart, R., 2008a, THERIA_G: a software program to numerically model prograde garnet growth. Contributions to Mineralogy and Petrology, 155, 657-671.

Gaidies, F., de Capitani, C., Abart, R. & Schuster, R., 2008b, Prograde garnet growth along complex P–T–t paths: results from numerical experiments on polyphase garnet from the Wölz Complex (Austroalpine basement). Contributions to Mineralogy and Petrology, 155, 673-688.

Gao, S., Zhang, B.-R., Wang, D.-P., Ouyang, J.-P. & Xie, Q.-L., 1996. Geochemical evidence for the Proterozoic tectonic evolution of the Qinling Orogenic Belt and its adjacent margins of the North China and Yangtze cratons. Precambrian Research, 80, 23-48.

Green, E., Holland, T.J.B. & Powell, R., 2007. An order-disorder for omphacitic pyroxenes in the system jadeite-diopside-hedenbergite-acmite, with applications to eclogitic rocks. American Mineralogist, 92, 1181-1189.

Hacker, B.R., Ratschbacher, L. & Liou, J.G., 2004, Subduction, collision and exhumation in the ultra-

high-pressure Qinling-Dabie orogen. in Malpas, J., Fletcher, C.J.N., Ali, J.R., and Aitchison, J.C., eds., Aspects of the Tectonic Evolution of China: Geological Society of London Special Publication, 226, 157-175.

Hacker, B.R., Wallis, S.R., Ratschbacher, L., Grove, M. & Gehrels, G., 2006. High- temperature geochronology constraints on the tectonic history and architecture of the ultrahigh-pressure Dabie-Sulu Orogen. Tectonics, 25, TC5006.

Holland, T.J.B. & Powell, R., 1998, An internally consistent thermodynamic data set for phases of petrological interest. Journal of metamorphic Geology, 16, 309-343.

Holland, T. J. B. & Powell, R., 2003. Activity–composition relations for phases in petrological calculations: an asymmetric multicomponent formulation. Contributions to Mineralogy and Petrology, 145, 492–501.

Hu, N., Yang, J., An, S., Hu J., 1993. Metamorphism and tectonic evolution of the Shangdan fault zone, Shaanxi, China. Journal of metamorphic Geology, 11, 537-548.

Kretz, R., 1983. Symbols for rock-forming minerals. American Mineralogist, 68, 277-279.

Kröner, A., Compston, W., Zhang, G.W., Guo, A.L. & Todt, W., 1988. Age and tectonic setting of late Archean greenstone gneiss terrane in Henan province, China, as revealed by single-grain zircon dating. Geology, 16, 211 –215.

Lai, S., 2007. Geochemistry and Tectonic Significance of the Ophiolite and Associated Volcanics in the Mianlüe Suture, Qinling Orogenic Belt, China. Journal of the Geological Society of India, 70, 217-234.

Lai, S., Qin, J., Chen, L. & Grapes, R., 2008. Geochemistry of Ophiolites from the Mian-Lue Suture Zone: Implications for the Tectonic Evolution of the Qinling Orogen, Central China. International Geology Review, 50, 650-664.

Laird, J. & Albee, A.L., 1981. High-pressure metamorphism in mafic schists from Northern Vermont. American Journal of Science, 281, 97-126.

Leake, B. E., Woolley, A. R., Arps, C. E. S., Birch, W. D., Gilbert, M. C., Grice, J. D., Hawthorne, F. C., Kato, A., Kisch, H. J., Krivovichev, V. G., Linthout, K., Laird, J., Mandarino, J. A., Maresch, W. V., Nickel, E. H., Rock, N. M. S., Schumacher, J. C., Smith, D. C., Stephenson, N. C. N., Ungaretti, L., Whittaker, E. J. W. & Youzhi, G., 1997. Nomenclature of amphiboles: Report of the subcommittee on amphiboles of the International Mineralogical Association, commission on new minerals and mineral names. Canadian Mineralogist, 35, 219-246.

Li, J., Wang, Z., & Zhao, M., 1999. $^{40}Ar/^{39}Ar$ thermochronological constraints on the timing of collisional orogeny in the Mian-Lue collision belt, southern Qinling Mountains. Acta Geologica Sinica, 73, 208-215.

Li, S.-G., Sun, W., Zhang, G., Chen, J., and Yang, Y., 1996. Chronology and geochemistry of metavolcanic rocks from Heigouxia Valley in the Mianlüe tectonic zone, South Qinling: Evidence for a Palaeozoic oceanic basin and its closure time: Science in China (Series D), 39, 300–310.

Li, S., Zhang, G., Li, Y. & Yang, Y., 2000. Discovery of granulite in the Mianxian-Lüeyang suture zone, Mianxian area and its tectonic significance. Acta Petrologica Sinica, 16, 220-226 (in Chinese with English abstract).

Li, Z.X., Li, X.H., Kinny, P.D., Wang, J., Zhang, S., Zhou, H., 2003. Geochronology of Neoproterozoic syn-rift magmatism in the Yangtze Craton, South China and correlations with other continents: evidence for a mantle superplume that broke up Rodinia. Precambrian Research, 122, 85-109.

Lindsley, D., 1983. Pyroxene thermometry. American Mineralogist, 68, 477-493.

Ling, W., Gao, S., Ouyang, J., Zhang, B. & Li, H., 2002. Time and tectonic setting of the Xixiang Group: Constraints from zircon U-Pb geochronology and geochemistry. Science China (Series D), 45, 818-831.

Liu, X., Jahn, B.-M., Dong, S., Lou, Y. & Cui, J., 2008. High-pressure metamorphic rocks from Tongbaishan, central China: U-Pb and 40Ar/39Ar age constraints on the provenance of protoliths and timing of metamorphism. Lithos, 105, 301-318.

Meng, Q.-R. & Zhang, G.-W., 1999. Timing of collision of the North and South China blocks: Controversy and reconciliation. Geology, 27, 123-126.

Meng, Q.-R. & Zhang, G.-W., 2000. Geologic framework and tectonic evolution of the Qinling orogen, central China. Tectonophysics, 323, 183-196.

Morimoto M., 1988. Nomenclature of pyroxenes. Mineralogical Magazine, 52, 535-550.

Nimis, P., 1999, Clinopyroxene geobarometry of magmatic rocks. Part 2. Structural geobarometers for basic to acid, tholeiitic and mildly alkaline magmatic systems. Contributions to Mineralogy and Petrology, 135, 62-74.

Nimis, P. & Taylor, W. R., 2000. Single clinopyroxene thermobarometry for garnet peridotites. Part I. Calibration and testing of a Cr-in-Cpx barometer and an enstatite-in-Cpx thermometer. Contributions to Mineralogy and Petrology, 139, 541-554.

Niu, B., Liu, Z., Ren, J., 1993. The tectonic relationship between the Qinling Mountains and Tongbai-Dabie Mountains with notes on the tectonic evolution of the Hehuai Basin. Bulletin of the Chinese Academy of Geological Sciences, 26, 1-12.

Pouchou, J. L. & Pichoir, F., 1985. 'PAP' φ(ρZ) procedure for improved quantitative microanalysis. In: Armstrong, J.T. (ed.), Microbeam Analysis. San Francisco Press, San Francisco, California, 104-106.

Qin, J., Lai, S. & Li, Y., 2008. Slab Breakoff Model for the Triassic Post-Collisional Adakitic Granitoids in the Qinling Orogen, Central China: Zircon U-Pb Ages, Geochemistry, and Sr-Nd-Pb Isotopic Constraints. International Geology Review, 50, 1080-1104.

Ratschbacher, L., Franz, L., Enkelmann, E., Jonckheere, R., & Axel Pörschke, Hacker B. R., Dong, S., & Zhang, Y., 2006, The Sino-Korean–Yangtze suture, the Huwan detachment, and the Palaeozoic–Tertiary exhumation of (ultra)high-pressure rocks along the Tongbai–Xinxian–Dabie Mountains. In: Hacker, B. R., McClelland, W. C. & Liu, J. G., (eds.), Ultrahigh pressure metamorphism: Deep continental subduction. Geological Society of America Special Paper, 403, 44-75.

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Schmidt, M.W., 1992, Amphibole composition in tonalite as a function of pressure: an experimental calibration of the Al-in-hornblende barometer. Contributions to Mineralogy and Petrology, 110, 304-310.

Schumacher, J.C., 1997. The estimation of the proportion of ferric iron in the electron-microprobe analysis of amphiboles. Canadian Mineralogist, 35, 238-246.

Shi, Y., Liu, D., Zhang, Z., Miao, L., Zhang, F., Xue, H., 2007. SHRIMP Zircon U-Pb Dating of Gabbro and Granite from the Huashan Ophiolite, Qinling Orogenic Belt, China: Neoproterozoic Suture on the Northern Margin of the Yangtze Craton. Acta Geolica Sinica, 81, 239-243.

Sun, W., Li, S., Chen, Y. & Li, Y., 2002. Timing of Synorogenic Granitoids in the South Qinling, Central China: Constraints on the Evolution of the Qinling-Dabie orogenic Belt. The Journal of Geology, 110, 457-468.

Wang, N., 1989. Micropaleontological study of lower Paleozoic siliceous sequences of the Yangtze platform and eastern Qinling Range. J. Southeast Asian Earth Sci. 3, 141–161.

Wang, T., Wang, X. & Li, W., 2000. Evaluation of multiple emplacement mechanisms: the Huichizi granite pluton, Qinling orogenic belt, central China. Journal of Structural Geology, 22, 505-518.

Wang, T., Zhang, Z., Wang, X., Wang, Y. & Zhang, C., 2005. Neoproterozoic Collisional Deformation in the Core of the Qinling Orogen and its Age: Constrained by Zircon SHRIMP Dating of Strongly Deformed Syn-collisional Granites and Weakly Deformed Granitic Veins. Acta Geologica Sinica, 79, 220-232.

Wang, T., Wang, X.X., Tian, W., Zhang, C.L., Li, W.P. & Li, S., 2009a. North Qinling Paleozoic granite associations and their variation in space and time: Implications for orogenic processes in the orogens of central China. Science in China (Series D – Earth Sciences), 52, 1359-1384.

Wang, T., Wang, Z.Q., Yan, Z., Yan, Q.R., Zhang, Y.L. & Xiang, Z.J, 2009b. Identification of the Ordovician oceanic island basalt and their tectonic significance of the Dabao Formation in southern Qinling: Constraints from geochemistry and geochronology of oceanic island basalt. Acta Petrologica Sinica, 25, 3241-3250 (in Chinese with English abstract).

Wang, T., Wang, Z.Q., Yan, Q.R., Yan, Z., Qin, X.F., Zhang, Y.L. & Xiang, Z.J., 2011. The formation age and geochemical characteristics of the metavolcanic rock blocks of the Baishuijiang Group in South Qinling. Acta Petrologica Sinica, 27, 645-656 (in Chinese with English abstract).

Wang, X.-C., Li, X.-H., Li, W.-X. Li, Z.-X., Liu, Y., Yang, Y.-H., Liang, X.-R. & Tu, X.-L., 2008. The Bikou basalts in the northwestern Yangtze block, South China: Remnants of 820-810 Ma continental flood basalts? Geological Society of America Bulletin, 120, 1478-1492.

Wei, C., Yang, C., Zhang, S. & Li, R., 1998. Discovery of granulite from the Fuping area in southern Qinling Mountains and its geological significance. Chinese Science Bulletin, 43, 1358-1362.

Wei, C., Yang, C. & Zhang, S., 1999. Metamorphism of the East Sector of the Southern Qinling Orogenic Belt and Its Geological Significance. Acta Geologica Sinica, 73, 65-77.

White, R.W., Powell, R. & Clarke, G.L., 2002. The interpretation of reaction textures in Fe-rich metapelitic granulites of the Musgrave Block, central Australia: Constraints from mineral equilibria calculations in the system K_2O-FeO-MgO-Al_2O_3-SiO_2-H_2O-TiO_2-Fe_2O_3. Journal of Metamorphic Geology, 20, 41-55.

White, R.W., Powell, R. & Holland, T.J.B., 2007. Progress relating to calculation of partial melting equilibria for metapelites. Journal of Metamorphic Geology, 25, 511-527.

Xue, F., Lerch, F., Kröner, A., & Reischmann, T., 1996, Tectonic evolution of the East Qinling Mountains, China, in the Palaeozoic: a review and a new tectonic model: Tectonophysics, 253, 271-284.

Yan, Q., Hanson, A.D., Wang, Z., Druschke, P.A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou, H., & Jiang, C., 2003. SHRIMP Age and Geochemistry of the Bikou Volcanic Terrane: Implications for Neoproterozoic Tectonics on the Northern Margin of the Yangtze Craton. Acta Geologica Sinica, 77, 479-490

Yan, Q., Hanson, A.D., Wang, Z., Druschke, P.A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou, H. & Jiang, C., 2004. Neoproterozoic Subduction and Rifting on the Northern Margin of the Yangtze Plate, China: Implications for Rodinia Reconstruction. International Geology Review, 46, 817-832.

Yan, Q., Wang, Z., Yan, Z., Xiang, Z., Chen, J. & Wang, T., 2007. SHRIMP Analyses for Ophiolitic - Mafic Blocks in the Kangxian - Mianxian Section of the Mianxian - Lueyang Melange: Their Geological Implications. Geology review, 53, 755-764 (in Chinese with English abstract)

Yan, Q.R., Chen, J.L., Wang, Z.Q, Yan, Z., Wang, T., Li, Q.G., Zhang, Z.Q. & Jiang, C.F., 2008. Zircon U-Pb and geochemical analyses for leucocratic intrusive rocks in pillow lavas in the Danfeng Group, north Qinling Mountains, China. Science in China (Series D), 51, 249-262.

Yan, Z., Wang, Z., Wang, T., Yan, Q., Xiao, W. & Li, J., 2006a. Provenance and tectonic setting of clastic deposits in the Devonian Xicheng basin, Qinling orogen, central China. Journal of Sedimentary Research, 76, 557-574.

Yan, Z., Wang, Z., Yan, Q., Wang, T., Xiao, W., Li, J., Han, F., Chen, J. & Yang, Y., 2006b. Devonian Sedimentary Environments and Provenance of the Qinling Orogen: Constraints on Late Palaeozoic Southward Accretionary Tectonics of the North China Craton. International Geology Review, 48, 585-618.

Yang, J., Xu, Z., Dobrzhinetskaya, L.F., Green II, H.W., Pei, X., Shi, R., Wu, C., Wooden, J.L., Zhang, J., Wan, Y., Li, H., 2003: Discovery of metamorphic diamonds in central China: an indication of a > 4000-km-long zone of deep subduction resulting from multiple continental collisions. Terra Nova, 15, 370-379.

Zhang, G., Yuan, X., Zhang, B., Chen, J., Xiao, Q., Meng, Q., Sun, Y., Lu, X., Zhang, C., Yu, Z. & Zhou, D., 1996. Tectonic map of Qinling orogenic belt. Science Press, Xi'an.

Zhang, Z., Zhang, G., Tang, S., Xu, J., Yang, Y. & Wang, J., 2002. Age of Anzishan granulites in the Mianxian-Lueyang suture zone of Qingling orogen: With a discussion of the timing of final assembly of Yangtze and North China craton blocks. Chinese Science Bulletin, 47, 1925-1930.

Zhou, M.-F., Ma, Y., Yan, D.-P., Xia, X., Zhao, J.-H. & Sun, M., 2006. The Yanbian Terrane (Southern Sichuan Province, SW China): A Neoproterozoic arc assemblage in the western margin of the Yangtze Block. Precambrian Research, 144, 19-38.

5 Conclusions

5.1 Precambrian evolution of the Yangtze craton

Crust-derived, syn-collisional granites intruded the Qinling unit and the Yangtze craton at ~960-890 Ma (Chen Z et al., 2006; Ling et al., 2002; Wang et al., 2003; 2005) reflecting collision of continental blocks during assemblage of the Precambrian supercontinent Rodinia, i.e. the so called Jinningian orogeny. Although previously interpreted to represent a continuation of the "Mianlüe suture" (e.g., Dong et al., 1999), the Huashan ophiolite located south of Tongbai formed during this event as implied by a 947 ± 14 Ma old gabbro (Shi et al., 2007). According to the recent reconstruction of Evans (2009), the Yangtze craton was located at the margin of Rodinia stitched to India and Tarim while the Sino-Korean craton was located on the opposite side of India.

At the northern and northwestern margin (todays orientation) of the Yangtze craton a south- to east-trending subduction zone formed reflected by numerous arc-related and mostly mafic intrusions (e.g., Yan Q et al., 2003; 2004; Zhou et al. 2002a; 2002b; 2006). Available U/Pb zircon ages of these arc magmatics range from ~846-776 Ma (Yan Q et al., 2003, Zhou et al. 2002; 2006). Appropriate Neoproterozoic oceanic crust was amalgamted to the Yangtze craton and occurs nowadays within discrete blocks in the Mianlüe mylonite zone (Yan Q. et al., 2007; Wang T et al, 2011) marking a Neoproterozoic suture.

The break-up of Rodinia started with the intrusion of numerous mafic dykes into the Yangze craton at 745-830 Ma (e.g., Li Z.X. et al., 1995; 1999). Both, Yangtze and Sino-Korean cratons likely became isolated islands. Furthermore, the long and narrow Qinling microcontinent separated from the Yangtze craton (Ratschbacher et al., 2006) and a Palaeo-Thetys branch in between formed. Subsequently, the Qinling microcontinent drifted away from the Yangtze craton approaching the Sino-Korean craton.

5.2 Early Palaeozoic HP/UHP metamorphism and continental arc

In the Cambrain the future Qinling belt comprised the Sino-Korean craton, the Erlangping ocean, the Qinling microcontinent, a Palaeo-Tethys branch, and the Yangtze craton, from north to south.

Deep subduction of the Qinling microcontinent below the intra-oceanic Erlangping arc caused UHP metamorphism of felsic gneisses and associated mafic rocks nowadays exposed at the northern margin of the Qinling Unit at ~507 Ma (Yang J et al., 2003). During uplift the UHP metamorphics underwent strong recrystalization, a first stage at ~2.0-2.3 GPa and ~660 °C was followed by a second stage at 1.2-1.4 GPa and ~550-600 °C. Ar/Ar phengite and U/Pb titanite dating yield ~470 Ma and imply exhumation into the lower crust within ~37 Ma.

The southern margin of the Qinling microcontinent faced a northward trending subduction zone. A continental arc set up and numerous, often multistage granitoid plutons (e.g., Wang T et al., 2000) intruded the Qinling, Erlangping and Kuanping units (Ratschbacher et al., 2003 and therein). Available U/Pb zircon ages of arc-related granitoids range from 507 to 399 Ma (Dong et al., 2011c; Wang T et al., 2009) and imply ~ 110 Ma magmatic activity and thus continuous subduction of the Shangdan ocean. The high heat flow caused migmatisation of felsic gneisses of the central and southern Qinling unit at peak metamorphic conditions of 680-775 °C at 0.5-0.75 GPa. The metamorphic overprint has the same time constraints as the magmatic arc.

Remarkably, the UHP metamorphics lack indications of an overprint by the magmatic arc pointing to a late juxtaposition of both crustal segments.

5.3 Closure of the Erlangping ocean

According to Ratschbacher et al. (2006) the closure of the Erlangping ocean formed two sutures: one between the Qinling microcontinent and the Erlangping intra-oceanic arc and the other one between the Erlangping intra-oceanic arc and the Sino-Korean craton. The two sutures are younger than the remnants of the ocean floor and older than the continental arc granitoids intruding the Kuanping, Erlangping and Qinling units (Ratschbacher et al., 2006). Granitoids related to the continental Qinling

arc intruded the Erlangping unit as early as ~460 Ma (Dong et al, 2011c) indicating that amalgamation of the Qinling microcontinent with the Erlangping intra-oceanic arc was completed at this time. However, the back-arc basin existed longer as U/Pb zircon ages of 443-467 Ma of dacite and pillow lavas (Dong et al., 2011c and therein) indicate ongoing rifting till the Ordovician-Silurian boundary. The age of youngest known radiolaria suggest marine sedimentation till the Early Silurian (~428 Ma, Ratschbacher et al., 2003; Wang N., 1989). A granitoid intruding the Kuanping unit yield an U/Pb zircon age of 399 ± 14 Ma (Dong et al., 2011c) and provides a minimum age for the collision with the Sino-Korean craton. As consequence, at ~400-428 Ma the Erlangping back-arc basin and thus the entire Erlangping ocean must have closed due to final amalgamation of the Qinling microcontinent to the Sino-Korean craton.

The ophiolite bodies located at the Shangdan fault are likely remnants of large nappes of Erlangping ocean origin and were thrust across the entire Qinling unit (Faure et al.,2001; 2008; Ratschbacher et al., 2003).

5.4 Ceasing of arc activity

Cooling of the central and southern part of the Qinling unit through amphibole closure at 359-410 Ma (Dong et al., 2011a and this study) highlights arc activity reduction in the Early-Middle Devonian. Further cooling was likely affected by the proximity to local heat sources and deformation as indicated by distinctly different Ar/Ar biotite ages that cluster at 356-370 Ma and ~330 Ma (Dong et al., 2011a and this study).Structural analysis show that the Qinling unit was exhumed during oblique left-lateral shearing (Wang T et al., 2005) triggered by oblique subduction (Ratschbacher et al., 2003).

5.5 The Sonshugou ophiolite

Granulites of the songshugou ophiolite experienced the HP-granulite facies overprint (830-920 °C at 1.0-1.6 GPa; Liu & Zhu, 1995; Zhang, 1999) at 485-518 Ma (Chen D et al., 2004; Liu J et al., 2009; Liu J & Sun, 2005) in the upper mantle below the Erlangping intra-oceanic arc. During collision with the Qinling microcontinent, the mafic and ultramafic rocks were exhumed and thrust southward as part of the Erlangping nappe stack. They subsequently experienced the medium-pressure amphibolite facies overprint and show a similar cooling history as the juxtaposed ultra-metamorphics of the Qinling unit.

5.6 Late Palaeozoic subduction

The Liuling Unit and its equivalents have been regarded as remnants of a forearc basin (e.g., Ratschbacher et al., 2006; Yan Z et al., 2006b) due to their position south of the Early Palaeozoic Andean style continental margin and the occurrence of Devonian turbidites. This is substantiated by new U/Pb ages of detrital zircons proving Early Palaeozoic Qinling magmatic arc provenance of clastic sediments of the Shanyang basin.

Early Carboniferous (~330 Ma) detrital zircon grains together with U/Pb dating garnet-staurolite dating give just ~10 Ma time span from sedimentation to burial to mid-crustal levels (1st metamorphic stage of sample 75261C) for the Liuling sediments. The second metamorphic stage might have incorporated Qinling basement thus pointing to burial of the hanging wall as the garnet cores of sample 75302A point to a HT/MP event typical for the Qinling arc metamorphics. Thus, the Carboniferous subduction of the Yangtze plate led to burial of the Liuling sediments to lower crustal levels at the same time, eclogites formed in the Huwan mélange. Altogether, this proves ongoing subduction along the Qinling-Dabie orogen until Late Carboniferous. Probably, the subduction stopped at the Carboniferous-Permian transition as palaeomagnetic data (Zhao and Coe 1987; Enkin et al. 1992) suggests that the Yangtze and the Sino-Korean cratons moved farther apart in the Middle Permian to Middle–Late Triassic, which, however, also contradicts the deep continental subduction in the Dabie Shan.

5.7 Triassic collision

The UHP eclogites of the Dabie area formed at ~240 Ma due to northward subduction of the leading edge of the Yangtze craton beneath the amalgamated Qinling-Erlangping-Sino-Korean continent (e.g., Hacker et al., 2006). In the Qinling belt, the subduction of the leading edge of the Yangtze craton manifests in the formation of blueschist- and greenschist facies rocks in the Wudang and the Douling complex being the continuation of the blueschist-facies Susong belt south of Dabie.

The HP/MT rocks from the Wudang formed under a subduction setting at a geothermal gradient of ~12 °C/km. Todays Wudang centre was buried to greater depths although the same geothermal gradient of ~12°C/km is, within errors of geobarometry, also appropriate for the low-grade metamorphic northern Wudang and Douling thus must have been part of the same downgoing slab. Still within the subduction channel nappes now building Wudang's core separated from the slab and ascended. Their HP/LT overprint proves very fast exhumation along approximately the same geothermal gradient. Thus, the HP/LT overprint may mark the juxtaposition with nappes now forming Wudang's north within the subduction channel and the onset of imbricated nappe stacking along south-verging thrusts (Huang, 1993). Crustal N-S extension (Ratschbacher et al., 2003) finally brought the Wudang Shan to the surface.

5.8 The location of the Triassic suture

The "Mianlüe suture" is a hypothetic fault zone thought to stretch all through the northern Yangtze craton (e.g., Meng & Zhang, 1999; 2000) and formed due to subduction of a Devonian-Permian "Mianlüe ocean. The major argument for the existence of this ocean is the occurrence of numerous ophiolitic blocks along this suture. However, U/Pb zircon dating (Yan Q. et al., 2007; Shi et al., 2007; Wang et al., 2011; this study) demonstrates a Neoproterozoic age. Thus we suggest that the ophiolitic blocks of the Mianlüe mylonite zone constitute the remnants of a Neoproterozoic oceanic basin. Therefore, the existence of a Mianlüe-ocean that formed in the Devonian as part of the Palaeo-Tethys (e.g. Lai et al., 2008) is rather unlikely. As there are no ophiolites of matching age known along the entire "Mianlüe suture" we conclude that the continuation of the Triassic suture between the amalgamated Sino-Corean craton – Erlangping – Qinling – continent and the Yangtze craton outlined in the Tongbai-Xinxian-Dabie area by Ratschbacher et al. (2006) must be located somewhere else. However, Late Mesozoic-recent faulting hampers its recognition. Speculatively, the suture may continue south of the Shanyang and Xicheng basins and north of the Baishuijiang Unit.

The formation of the tectonic melange (the Mianlüe mylonite zone) nowadays hosting the ophiolites as well as Middle-Late Palaeozoic sediments is bracketed between the age of the youngest known sediments (Lower Carboniferous; Feng, 1996) and the Late Triassic metamorphic overprint outlined above. It may thus coincide with the Permian Barrovian metamorphism in the central Liuling Unit.

5.9 References

Chen, D., Liu, L., Sun, Y., Zhang, A., Liu, X. & Luo, J., 2004. LA-ICP-MS zircon U-Pb dating for high-pressure basic granulite from North Qinling and its geological significance. Chinese Science Bulletin, 49, 2296-2304.

Chen, Z., Lu, S., Li, H., Li, H., Xiang, Z., Zhou, H. & Song, B., 2006. Constraining the role of the Qinling orogen in the assembly and break-up of Rodinia: Tectonic implications for Neoproterozoic granite occurrences. Journal of Asian Earth Sciences, 28, 99-115.

Dong, Y., Zhang, G., Lai, S., Zhou, D. & Zhu, B., 1999. An ophiolitic tectonic mélange first discovered in Huashan area, south margin of Qinling Orogenic Belt, and its tectonic implications. Science in China (Series D – Earth Sciences), 42, 292-301.

Dong, Y., Zhang, G., Neubauer, F., Liu, X., Genser, J. & Hauzenberger, C., 2011c. Tectonic evolution of the Qinling orogen, China: Review and synthesis. Journal of Asian Earth Sciences, 41, 213-237.

Enkin, R.J., Yang, Z., Chen, Y., and Courtillot, V., 1992, Palaeomagnetic constraints on the geodynamic history of the major blocks of China from Permian to present: Journal of Geophysical Research, v. 97, p. 13953–13989.

Evans, D.A.D., 2009. The palaeomagnetically viable, long-lived and all-inclusive Rodinia supercontinent reconstruction. In: Murphy, J.B., Keppie, J.D. & Hynes, A.J. (eds.): Ancient Orogens and Modern Analogues. Geological Society, London, Special Publications, 327, 371-404

Faure, M., Lin, W. & Le Breton, N., 2001. Where is the North China–South China block boundary in eastern China? Geology, 29, 119-122.

Faure, M., Lin, W., Monié, P. & Meffre, S., 2008. Palaeozoic collision between the North and South

China blocks, Triassic intracontinental tectonics, and the problem of the ultrahigh-pressure metamorphism. C. R. Geoscience, 340, 139-150.

Feng, Q., Du, Y., Yin, H., Sheng, J. & Xu, J., 1996. Carboniferous radiolarian fauna firstly discovered in Mian-Lüe ophiolitic melange belt of South Qinling Mountains. Science in China (Series D – Earth Sciences), 39 (Supplement), 87-92.

Hacker, B.R., Wallis, S.R., Ratschbacher, L., Grove, M. & Gehrels, G., 2006. High- temperature geochronology constraints on the tectonic history and architecture of the ultrahigh-pressure Dabie-Sulu Orogen. Tectonics, 25, TC5006.

Huang, W., 1993, Multiphase deformation and displacement within a basement complex on a continental margin: the Wudang Complex in the Qinling Orogen, China. Tectonophysics, 224, 305-326.

Lai, S., Qin, J., Chen, L. & Grapes, R., 2008. Geochemistry of Ophiolites from the Mian-Lue Suture Zone: Implications for the Tectonic Evolution of the Qinling Orogen, Central China. International Geology Review, 50, 650-664.

Li, Z.X., Zhang, L. & Powell, McA., Ch., 1995, South China in Rodinia: Part of the missing link between Australia-East Antarctica and Laurentia? Geology, 23, 407-410.

Li, Z.X., Li, X.H., Kinny, P.D. & Wang, J., 1999, The break-up of Rodinia: did it start with a mantle plume beneath South China? Earth and Planetary Science Letters, 173, 171-181.

Li, Z.X., Li, X.H., Kinny, P.D., Wang, J., Zhang, S., Zhou, H., 2003. Geochronology of Neoproterozoic syn-rift magmatism in the Yangtze Craton, South China and correlations with other continents: evidence for a mantle superplume that broke up Rodinia. Prec. Res. 122, 85-109.

Ling, W., Gao, S., Ouyang, J., Zhang, B. & Li, H., 2002. Time and tectonic setting of the Xixiang Group: Constraints from zircon U-Pb geochronology and geochemistry. Science China (Series D), 45, 818-831.

Liu, J. & Sun, Y., 2005. New Data on the "Hot" Emplacement Age of Ultramafic Rocks from the Songshugou Area in the Eastern Qinling. Geological Review, 51, 198-192 (in Chinese with English abstract).

Liu, J., Sun, Y., Lai, T. & Sun, W., 2009. Emplacement age of the Songshugou ultramafic massif in the Qinling orogenic belt, and geologic implications. International Geology Review, 51, 58-76.

Liu, L., & Zhou, D., 1995. Discovery and study of high-pressure basic granulites in Songshugou area of Shangnan, East Qinling. Chinese Science Bulletin, 40, 400-404.

Meng, Q.-R. & Zhang, G.-W., 1999. Timing of collision of the North and South China blocks: Controversy and reconciliation. Geology, 27, 123-126.

Meng, Q.-R. & Zhang, G.-W., 2000. Geologic framework and tectonic evolution of the Qinling orogen, central China. Tectonophysics, 323, 183-196.

Ratschbacher, L., Hacker, B.R., Calvert, A., Webb, L.E., Grimmer, J.C., McWilliams, M., Ireland, T., Dong, S. & Hu, J., 2003, Tectonics of the Qinling Belt (Central China): Tectonostratigraphy, geochronology, and deformation history. Tectonophysics, 366, 1-53.

Ratschbacher, L., Franz, L., Enkelmann, E., Jonckheere, R., & Axel Pörschke, Hacker B. R., Dong, S., & Zhang, Y., 2006, The Sino-Korean–Yangtze suture, the Huwan detachment, and the Paleozoic–Tertiary exhumation of (ultra)high-pressure rocks along the Tongbai–Xinxian–Dabie Mountains. In: Hacker, B. R., McClelland, W. C. & Liu, J. G., eds., Ultrahigh pressure metamorphism: Deep continental subduction. Geological Society of America Special Paper, 403, 44-75..

Shi, Y., Liu, D., Zhang, Z., Miao, L., Zhang, F., Xue, H., 2007. SHRIMP Zircon U-Pb Dating of Gabbro and Granite from the Huashan Ophiolite, Qinling Orogenic Belt, China: Neoproterozoic Suture on the Northern Margin of the Yangtze Craton. Acta Geol. Sin. 81, 239-243.

Wang, N., 1989. Micropaleontological study of lower Paleozoic siliceous sequences of the Yangtze platform and eastern Qinling Range. J. Southeast Asian Earth Sci. 3, 141–161.

Wang, T., Wang, X. & Li, W., 2000. Evaluation of multiple emplacement mechanisms: the Huichizi granite pluton, Qinling orogenic belt, central China. Journal of Structural Geology, 22, 505-518.

Wang, T., Wang, X., Zhang, G., Pei, X. & Zhang, C., 2003. Remnants of a Neoproterozoic Collisional Orogenic Belt in the Core of the Phanerozoic Qmling Orogenic Belt (China). Gondwana Research, 4, 699-710

Wang, T., Zhang, Z., Wang, X., Wang, Y. & Zhang, C., 2005a. Neoproterozoic Collisional Deformation in the Core of the Qinling Orogen and its Age: Constrained by Zircon SHRIMP Dating of Strongly Deformed Syn-collisional Granites and Weakly Deformed Granitic Veins. Acta Geologica Sinica, 79, 220-232 (in Chinese with English abstract).

Wang, T., Pei, X.-Z., Wang, X.-X., Hu, N.-G., Li, W.-P & Zhang, G.-W., 2005b. Orogen-Parallel Westward Oblique Uplift of the Qinling Basement Complex in the Core of the Qinling Orogen (China): An Example of Oblique Extrusion of Deep-Seated Metamorphic Rocks in a Collisional Orogen. Journal of Geology 113, 181-200.

Wang, T., Wang, X.X., Tian, W., Zhang, C.L., Li, W.P. & Li, S., 2009. North Qinling Paleozoic granite associations and their variation in space and time: Implications for orogenic processes in the orogens of central China. Science in China (Series D – Earth Sciences), 52, 1359-1384.

Wang, T., Wang, Z.Q., Yan, Q.R., Yan, Z., Qin, X.F., Zhang, Y.L. & Xiang, Z.J., 2011. The formation age and geochemical characteristics of the metavolcanic rock blocks of the Baishuijiang Group in South Qinling. Acta Petrologica Sinica, 27, 645-656 (in Chinese with English abstract).

Yan, Q., Hanson, A.D., Wang, Z., Druschke, P.A., Yan, Z., Wang, T., Liu, D., Song, B., Jian, P., Zhou, H., & Jiang, C., 2003. SHRIMP Age and Geochemistry of the Bikou Volcanic Terrane: Implications for Neoproterozoic Tectonics on the Northern Margin of the Yangtze Craton. Acta Geologica Sinica, 77, 479-490.

Yan, Q., Hanson, A.D., Wang, Z.; Druschke, P.A., Yan, Z., Wang, T. & Liu, D., 2004. Neoproterozoic Subduction and Rifting on the Northern Margin of the Yangtze Plate, China: Implications for Rodinia Reconstruction. International Geology Review, 46, 817-832.

Yan, Q., Wang, Z., Yan, Z., Xiang, Z., Chen, J. & Wang, T., 2007. SHRIMP Analyses for Ophiolitic – Mafic Blocks in the Kangxian - Mianxian Section of the Mianxian - Lueyang Melange: Their Geological Implications. Geology review, 53, 755-764 (in Chinese with English abstract)

Yan, Z., Wang, Z., Yan, Q., Wang, T., Xiao, W., Li, J., Han, F., Chen, J. & Yang, Y., 2006b. Devonian Sedimentary Environments and Provenance of the Qinling Orogen: Constraints on Late Palaeozoic Southward Accretionary Tectonics of the North China Craton. International Geology Review, 48, 585-618.

Yang, J., Xu, Z., Dobrzhinetskaya, L. F., Green II, H. W., Pei, X., Shi, R., Wu, C., Wooden, J. L., Zhang, J., Wan, Y., Li, H., 2003: Discovery of metamorphic diamonds in central China: an indication of a > 4000-km-long zone of deep subduction resulting from multiple continental collisions. Terra Nova, 15, 370-379.

Zhang, Z.J., 1999. Metamorphic evolution of garnet-clinopyroxene-amphibole rocks from the Proterozoic Songshugou mafic-ultramafic complex, Qinling Mountains, central China. Island Arc, 8, 259-280.

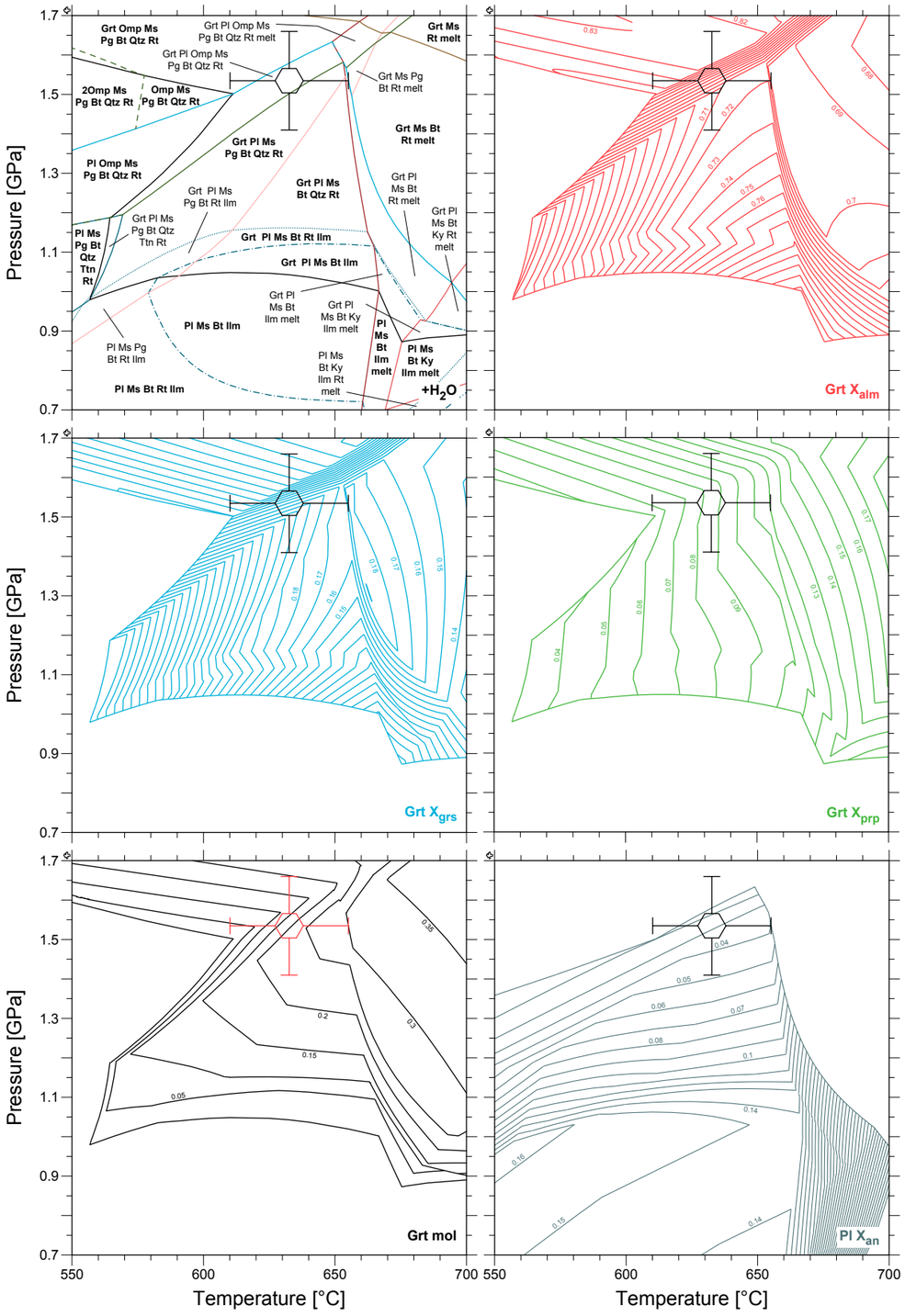
Zhao, Z. & Coe, R.S., 1987, Palaeomagnetic constraints on the collision and rotation of North and South China: Nature, v. 327, p. 141–144.

Zhou, M.-F., Kennedy, A.K., Sun, M., Malpas, J. & Lesher, C.M., 2002a. Neoproterozoic Arc-Related Mafic Intrusions along the Northern Margin of South China: Implications for the Accretion of Rodinia. Journal Geology, 110, 611-618.

Zhou, M.-F., Yan, D.-P., Kennedy, A.K., Li, Y. & Ding, J., 2002b. SHRIMP U-Pb zircon geochronological and geochemical evidence for Neoproterozoic arc-magmatism along the western margin of the Yangtze block, South China. Earth and Planetary Science Letters, 196, 51-67.

Zhou, M.-F., Ma, Y., Yan, D.-P., Xia, X., Zhao, J.-H. & Sun, M., 2006. The Yanbian Terrane (Southern Sichuan Province, SW China): A Neoproterozoic arc assemblage in the western margin of the Yangtze Block. Precambrian Research, 144, 19-38.

Appendix A - Equilibrium assemblage and isopleth diagrams



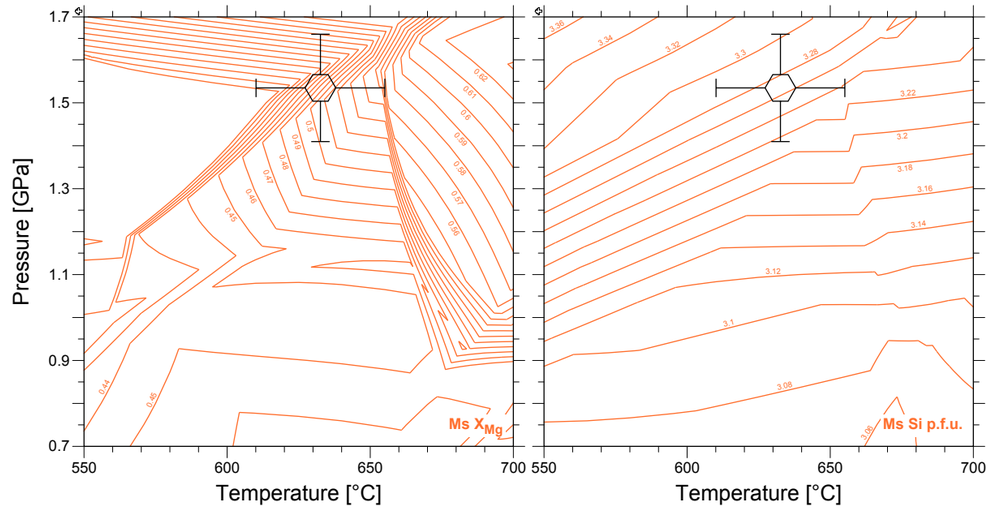


Figure A1 (continued). Equilibrium assemblage diagram and dependency of garnet composition, its molar amount, the X_{An} of plagioclase and the composition of muscovite-phengite of sample 75223A on pressure and temperature. Bulk rock composition (in mol): Si 24.176, Ti 0.179, Al 7.388, Fe 0.987, Mg 0.545, Ca, 0.179, Na, 1.324, K, 2.036, O 63.183.

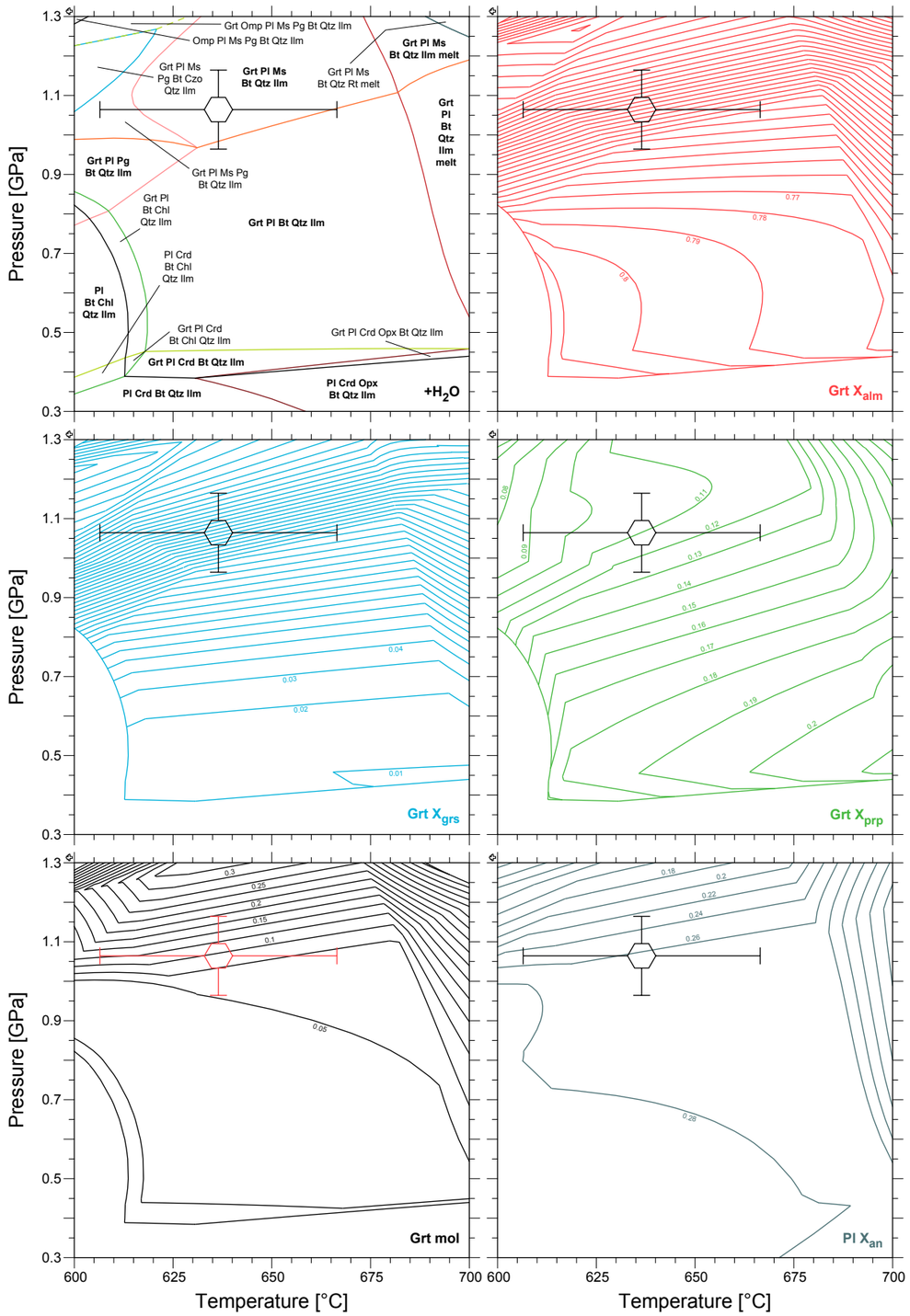


Figure A2. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{An} of plagioclase of sample 75214D on pressure and temperature. Bulk rock composition (in mol): Si 26.272, Ti 0.127, Al 4.528, Fe 1.071, Mg 0.955, Ca 0.743, Na 1.889, K 0.702, O 63.6545.

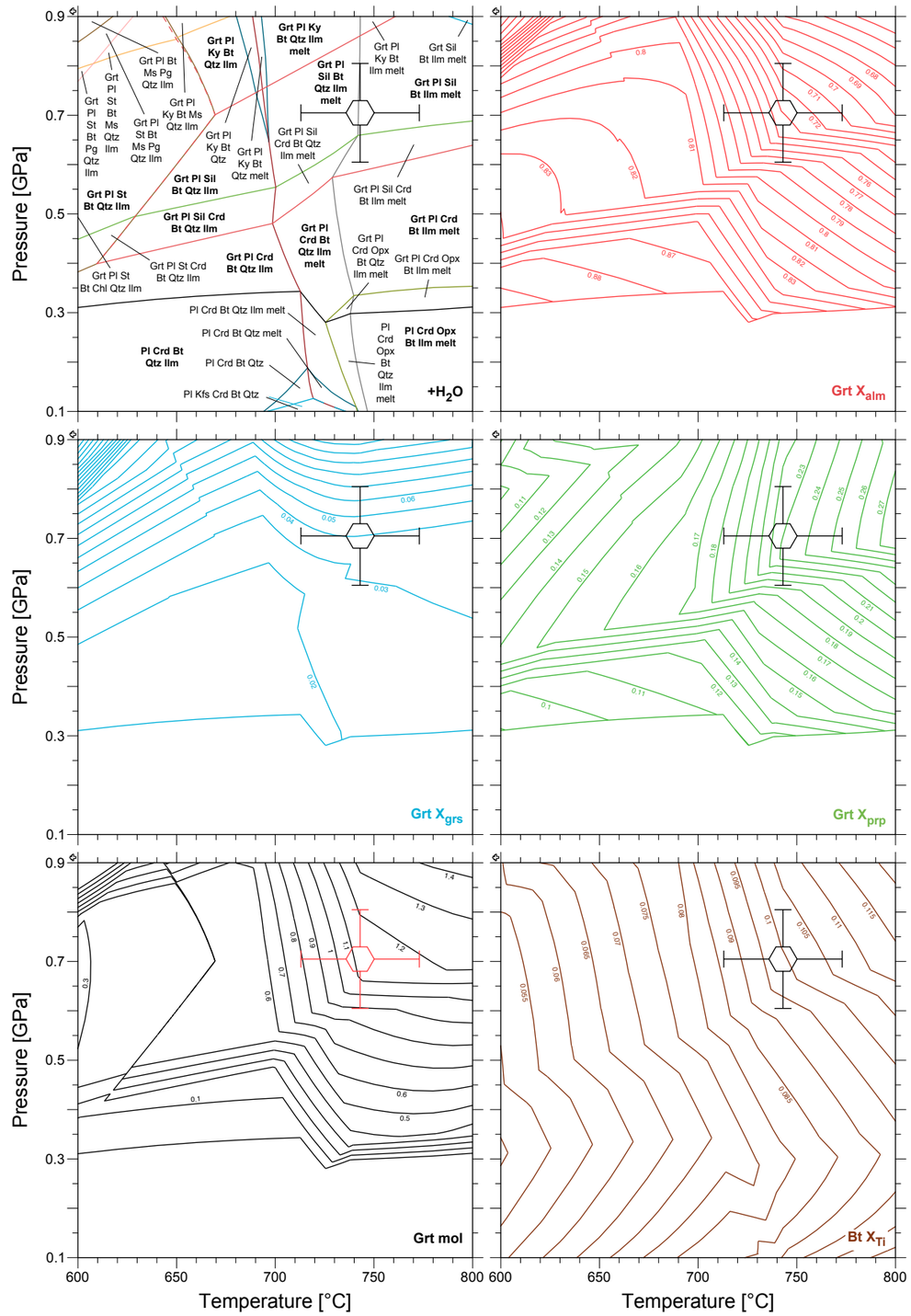


Figure A3. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample Q33B on pressure and temperature. Bulk rock composition (in mol): Si 20.139, Ti 0.115, Al 9.013 Fe 3.487, Mg 1.841, Ca 0.860, Na 1.367, K 1.489, O 61.6435.

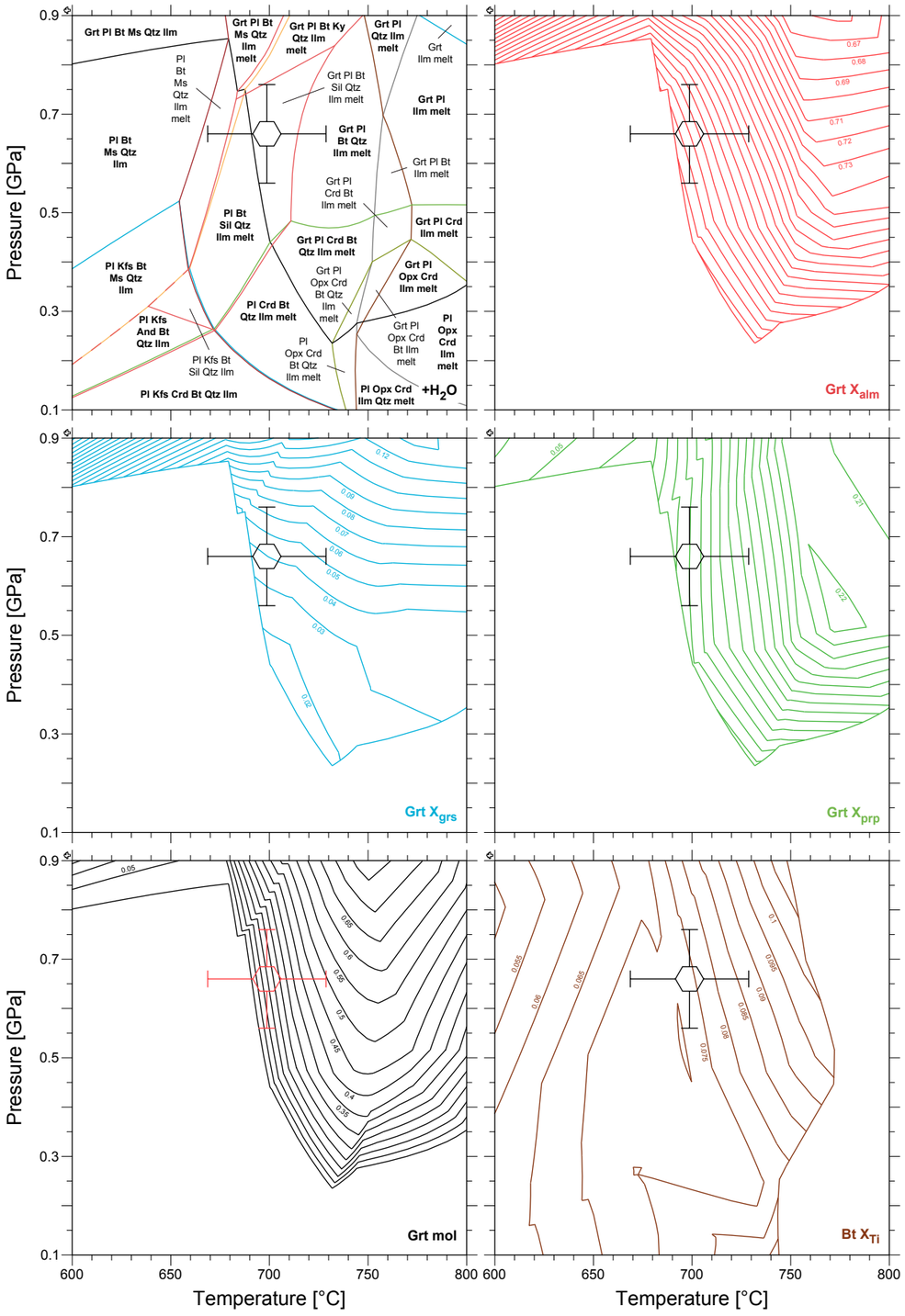


Figure A4. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 75247F on pressure and temperature. Bulk rock composition (in mol): Si 23.476, Ti 0.136, Al 6.247, Fe 1.873, Mg 0.598, Ca 0.880, Na 1.738, K 1.282, O 61.4555.

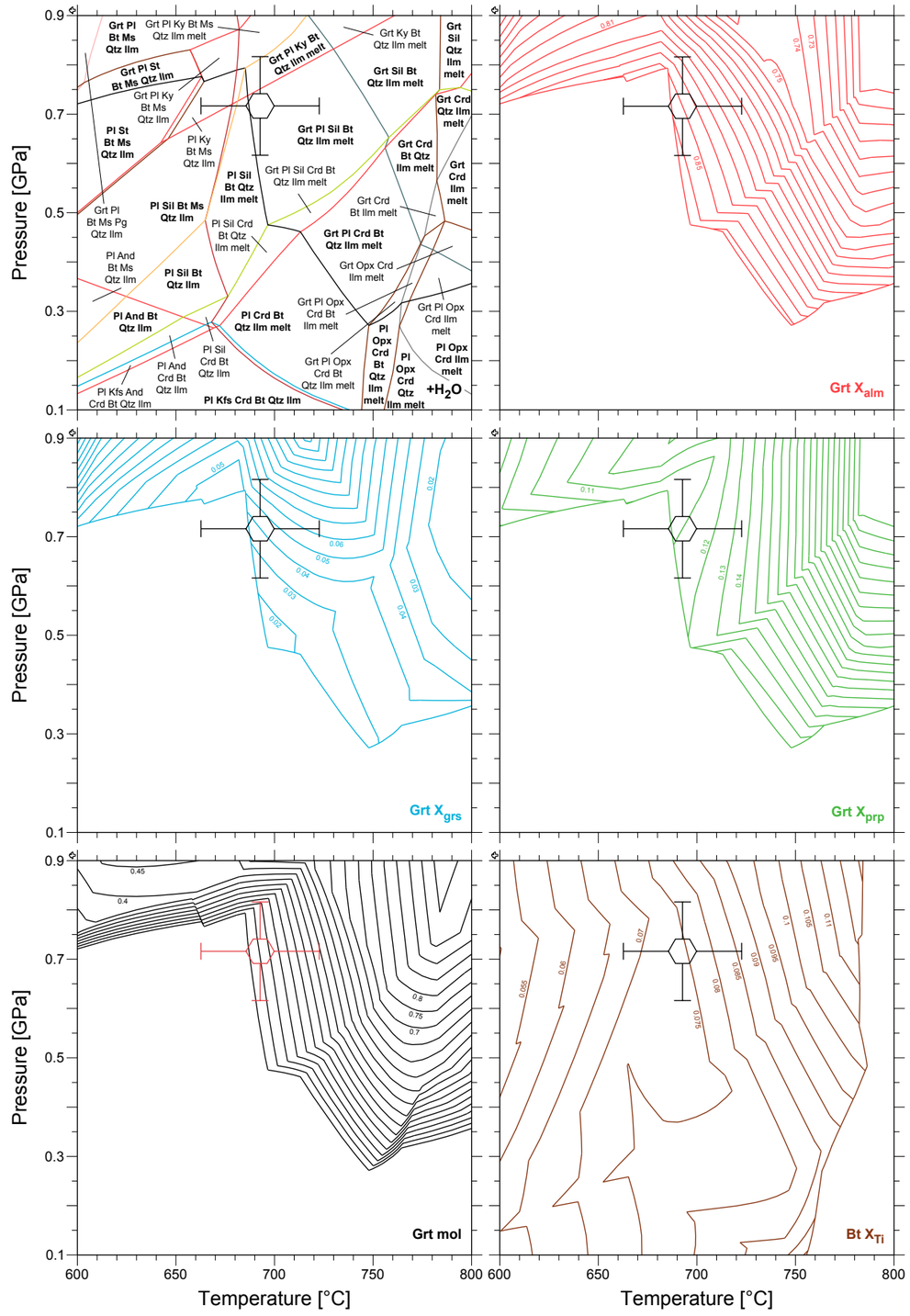


Figure A5. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 75248C on pressure and temperature. Bulk rock composition (in mol): Si 24.019, Ti 0.284, Al 5.980, Fe 2.643, Mg 1.086, Ca 0.367, Na 0.818, K 1.555, O 62.8585.

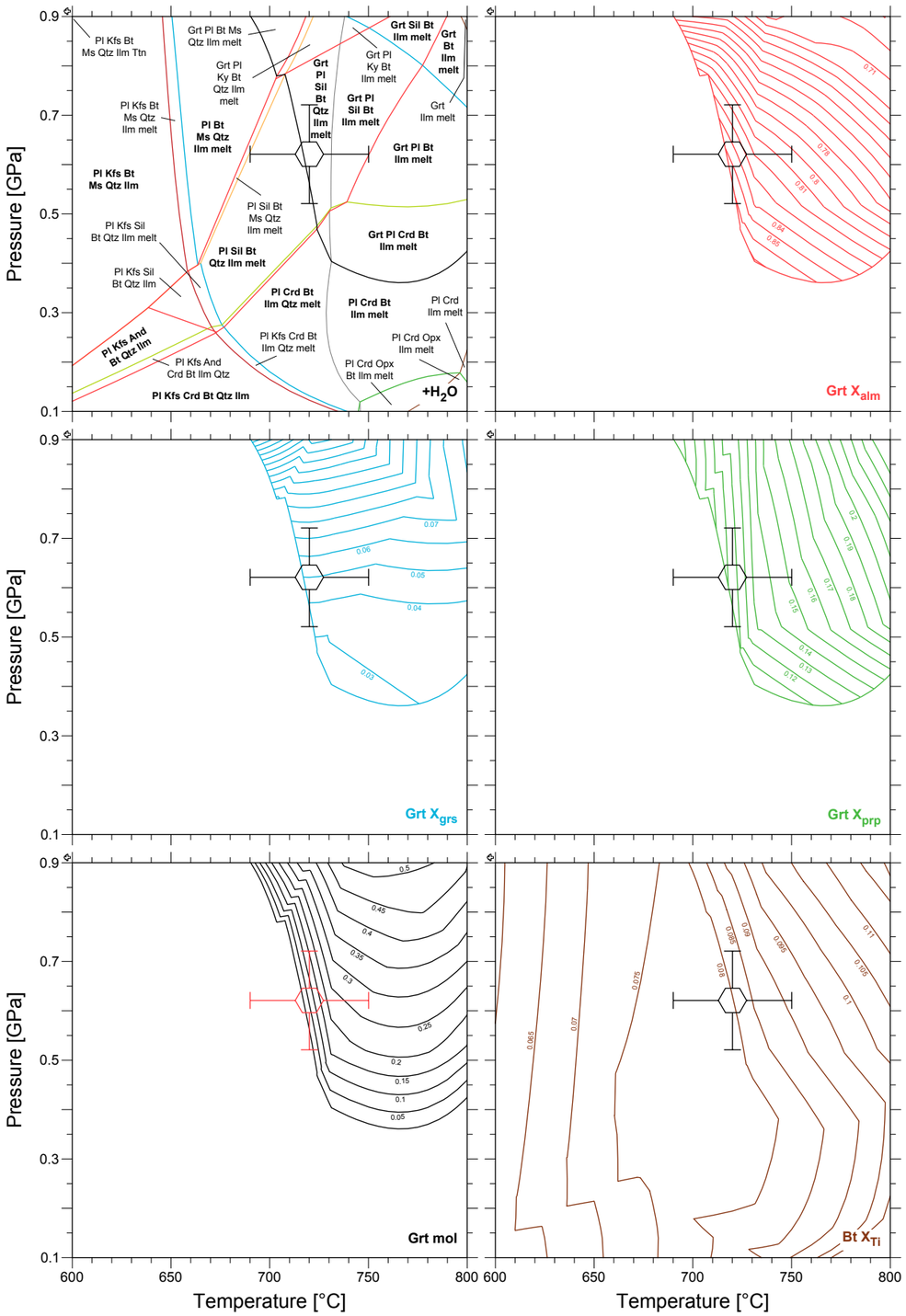


Figure A6. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 75251E on pressure and temperature. Bulk rock composition (in mol): Si 23.379, Ti 0.399, Al 6.745, Fe 1.887, Mg 0.582, Ca 0.667, Na 1.580, K 2.084, O 62.6415.

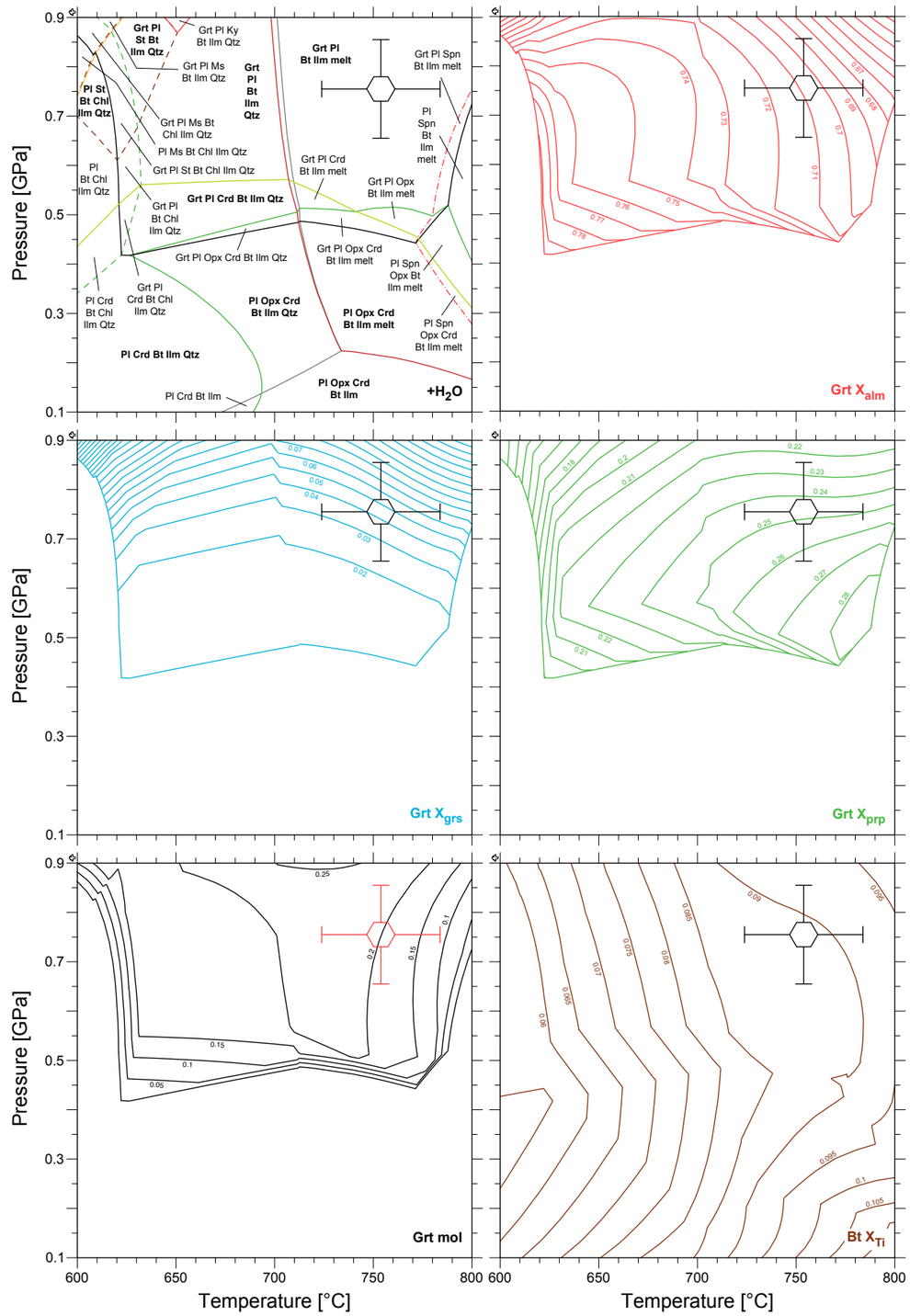


Figure A7. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 76172C on pressure and temperature. Bulk rock composition (in mol): Si 23.842, Ti 0.346, Al 5.786, Fe 2.246, Mg 0.900, Ca 0.741, Na 1.952, K 1.435, O 62.6355.

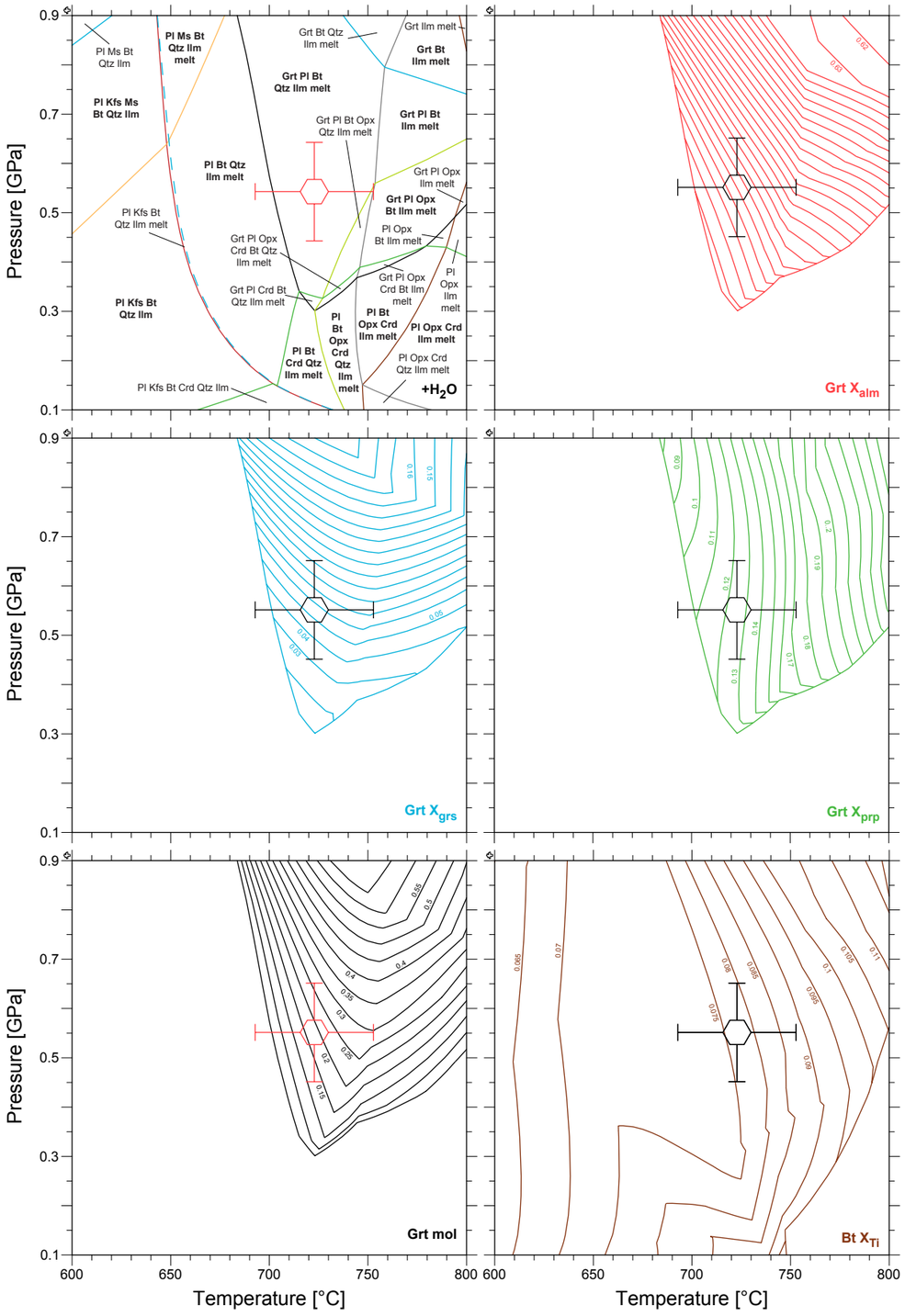


Figure A8. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 76175A on pressure and temperature. Bulk rock composition (in mol): Si 23.842, Ti 0.346, Al 5.786, Fe 2.246, Mg 0.900, Ca 0.741, Na 1.952, K 1.435, 62.6355.

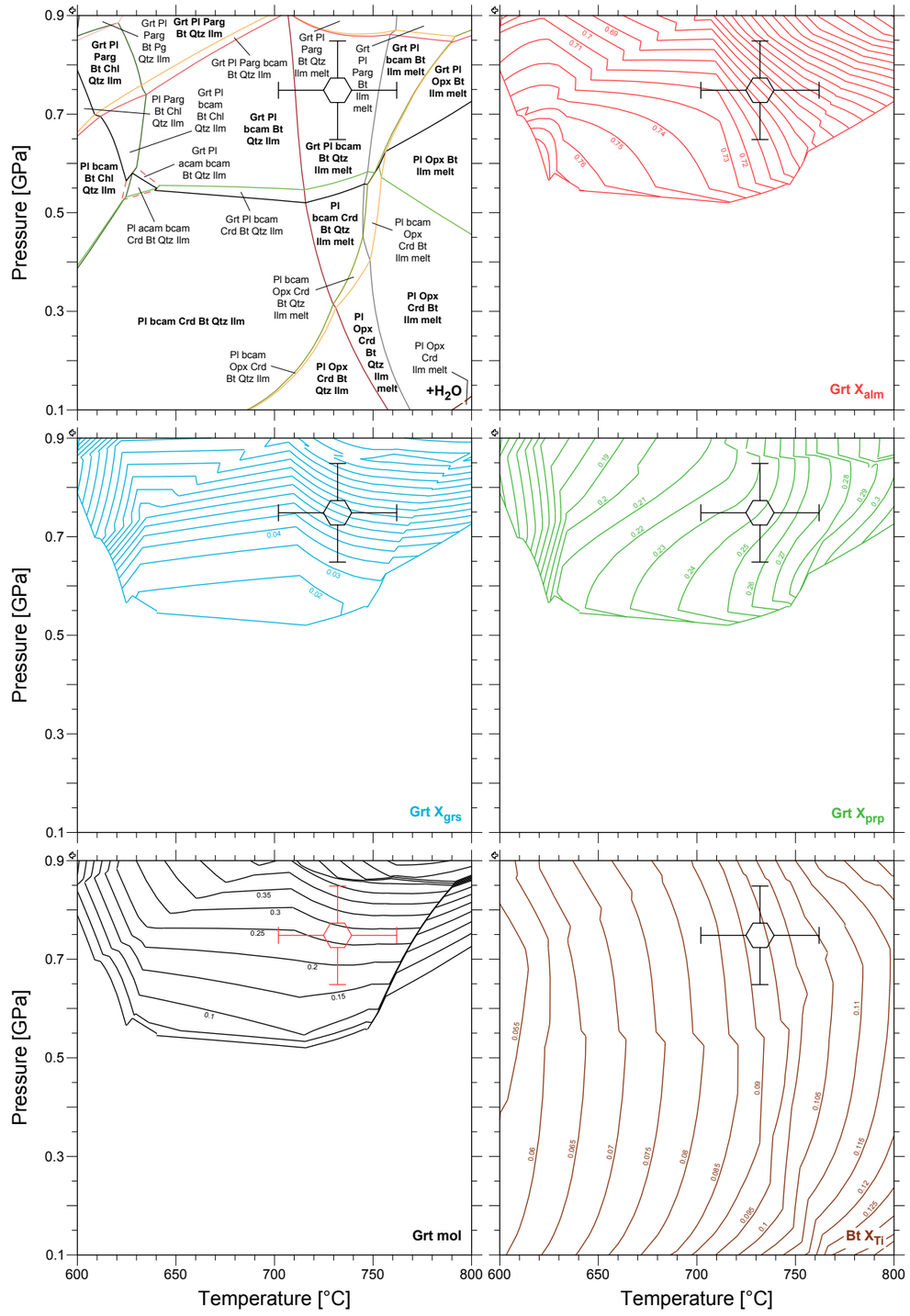


Figure A9. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 75254A on pressure and temperature. Bulk rock composition (in mol): Si 20.373, Ti 0.233, Al 6.573, Fe 2.207, Mg 2.212, Ca 1.364, Na 1.977, K 1.000, O 58.343.

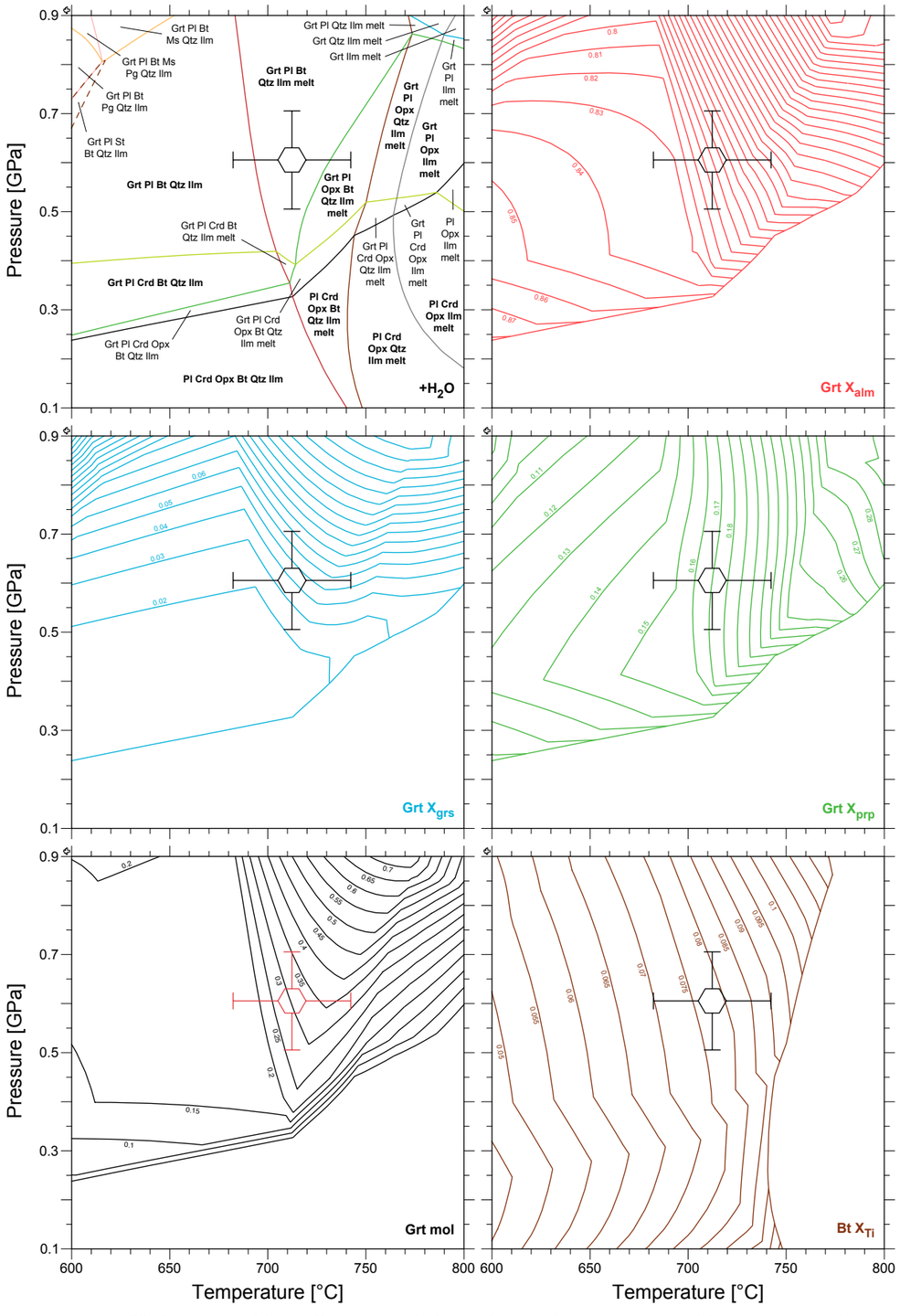


Figure A10. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 76163B on pressure and temperature. Bulk rock composition (in mol): Si 24.300, Ti 0.221, Al 5.741, Fe 1.871, Mg 0.957, Ca 0.923, Na 2.116, K 0.866, O 62.8955.

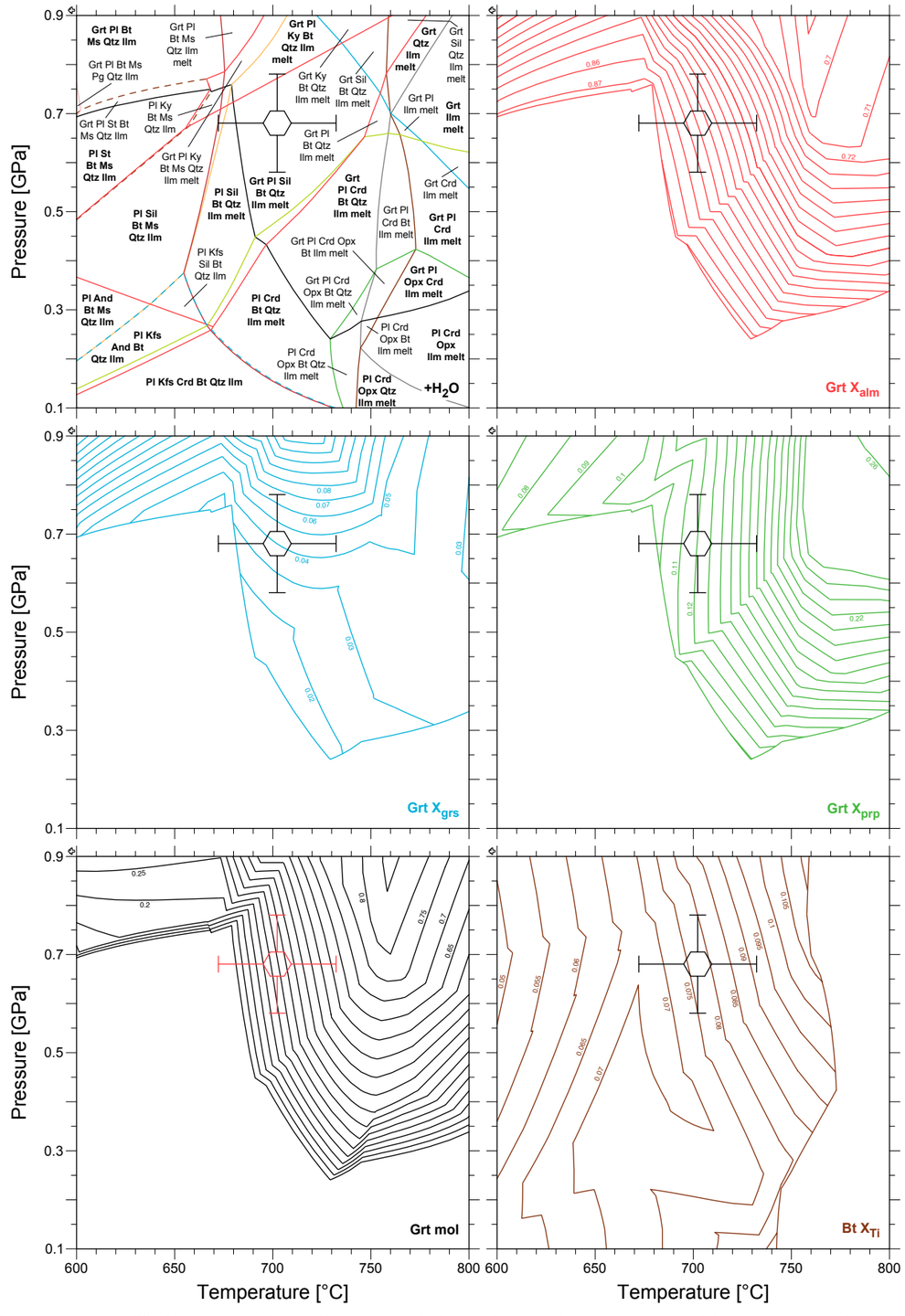


Figure A11. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 75271B on pressure and temperature. Bulk rock composition (in mol): Si 23.336, Ti 0.206, Al 6.002, Fe 2.223, Mg 0.777, Ca 0.495, Na 1.511, K 1.358, O 61.0165.

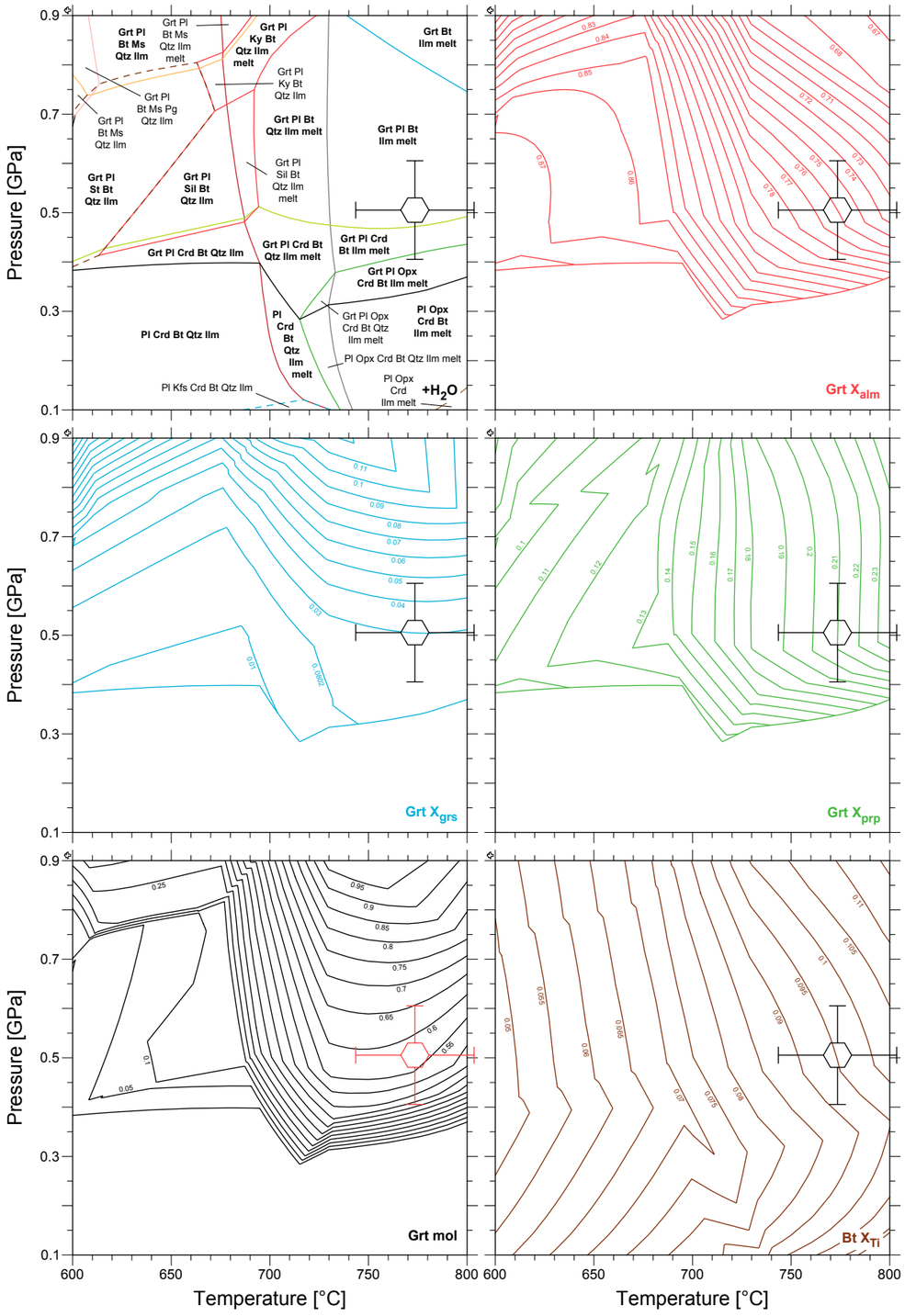


Figure A12. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 811102F on pressure and temperature. Bulk rock composition (in mol): Si 22.133, Ti 0.223, Al 7.034, Fe 2.904, Mg 1.304, Ca 0.695, Na 2.095, K 1.570, O 61.9985.

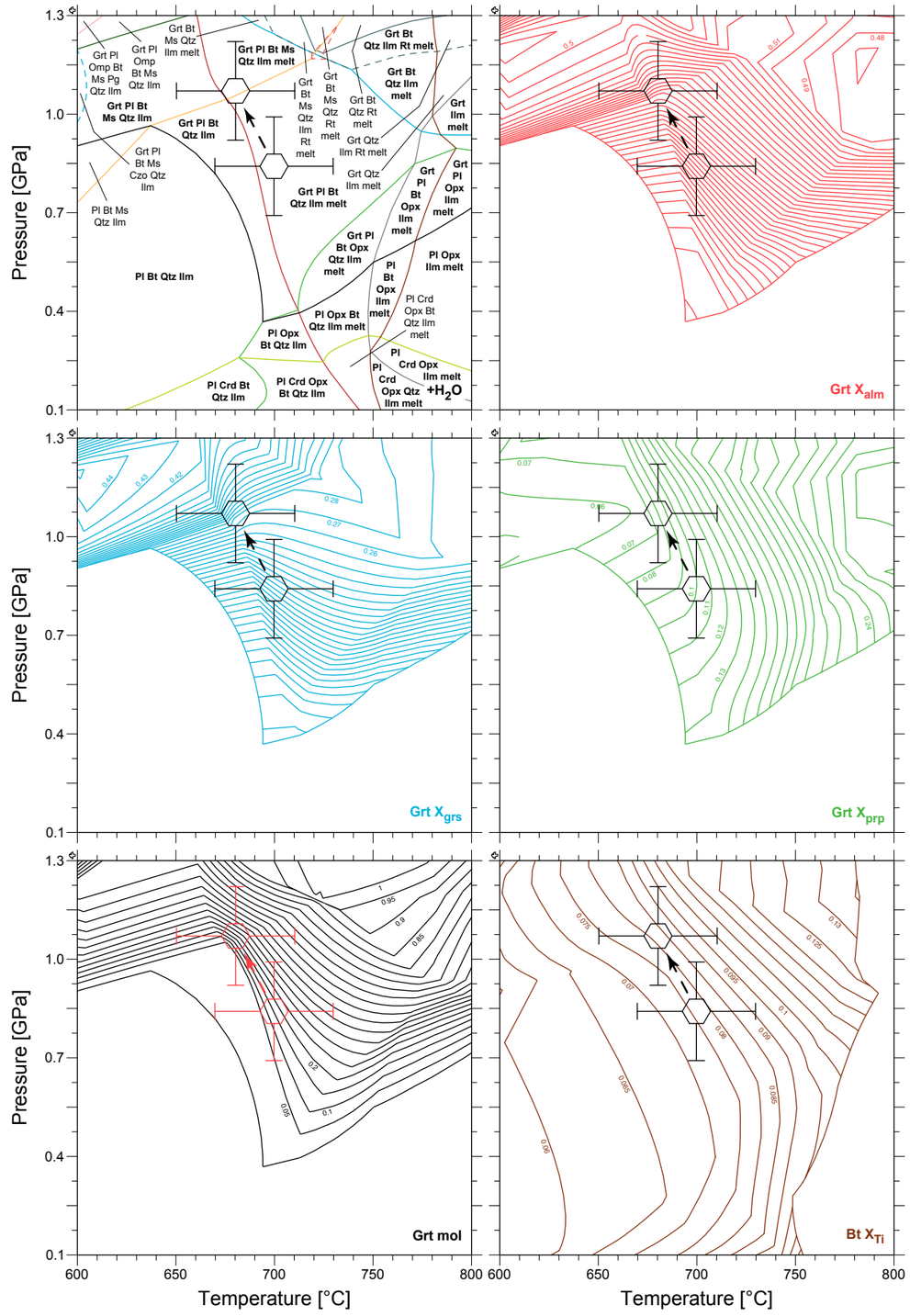


Figure A13. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 811079A on pressure and temperature. Bulk rock composition (in mol): Si 23.287, Ti 0.209, Al 6.069, Fe 1.800, Mg 0.970, Ca 1.176, Na 2.168, K 1.016, O 61.6335.

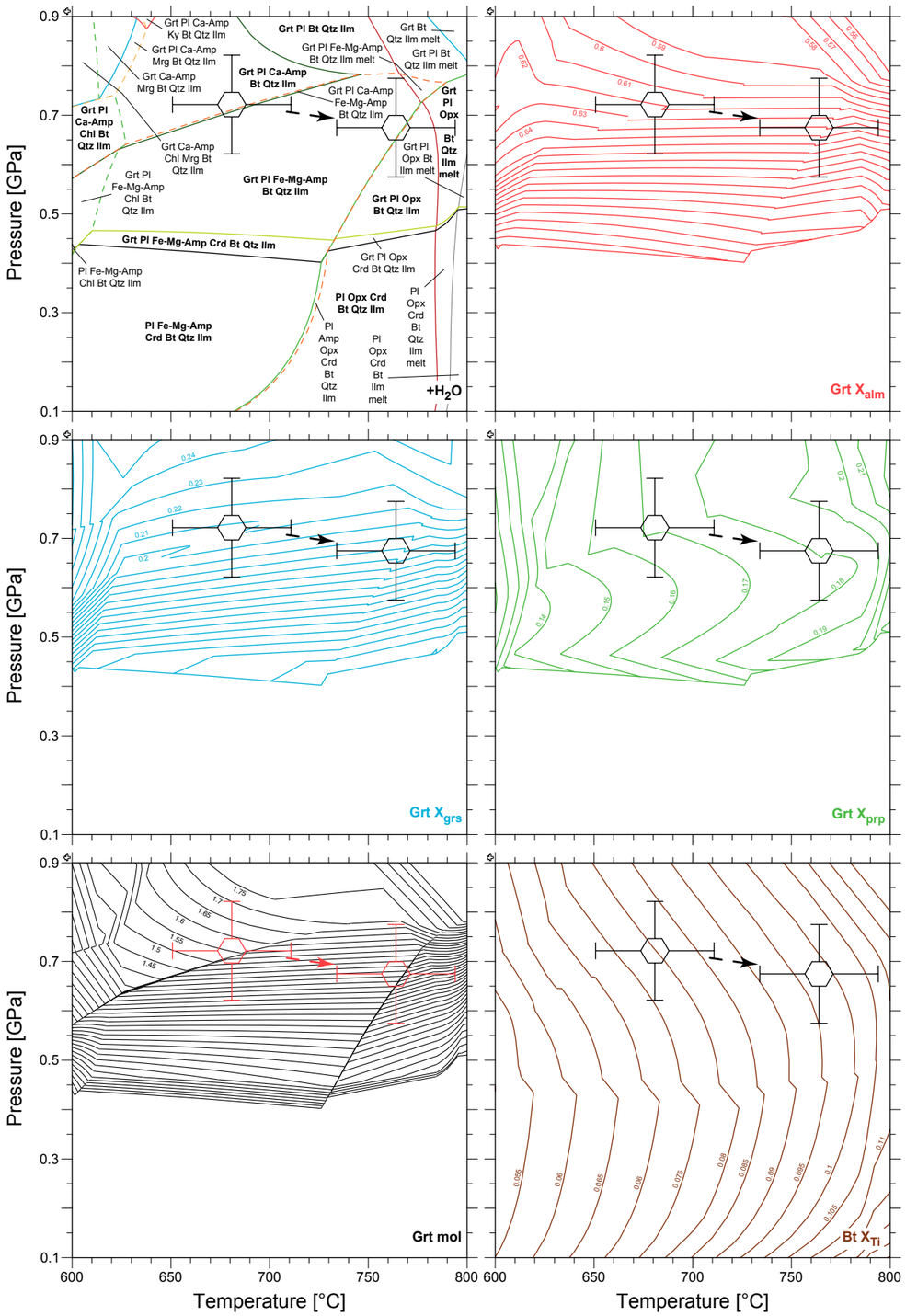


Figure A14. Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount and the X_{Ti} of biotite of sample 76163F on pressure and temperature. Bulk rock composition (in mol): Si 19.345, Ti 0.693, Al 6.613, Fe 5.194, Mg 3.594, Ca 1.603, Na 0.166, K 1.548, O 61.2435.

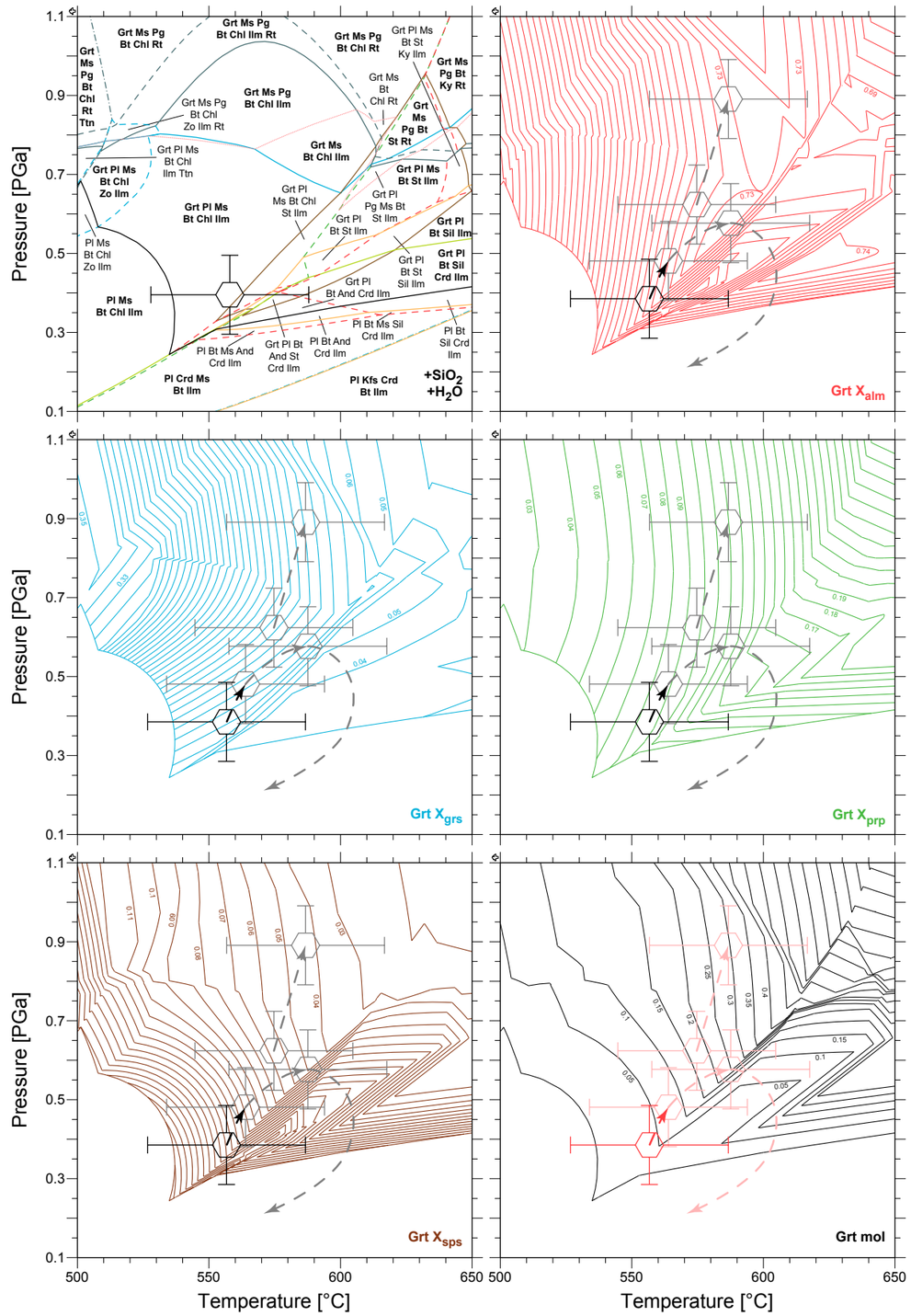


Figure A15. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75261C (initial bulk rock composition) on pressure and temperature. Bulk rock composition (in mol) is 24.518 Si; 0.230 Ti; 5.733 Al; 2.340 Fe; 1.998 Mg; 0.096 Ca; 0.044 Mn; 0.332 Na; 1.308 K; 63.394 O.

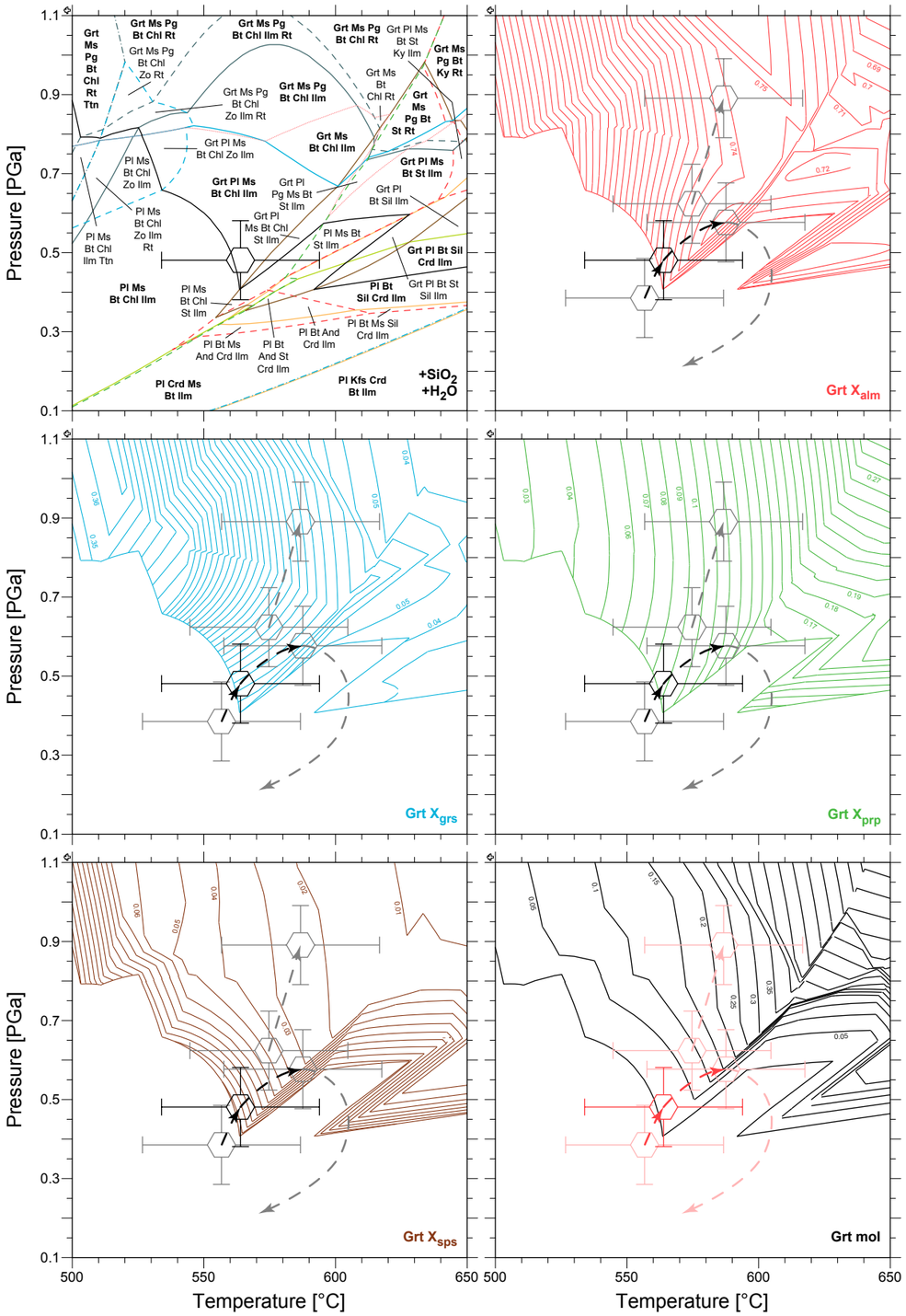


Figure A16. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75261C (fractionation step valid for EMP analysis #18) on pressure and temperature. Bulk rock composition (in mol) is 24.351 Si; 0.230 Ti; 5.622 Al; 2.226 Fe; 1.984 Mg; 0.0822 Ca; 0.0196 Mn; 0.332 Na; 1.308 K; 62.726 O.

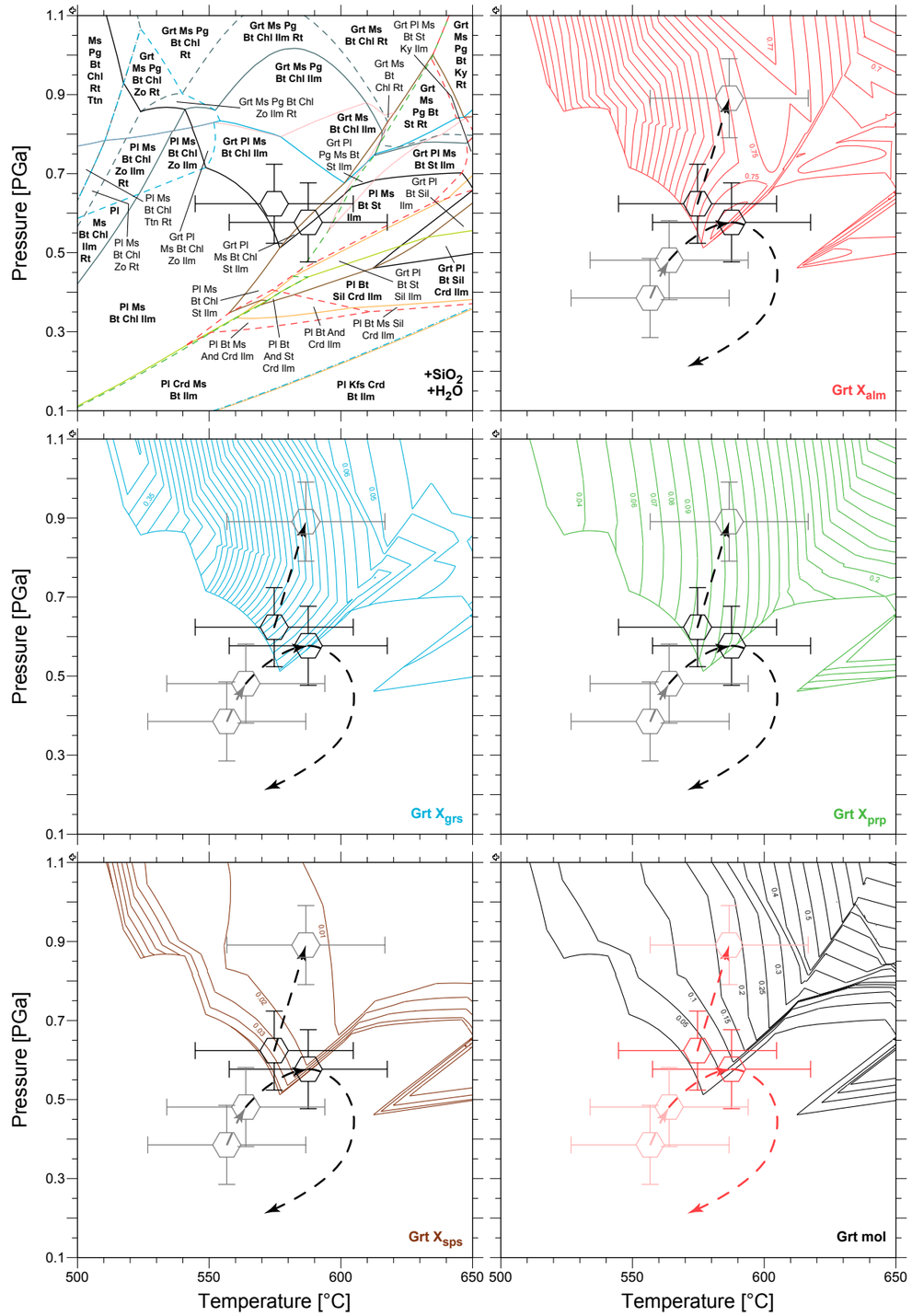


Figure A17. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75261C (fractionation step valid for EMP analyses #11, and #5) on pressure and temperature. Bulk rock composition (in mol) is 24.210 Si; 0.230 Ti; 5.528 Al; 2.123 Fe; 1.971 Mg; 0.0685 Ca; 0.00799 Mn; 0.332 Na; 1.308 K; 62.161 O.

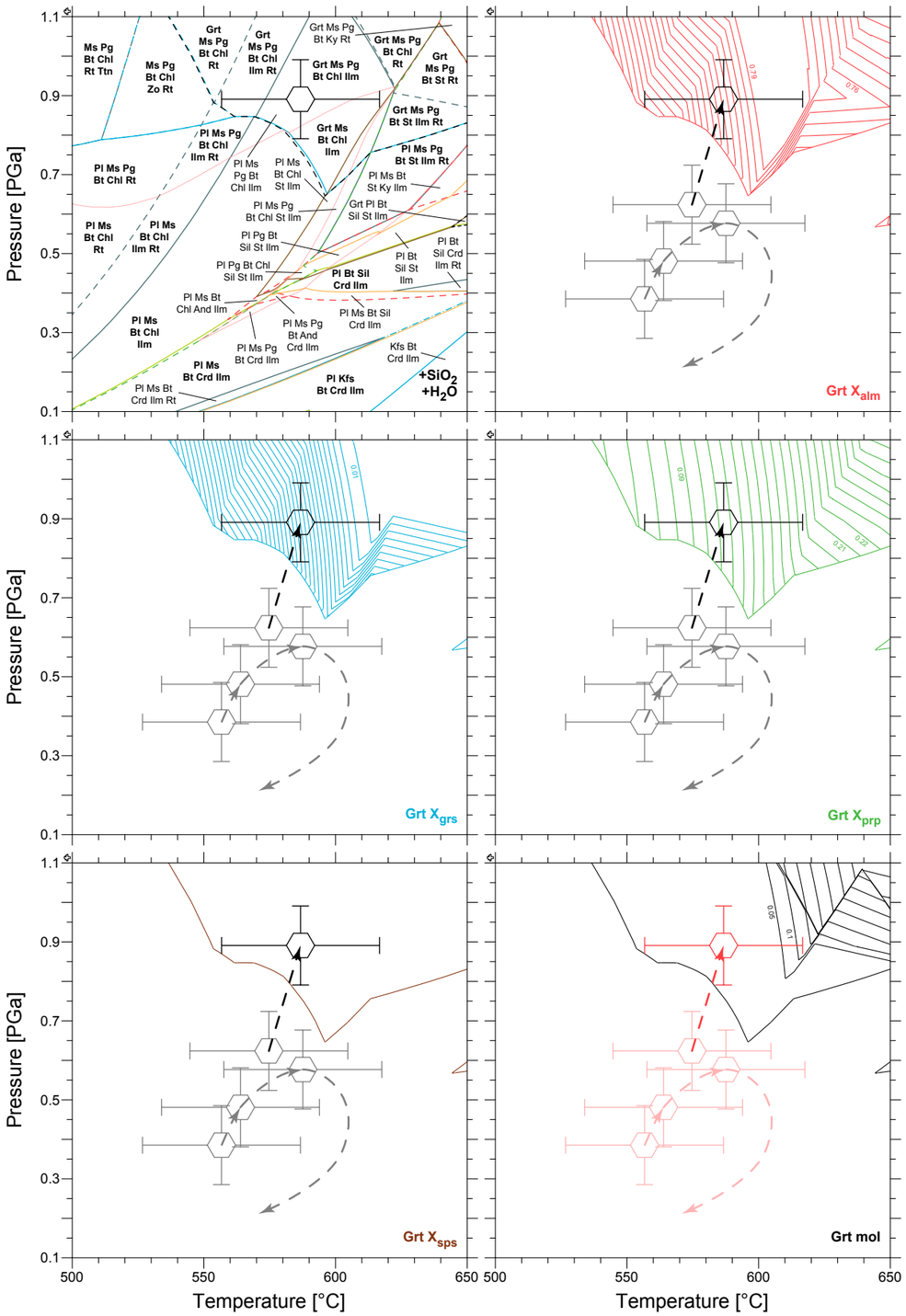


Figure A18. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75261C (fractionation step valid for outermost garnet rim) on pressure and temperature. Bulk rock composition (in mol) is 23.729 Si; 0.230 Ti; 5.207 Al; 1.766 Fe; 1.920 Mg; 0.00244 Ca; 0.00036 Mn; 0.332 Na; 1.308 K; 60.239 O.

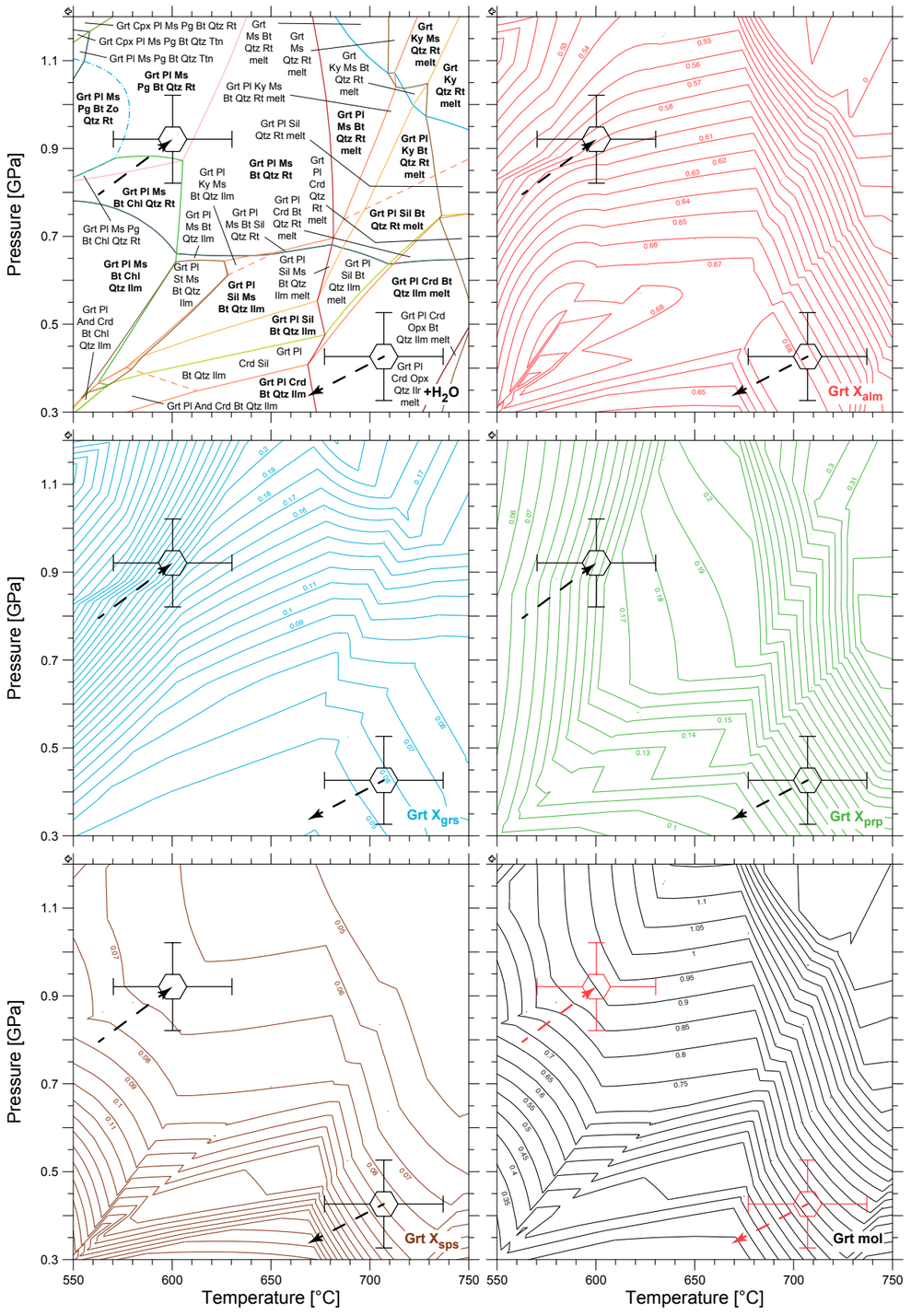


Figure A19. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75302A (initial bulk rock composition) on pressure and temperature. Bulk rock composition (in mol) is 23.127 Si; 0.001 Ti; 6.836 Al; 2.165 Fe; 1.402 Mg; 0.944 Ca; 0.179 Mn; 1.445 Na; 1.050 K; 62.448 O.

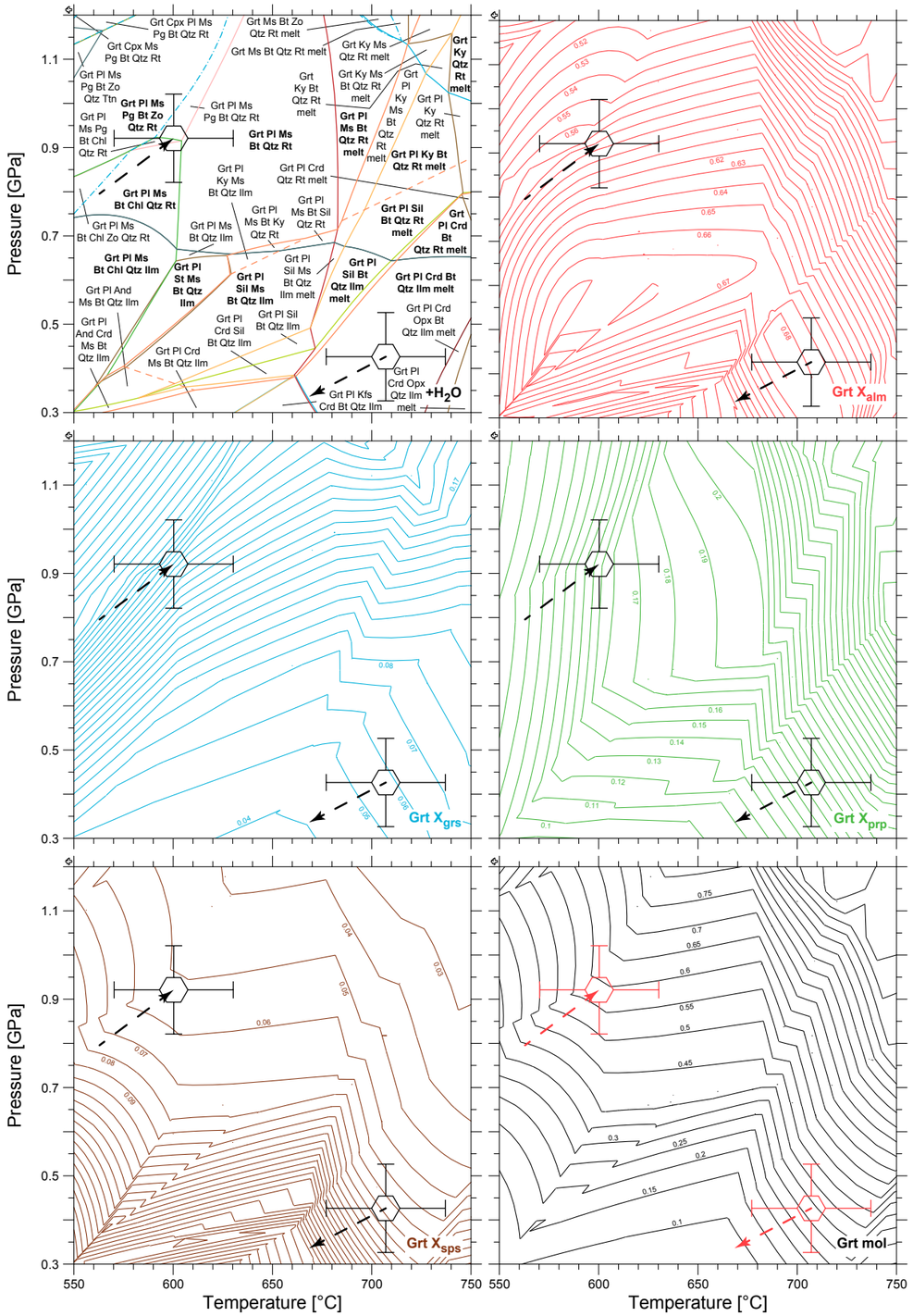


Figure A20. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 75302A (fractionation step valid for garnet rim) on pressure and temperature. Bulk rock composition (in mol) is 22.240 Si; 0.001 Ti; 6.244 Al; 1.559 Fe; 1.254 Mg; 0.896 Ca; 0.093 Mn; 1.445 Na; 1.050 K; 58.898 O.

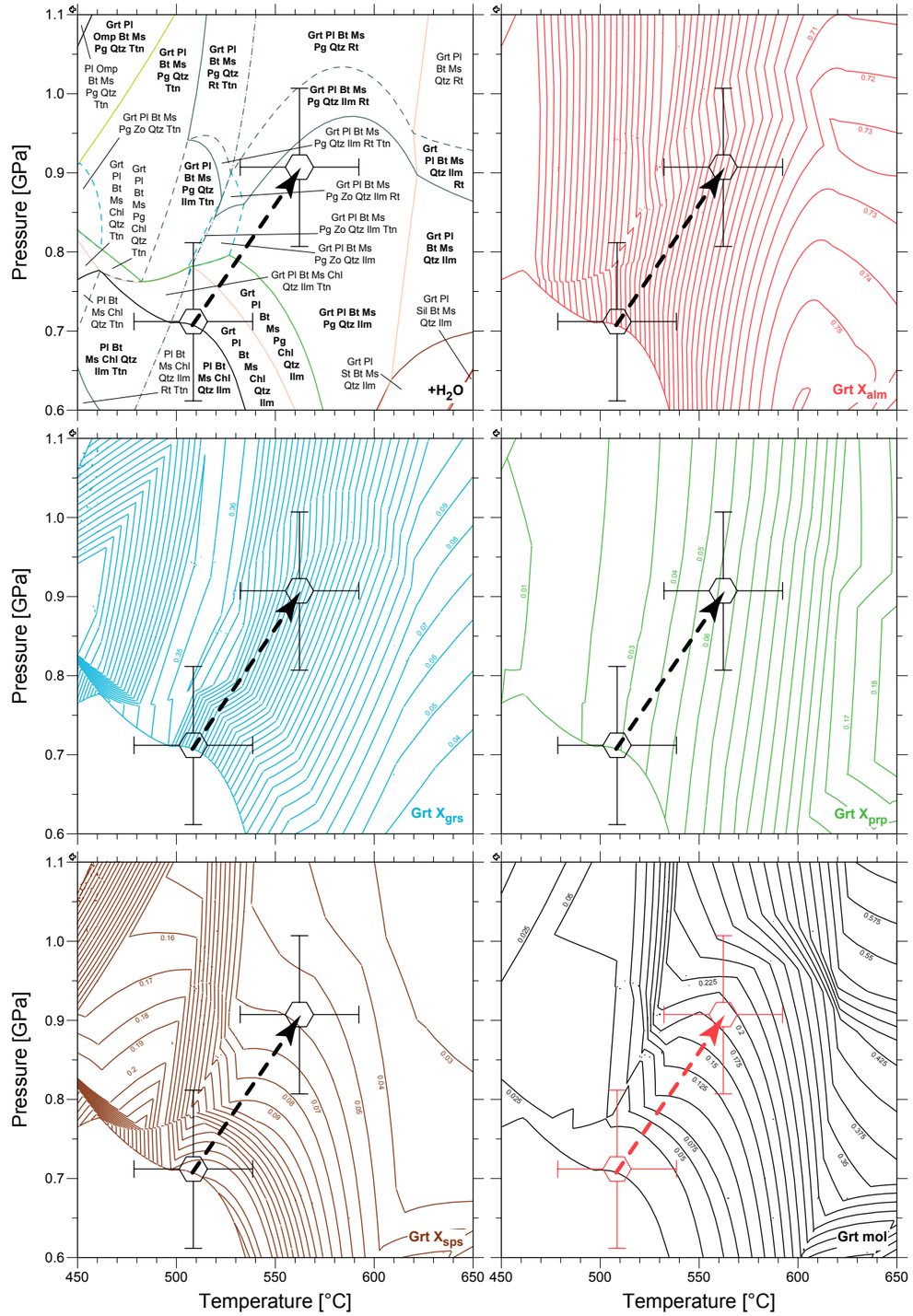


Figure A21. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76111A (initial bulk rock composition) on pressure and temperature. Bulk rock composition (in mol) is 22.203 Si; 0.274 Ti; 6.947 Al; 2.225 Fe; 1.614 Mg; 0.367 Ca; 0.042 Mn; 2.101 Na; 1.508 K; 61.427 O.

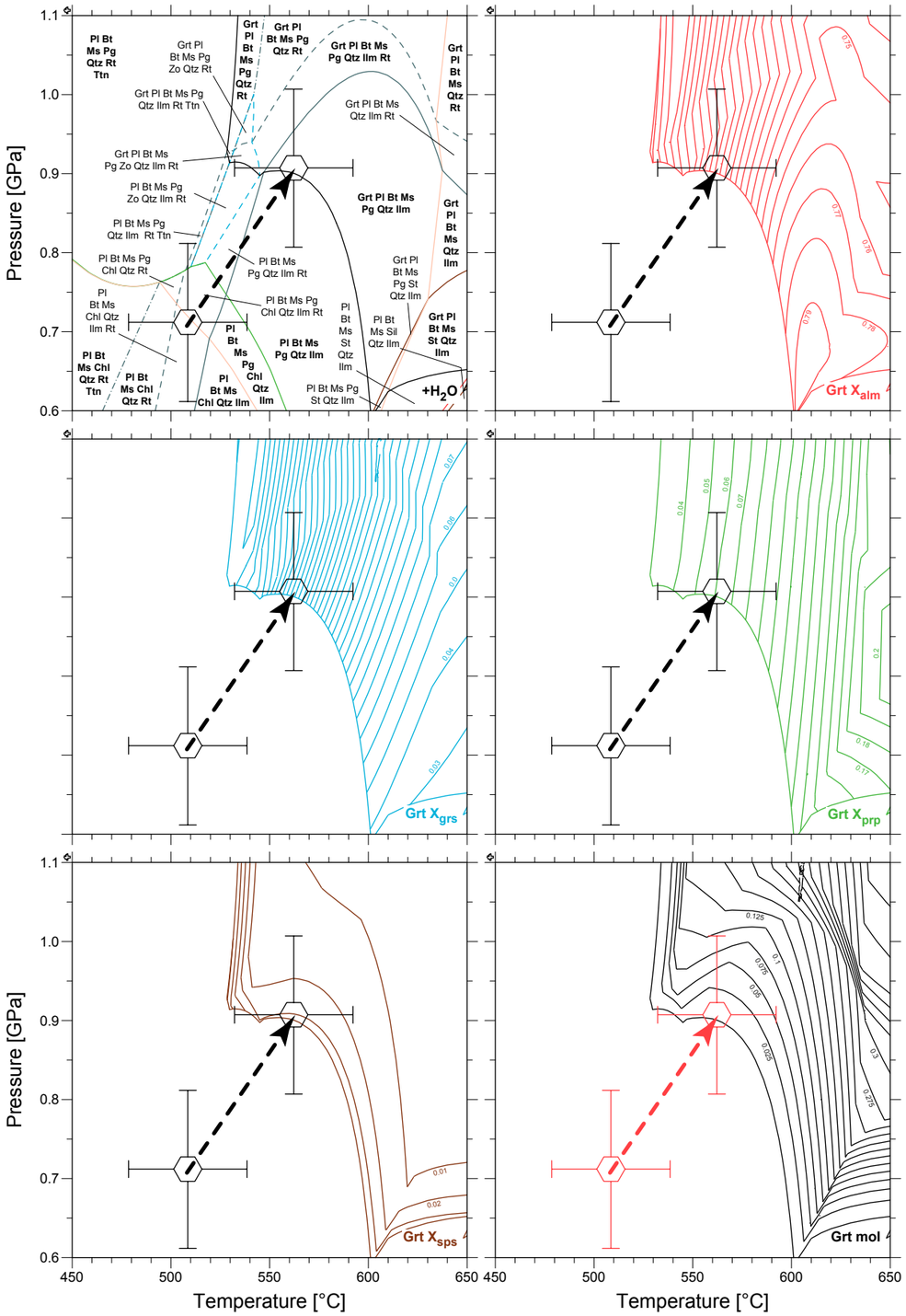


Figure A22. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76111A (fractionation step valid for outermost garnet rim) on pressure and temperature. Bulk rock composition (in mol) is 21.762 Si; 0.274 Ti; 6.653 Al; 1.968 Fe; 1.595 Mg; 0.238 Ca; 0.005 Mn; 2.101 Na; 1.508 K; 59.661 O.

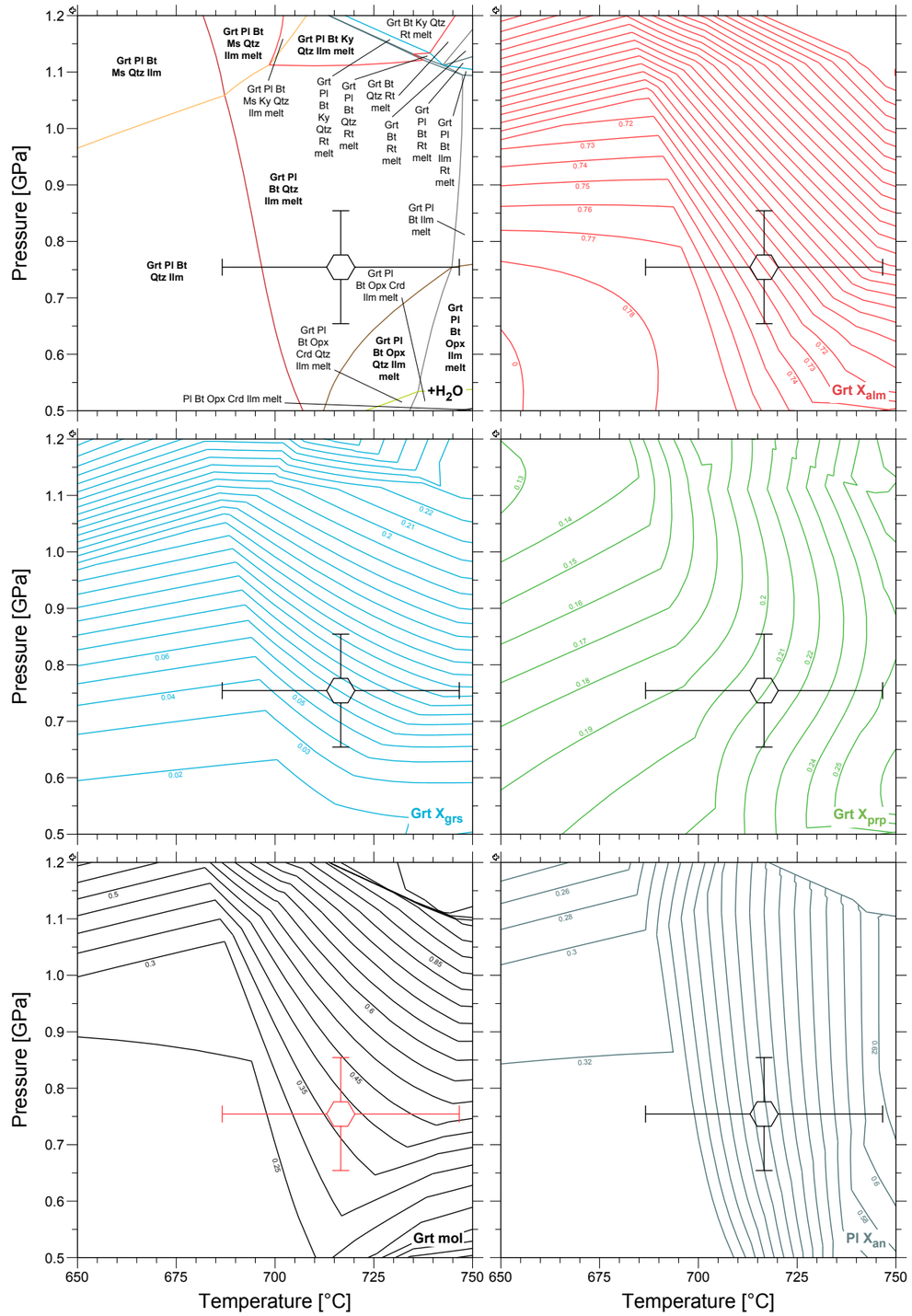


Figure A23. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{An} of plagioclase of sample 76114C on pressure and temperature. Bulk rock composition (in mol): 21.823 Si; 0.267 Ti; 7.240 Al; 2.155 Fe; 1.658 Mg; 1.250 Ca; 2.519 Na; 1.150 K; 61.938 O.

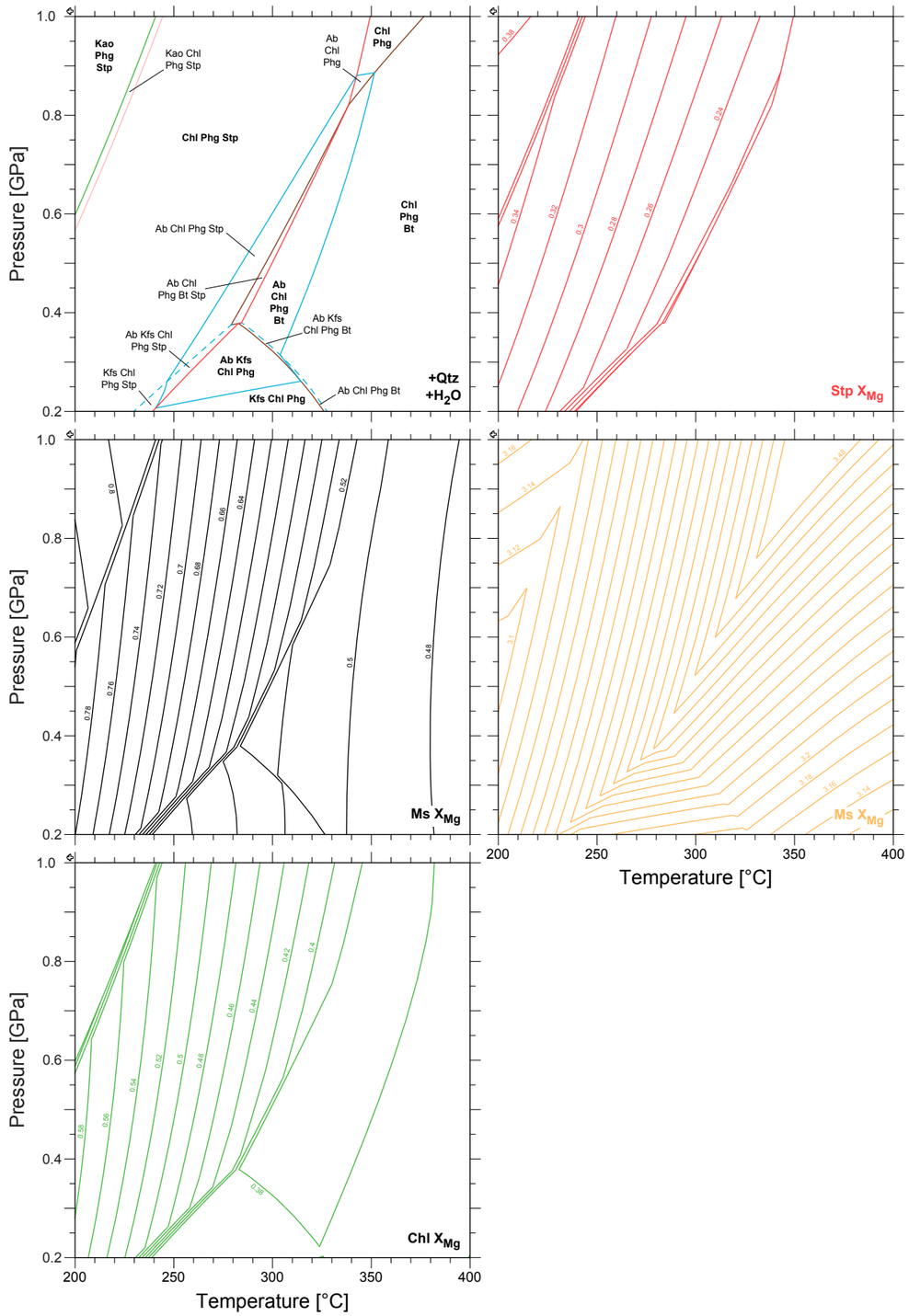


Figure A24. Equilibrium assemblage diagram and dependency of the X_{Mg} of stilpnomelane, muscovite-phengite, and chlorite and the Si-content of muscovite-phengite of sample 75312B on pressure and temperature. Bulk rock composition (in mol): 19.544 Si; 8.732 Al; 4.138 Fe; 2.819 Mg; 3.232 Na; 0.052 K; 60.785 O.

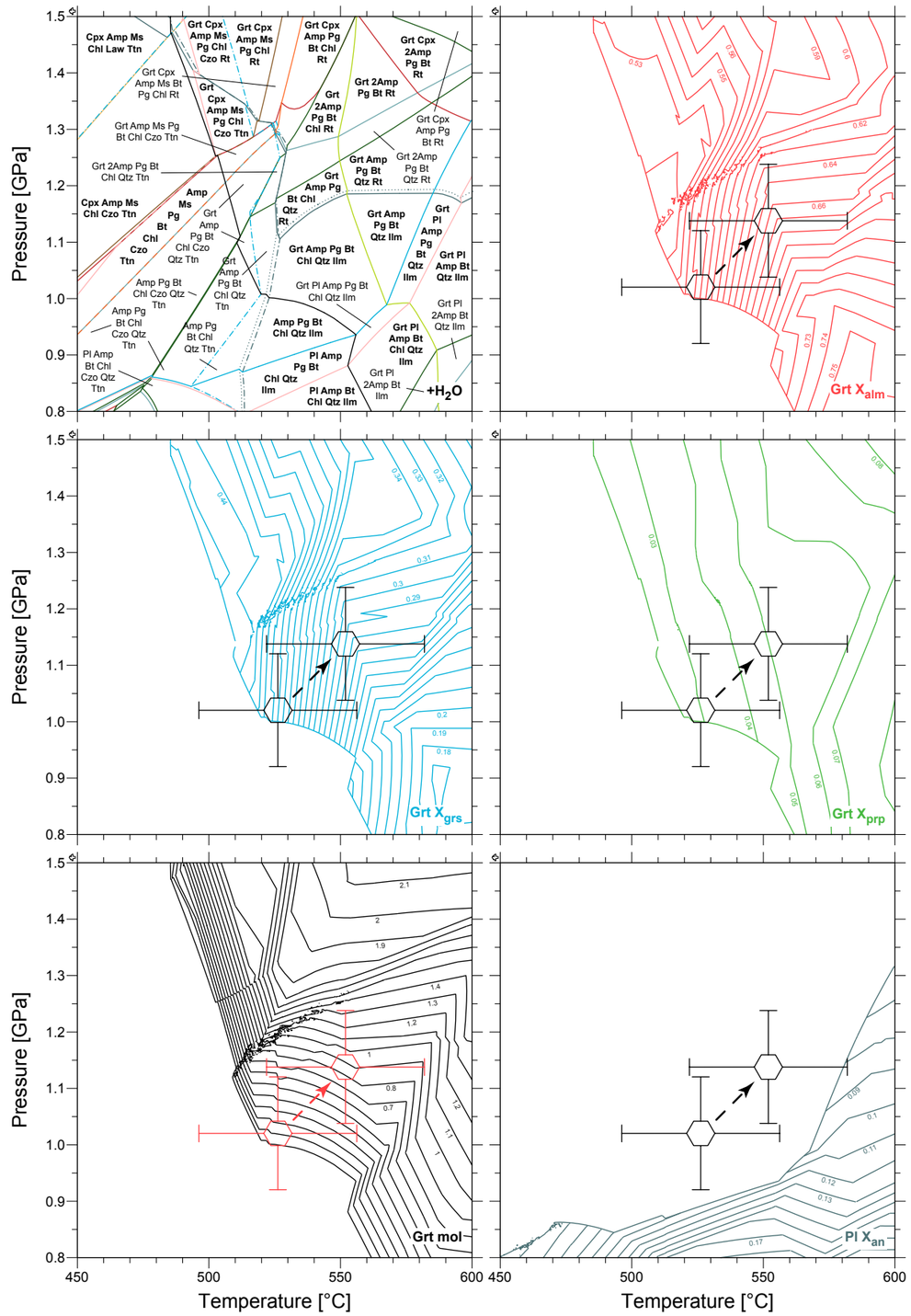


Figure A25. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{An} of plagioclase of sample 76017B on pressure and temperature. Bulk rock composition (in mol): 17.343 Si; 0.151 Ti; 8.075 Al; 5.782 Fe; 3.117 Mg; 2.560 Ca; 2.546 Na; 0.373 K; 60.019 O.

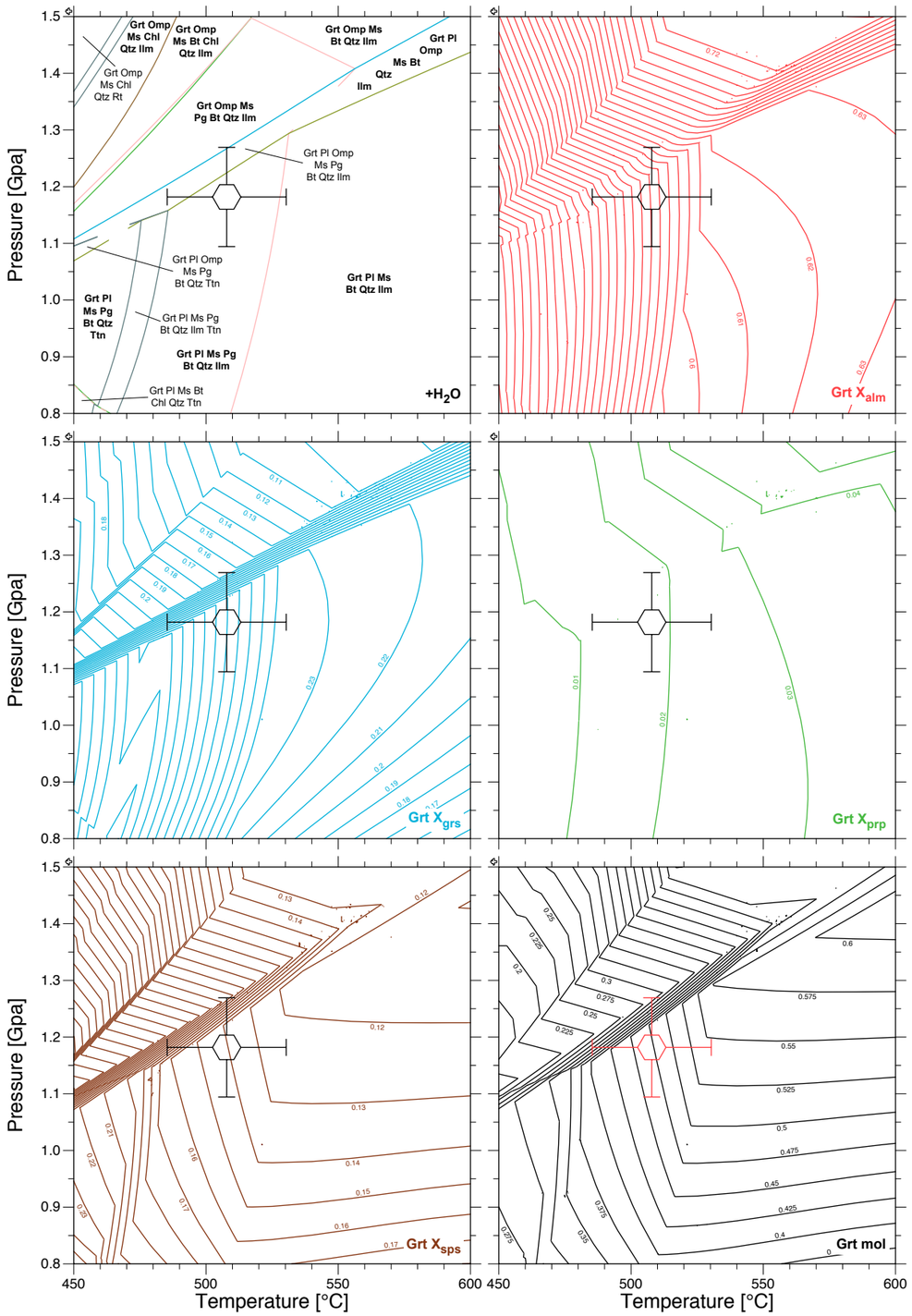


Figure A26. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76017A on pressure and temperature. Bulk rock composition (in mol) is 24.805 Si; 0.076 Ti; 5.591 Al; 2.021 Fe; 0.549 Mg; 0.432 Ca; 0.209 Mn; 2.166 Na; 1.127 K; 63.006 O.

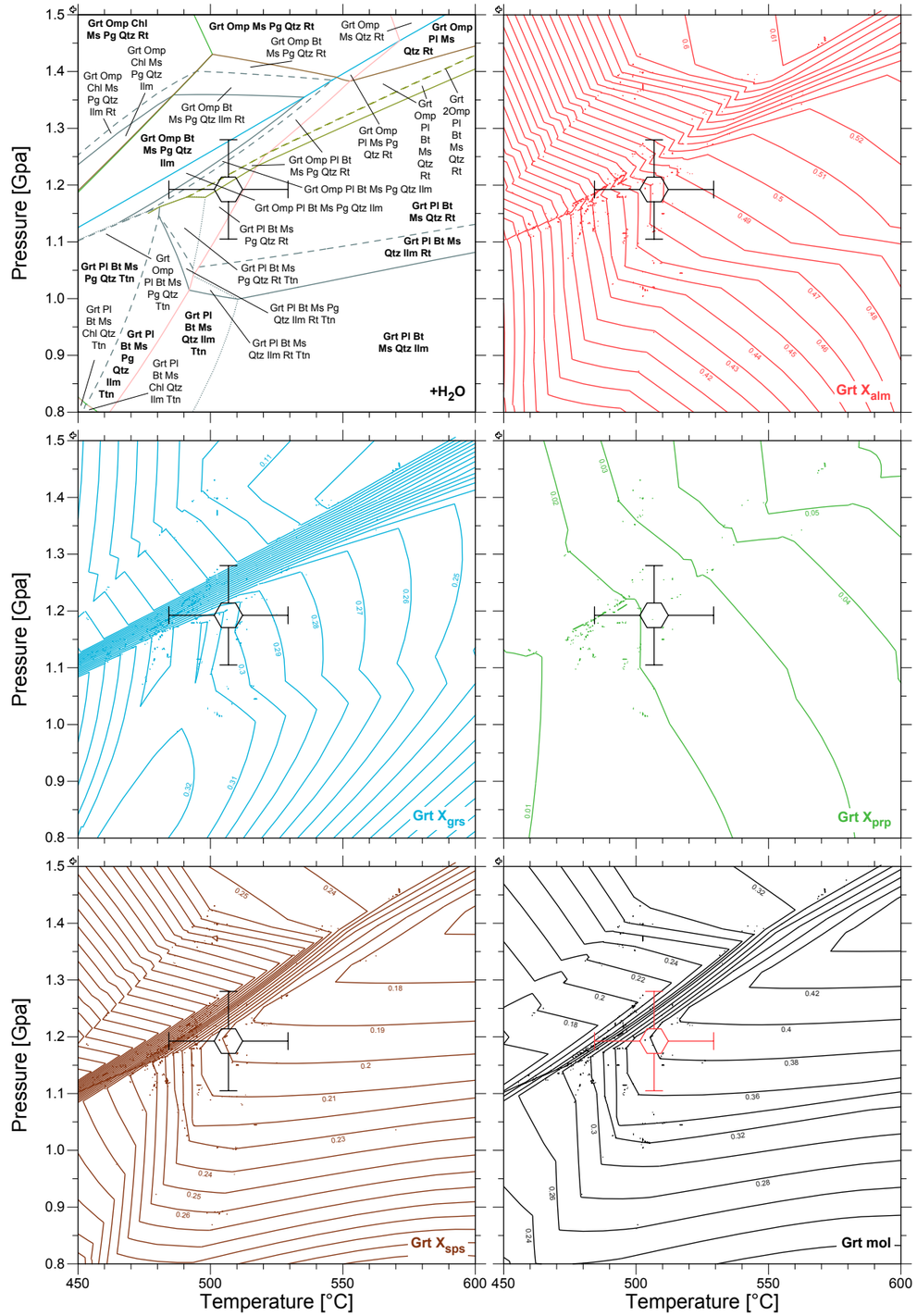


Figure A27. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76032C on pressure and temperature. Bulk rock composition (in mol) is 23.419 Si; 0.101 Ti; 7.412 Al; 1.105 Fe; 0.451 Mg; 0.397 Ca; 0.230 Mn; 2.693 Na; 1.650 K; 62.513 O.

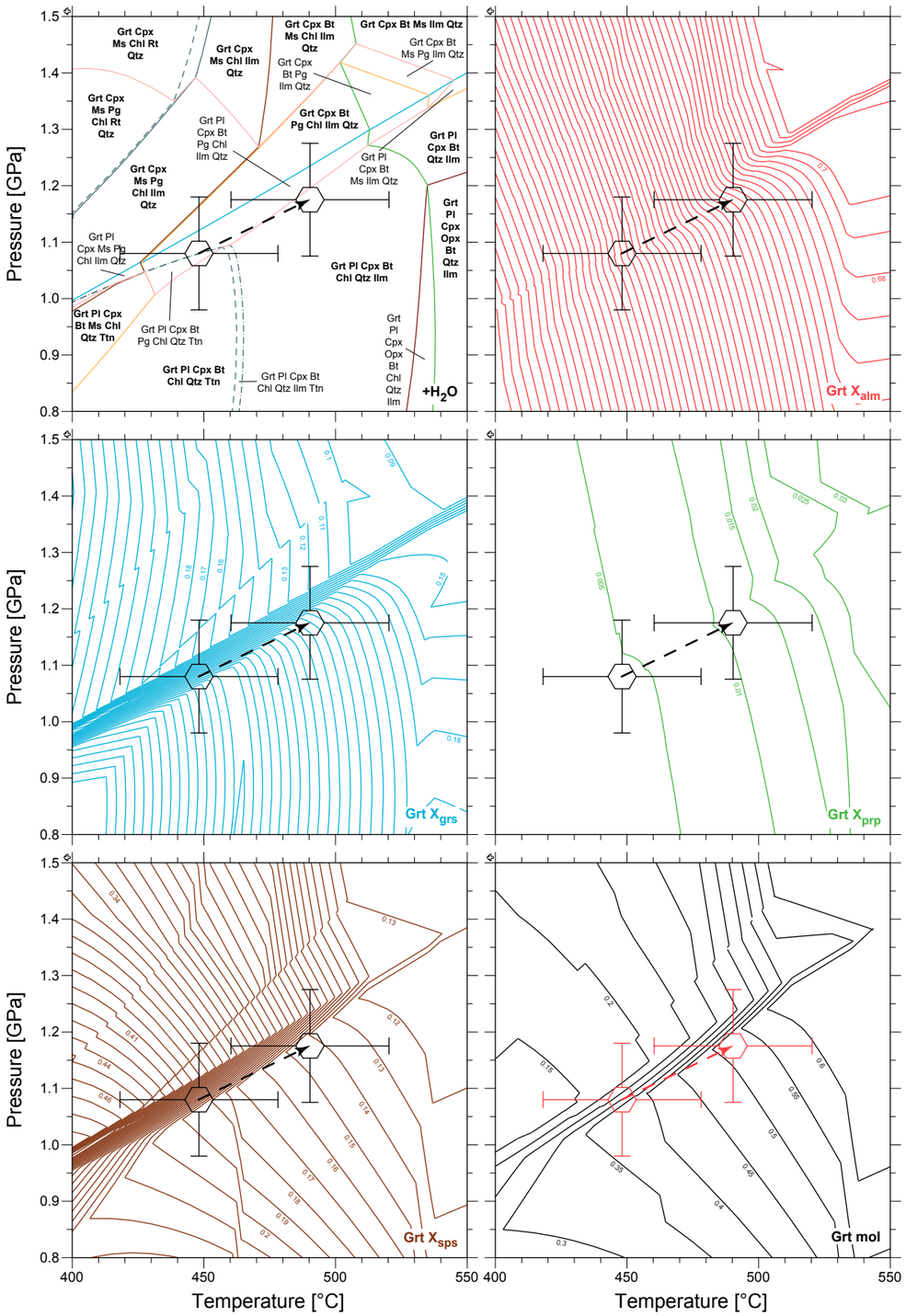


Figure A28. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76032D (initial bulk rock composition) on pressure and temperature. Bulk rock composition (in mol) is 24.709 Si; 0.059 Ti; 5.320 Al; 2.093 Fe; 0.295 Mg; 0.580 Ca; 0.231 Mn; 3.758 Na; 0.221 K; 62.705 O.

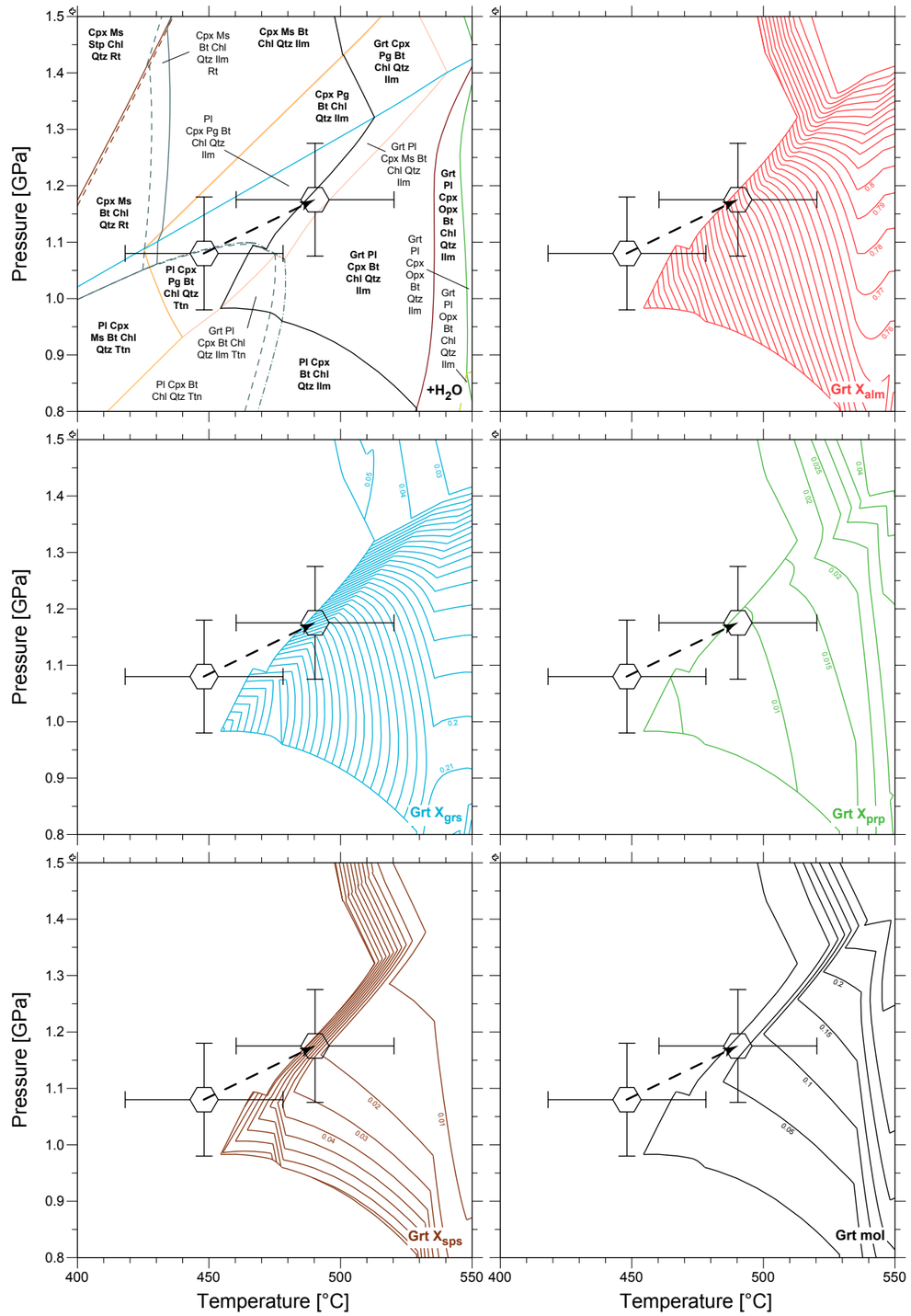


Figure A29. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample 76032D (fractionation step valid for outermost garnet rim) on pressure and temperature. Bulk rock composition (in mol) is 23.699 Si; 0.059 Ti; 4.647 Al; 1.632 Fe; 0.290 Mg; 0.261 Ca; 0.006 Mn; 3.758 Na; 0.221 K; 58.664 O.

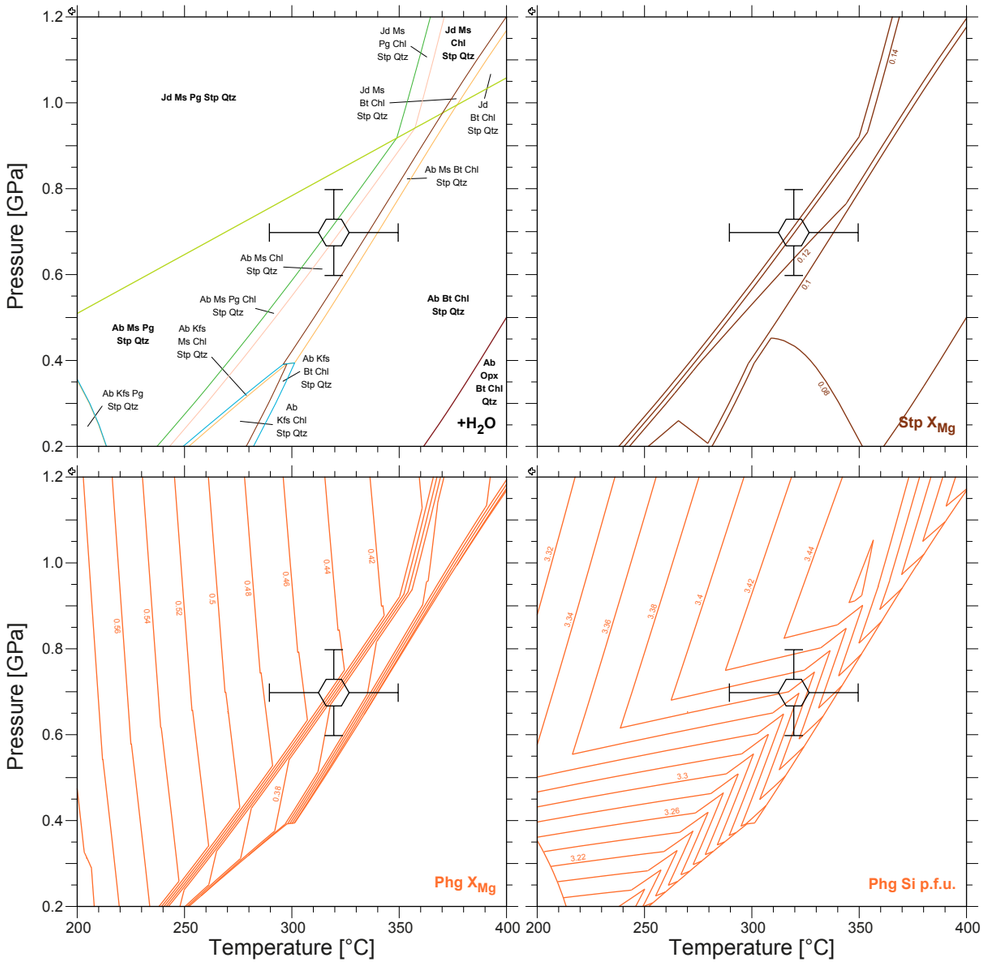


Figure A30. Equilibrium assemblage diagram and dependency of the X_{Mg} of stilpnomelane, and muscovite-phengite, the Si-content of muscovite-phengite of sample 76032D (matrix composition) on pressure and temperature. Bulk rock composition (in mol): 25.786 Si; 4.862 Al; 1.570 Fe; 0.318 Mg; 4.169 Na; 0.245 K; 62.960 O.

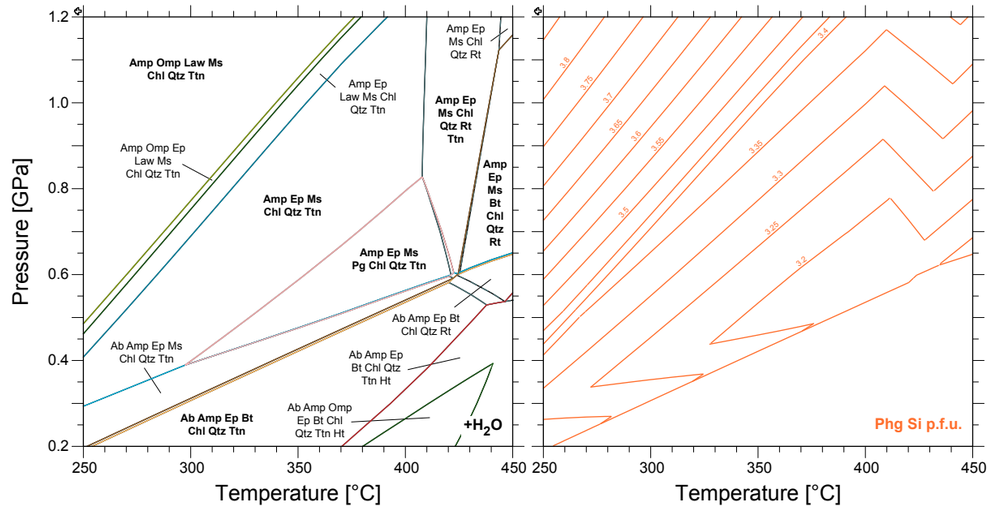


Figure A31. Equilibrium assemblage diagram and dependency of the Si-content of phengite of sample 760210A (matrix composition) on pressure and temperature. Bulk rock composition (in mol): 20.431 Si; 0.358 Ti; 5.391 Al; 3.904 Fe; 3.615 Mg; 2.559 Ca; 0.079 Mn; 1.868 Na; 0.168 K; O is defined by the hematite-magnetite buffer.

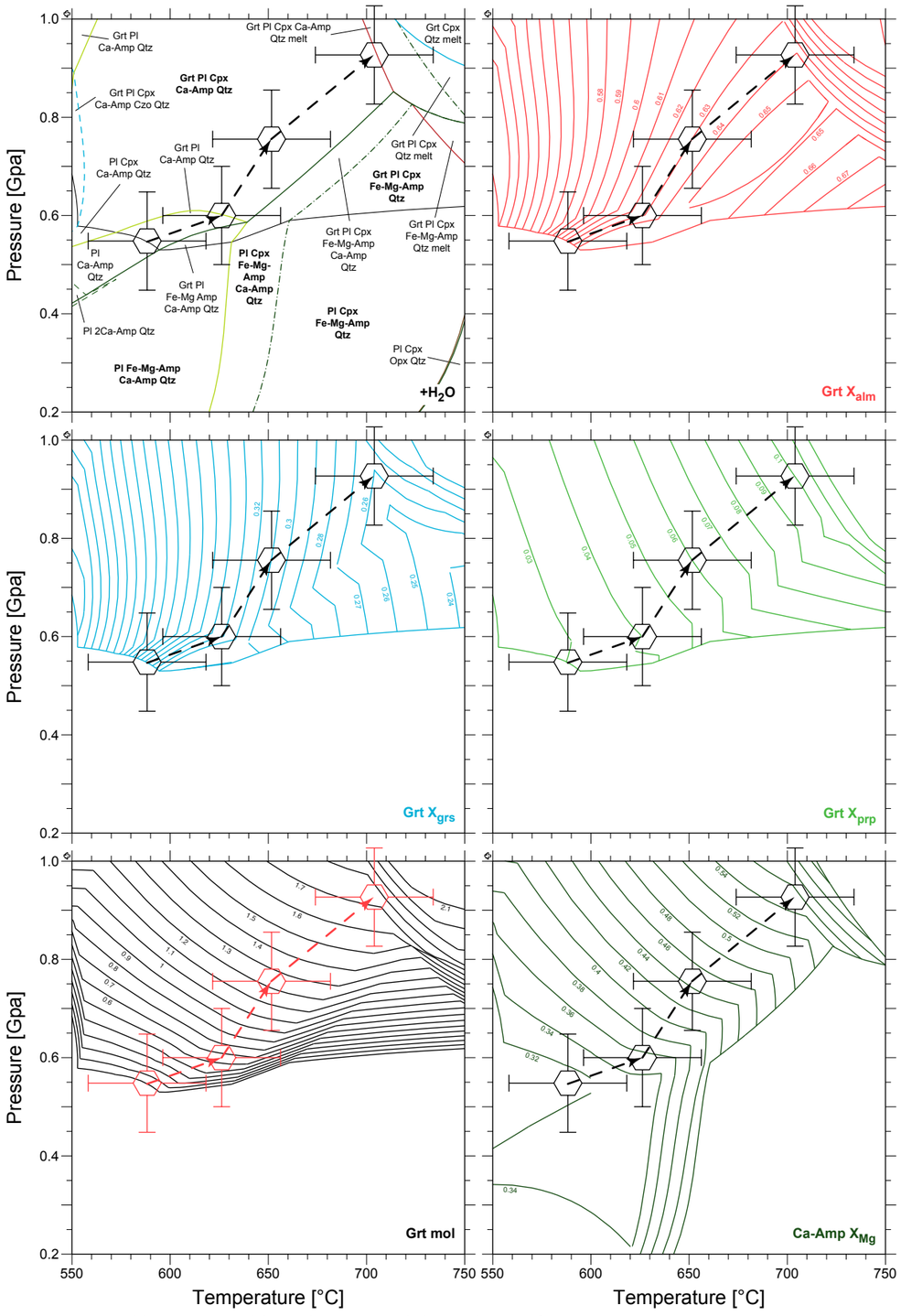


Figure A32. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{Mg} of calcic amphibole (Ca-Amp) of sample 76046A on pressure and temperature. Bulk rock composition (in mol): 18.771 Si; 5.660 Al; 4.574 Fe; 2.040 Mg; 3.874 Ca; 0.078 Mn; 1.241 Na; 57.219 O.

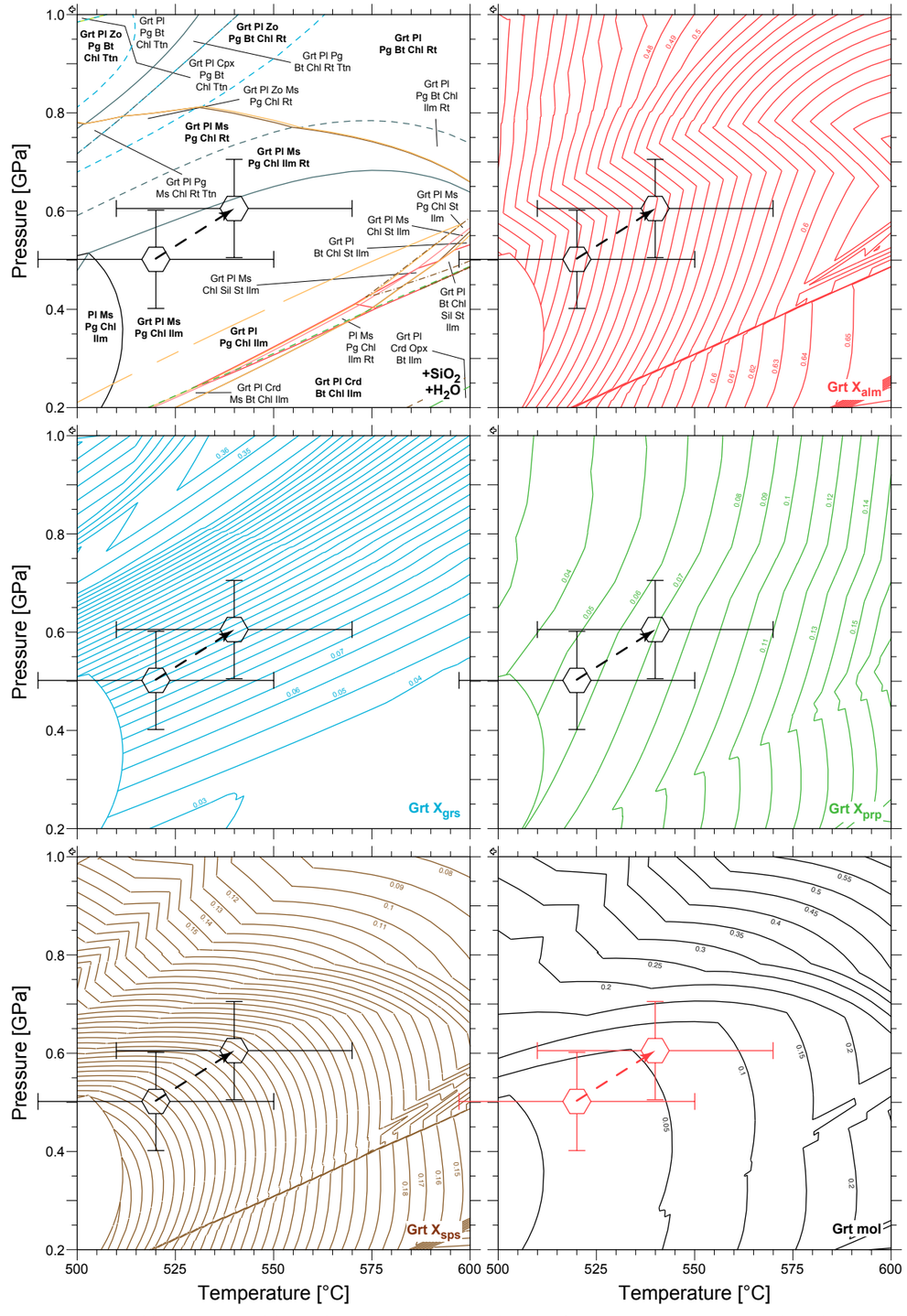


Figure A33. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample D7626A on pressure and temperature. Bulk rock composition (in mol) is 19.088 Si; 0.492 Ti; 9.743 Al; 1.820 Fe; 1.959 Mg; 1.113 Ca; 0.143 Mn; 4.429 Na; 0.124 K; 61.086 O.

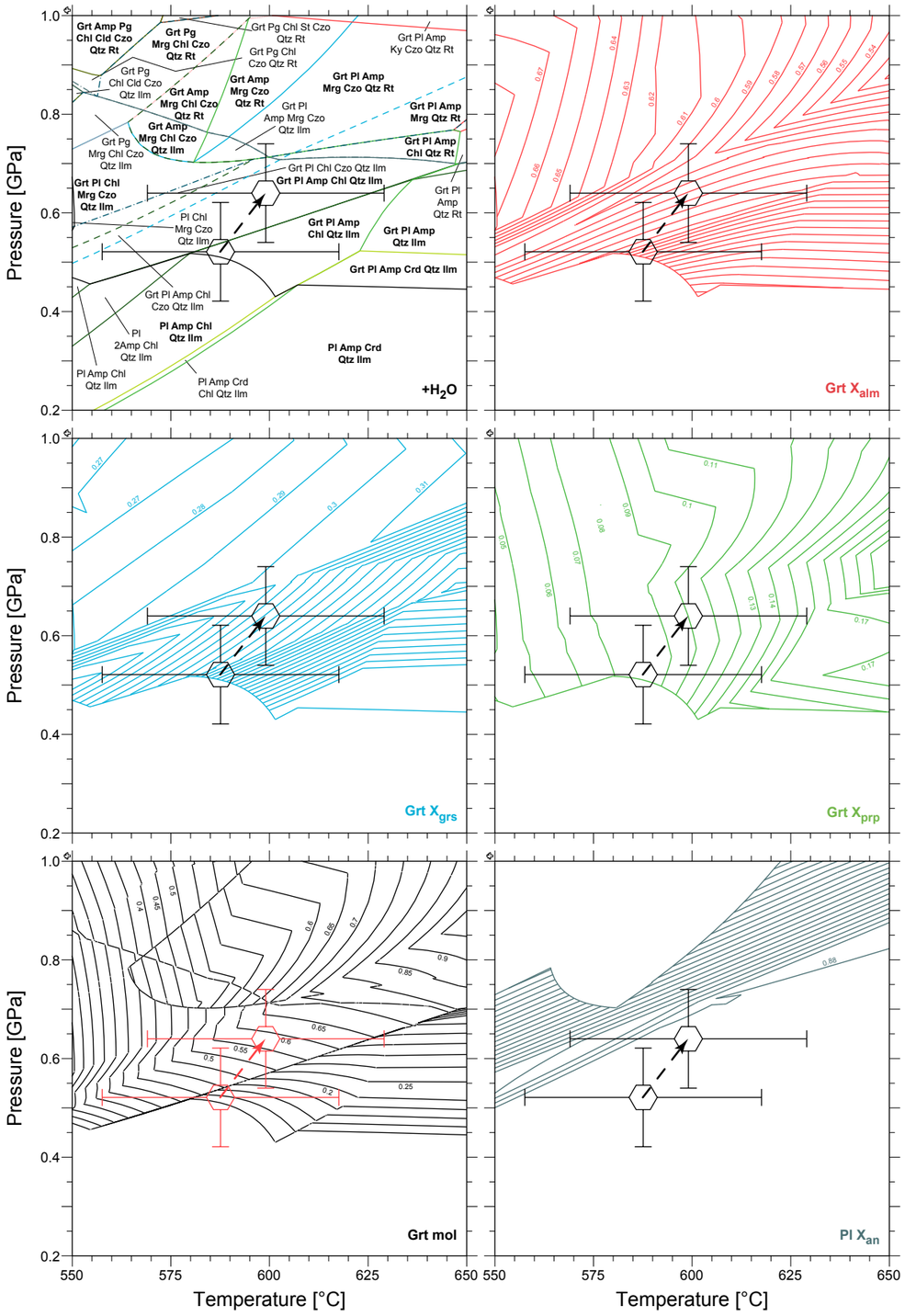


Figure A34. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{An} of plagioclase of sample 76017B on pressure and temperature. Bulk rock composition (in mol): 21.753 Si; 0.075 Ti; 8.106 Al; 1.844 Fe; 1.315 Mg; 3.597 Ca; 0.433 Na; 62.788 O.

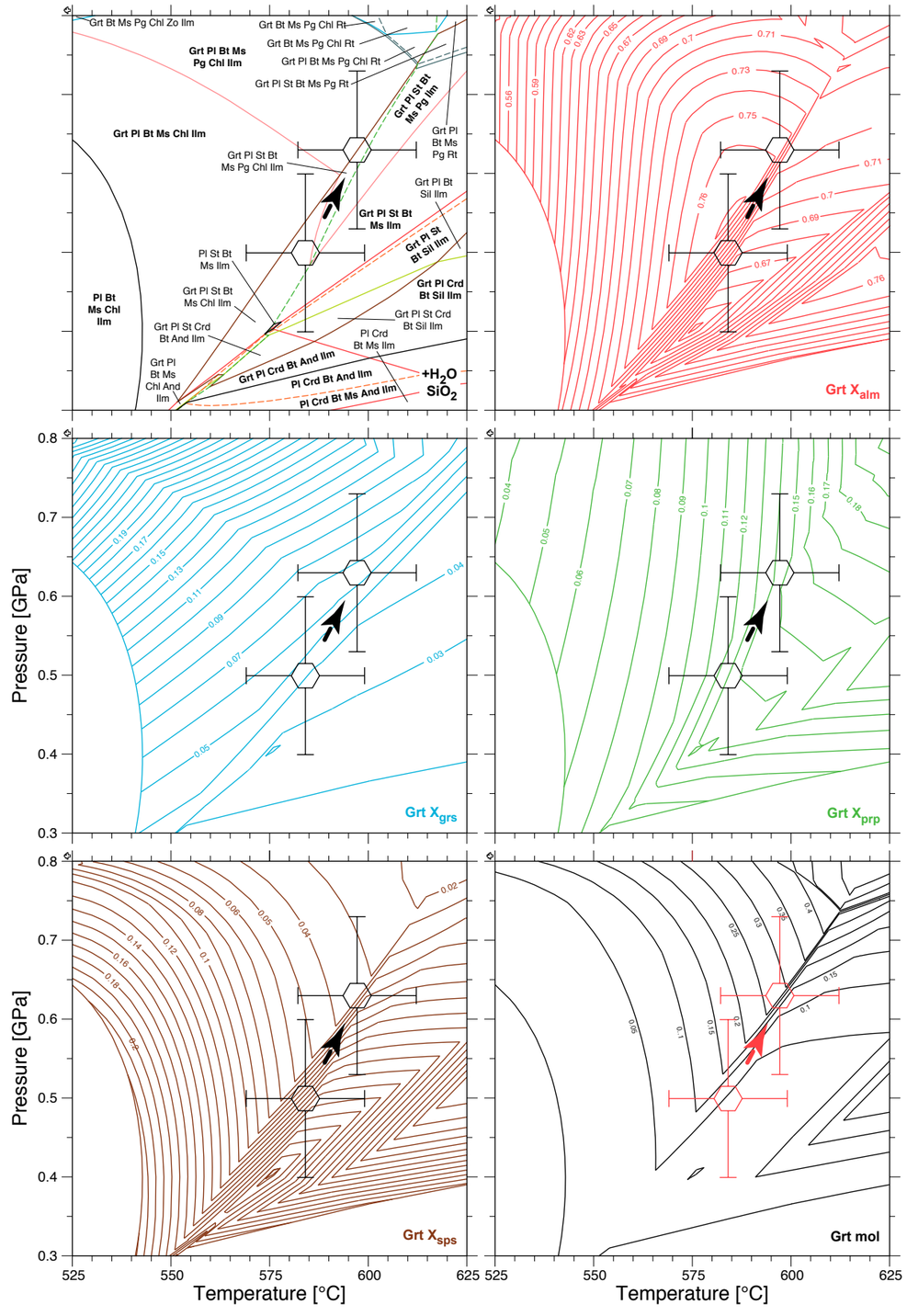


Figure A35. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample Q61E on pressure and temperature. Bulk rock composition (in mol): Si 24.342; Ti 0.195; Al 6.218; Fe 2.051; Mg 1.630; Ca 0.173; Mn 0.033; Na 0.893; K 1.153; O 63.311.

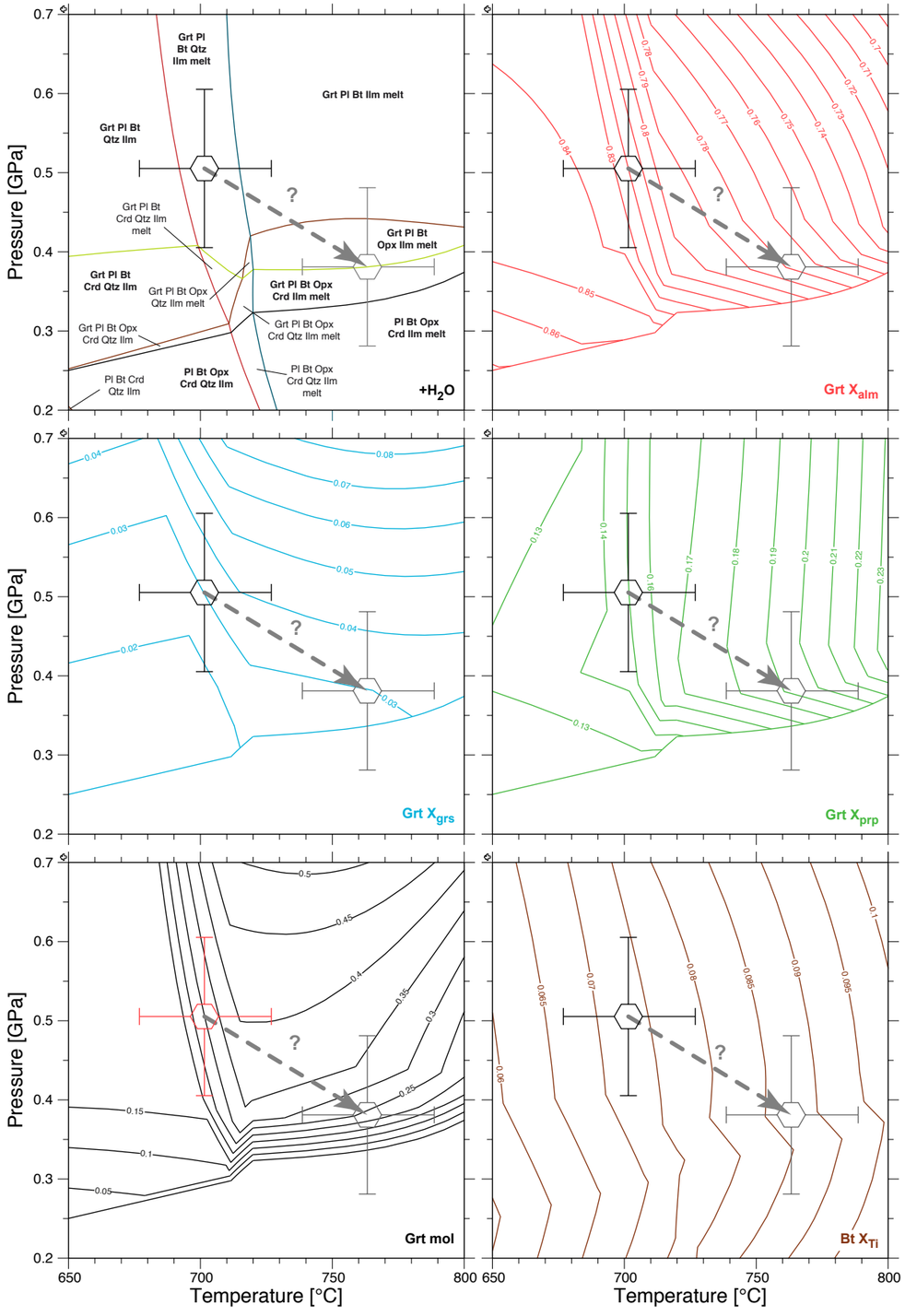
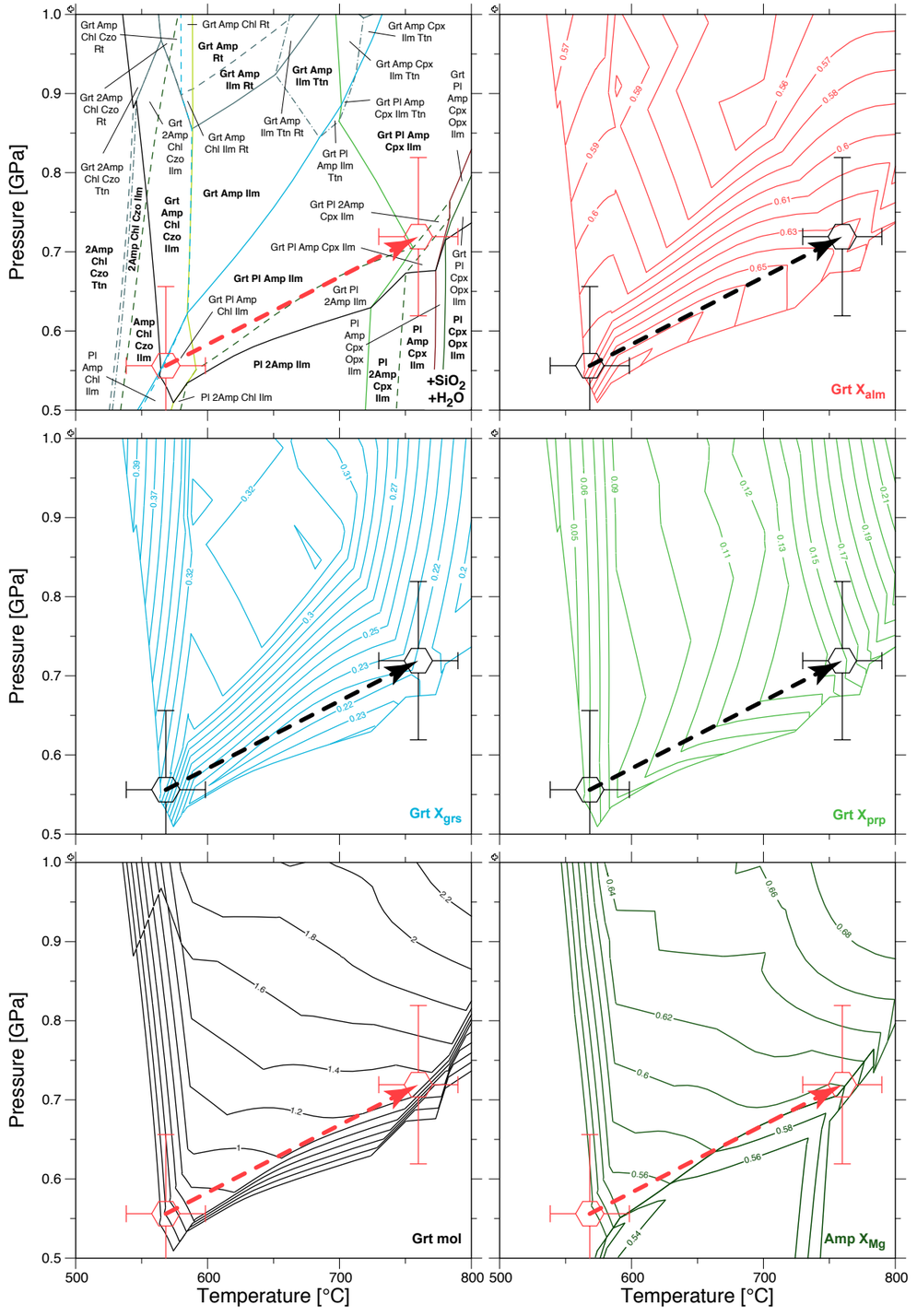


Figure A36. Equilibrium assemblage diagram and dependency of garnet composition, its molar amount and the X_{Ti} (=Ti/octahedral sum) of biotite of sample Q64D on pressure and temperature. Bulk rock composition (in mol): Si 20.707; Ti 0.526; Al 7.358; Fe 2.859; Mg 1.241; Ca 1.009; Na 2.774; K 1.287; O 60.6425.



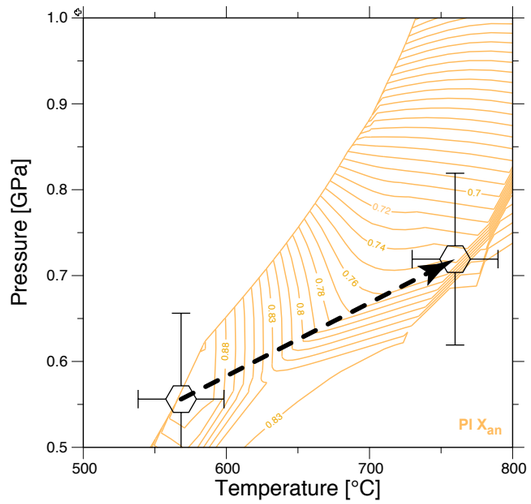


Figure A37 (continued). Equilibrium assemblage diagram and dependency of garnet composition, garnet molar amount, X_{Mg} of amphibole and X_{an} of plagioclase of sample Q64E on pressure and temperature. Bulk rock composition (in mol): Si 25.640; Ti 0.361; Al 6.732; Fe 5.613; Mg 4.798; Ca 4.544; Na 0.663; O 77.3865.

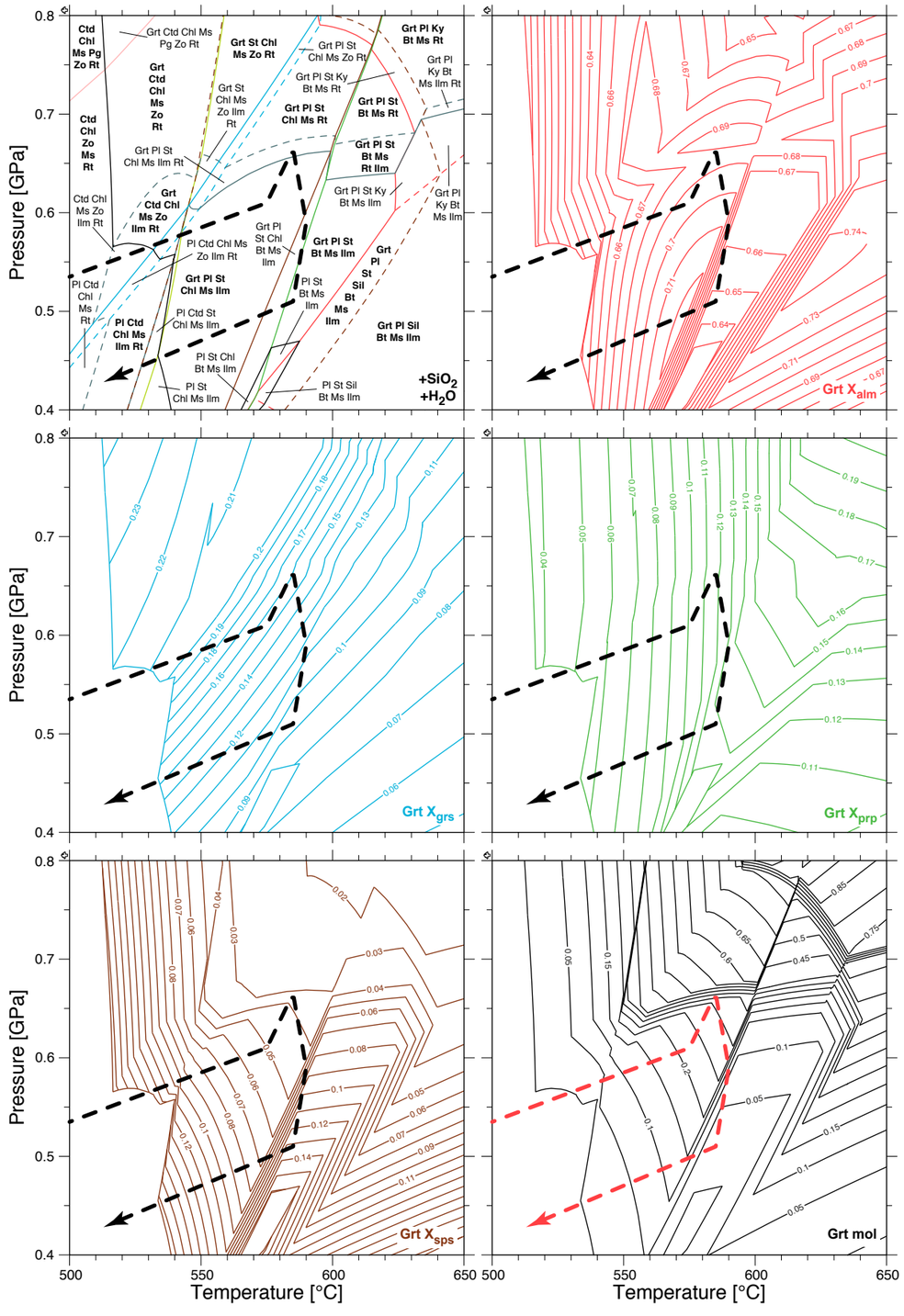


Figure A38. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample Q67F (initial bulk rock composition) on pressure and temperature. Bulk rock composition (in mol) is Si 15.713; Ti 0.460; Al 14.781; Fe 2.310; Mg 1.342; Ca 0.660; Mn 0.045; Na 0.942; K 2.621; O 60.656.

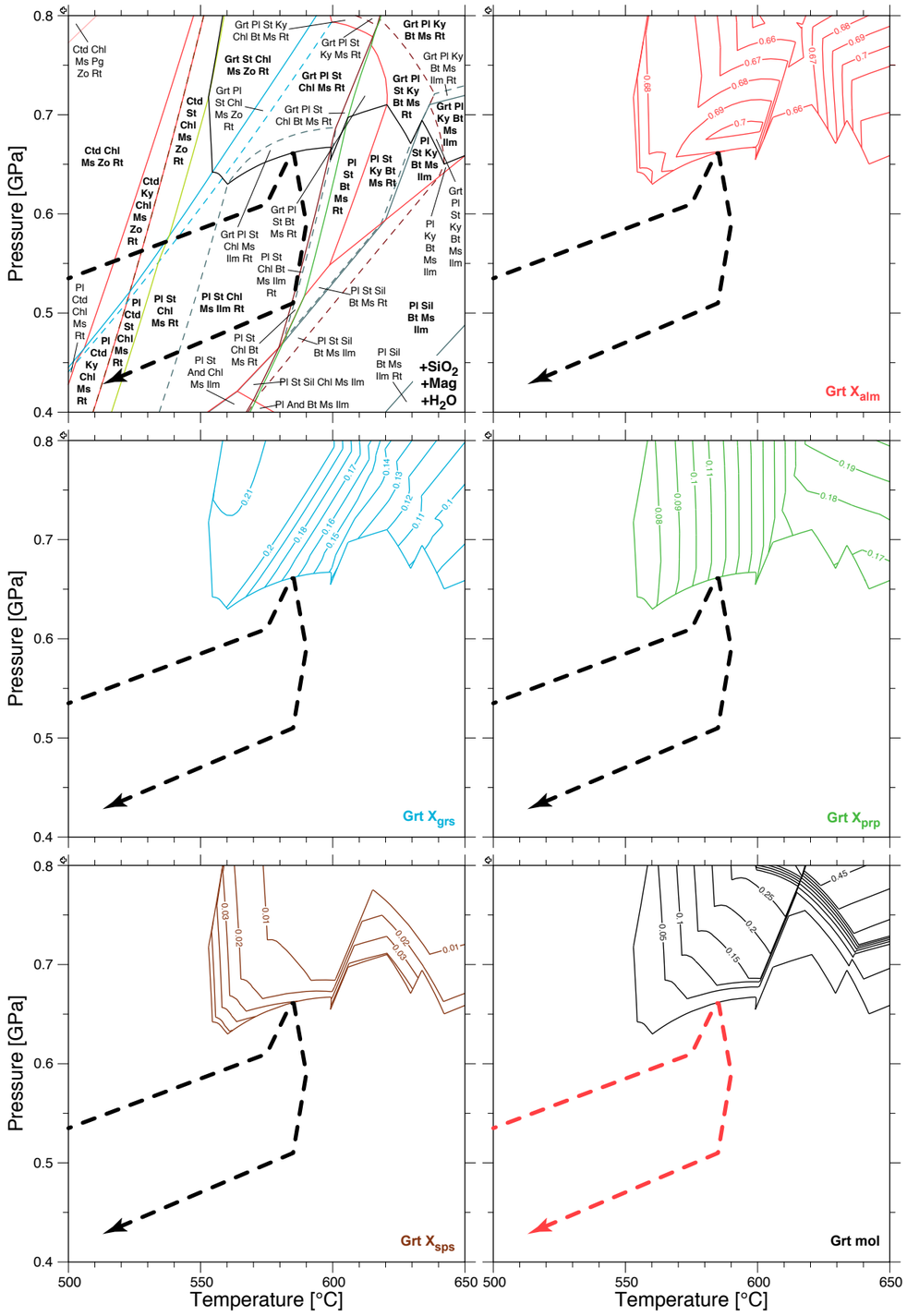


Figure A39. Equilibrium assemblage diagram and dependency of garnet composition and molar amount of sample Q67F, fractionation step valid for outermost garnet rim on pressure and temperature. Bulk rock composition is Si 15.303; Ti 0.460; Al 14.508; Fe 1.949, Mg 1.295; Ca 0.561; Mn 0.00471; Na 0.942, K 2.621; O 60.01600.

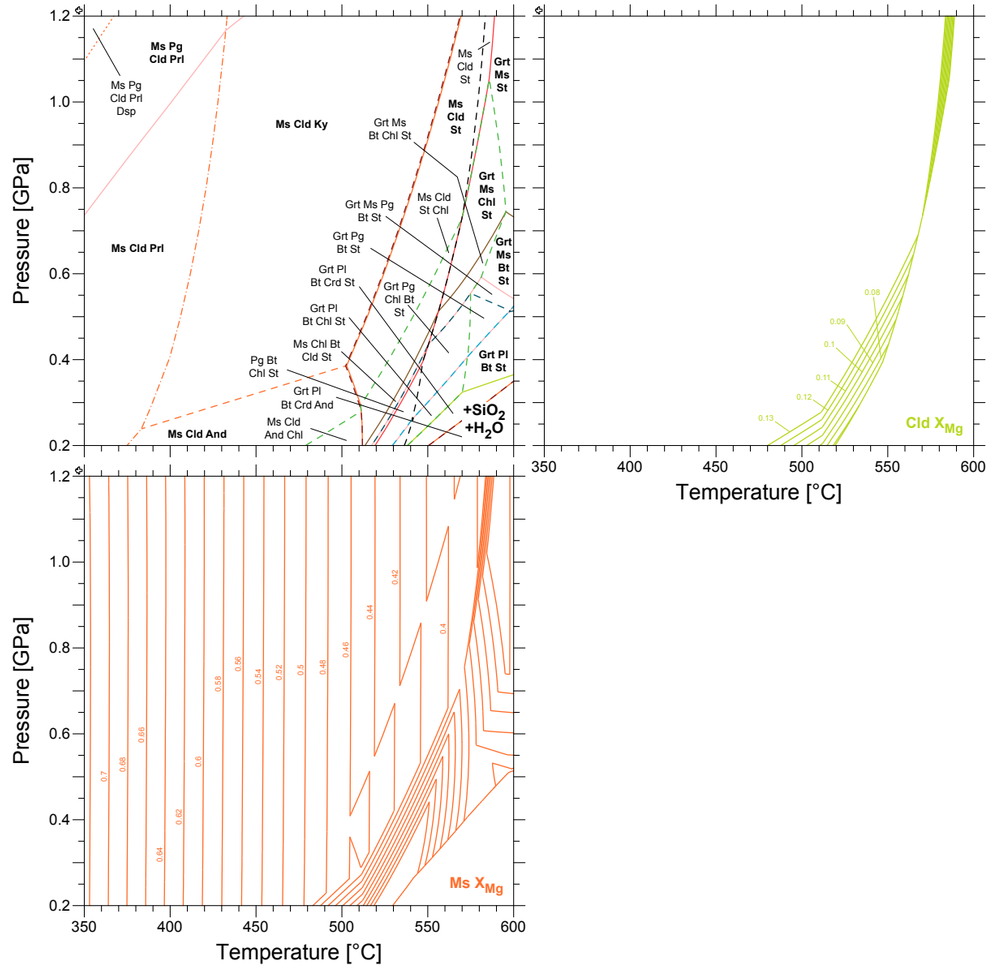


Figure A40. Equilibrium assemblage diagram and dependency of the X_{Mg}-value of chloritoid and muscoviteof sample Q68B on pressure and temperature. Bulk rock composition is Si 29.6367; Al 2.1175; Fe 0.7082; Mg 0.1077; Na 0.0136; K 0.0635; O 78.3041.

Appendix B - EMP analyses

Amphibole

Electron microprobe analyses of amphibole. Cations based on a 23 oxygen basis. Ferric iron was estimated using the minmax-midpoint method (Schumacher, 1997).

	75254A F3 Amp bIgrü2	75254A F3 Amp bIgrü3	75254A F2 Amp w2	75254A F2 Amp w3	75254A F2 Amp w4	75254A F2 Amp w5	75254A F2 Amp w6	75254A F2 Amp w7	75254A F2 Amp w21	75254A F2 Amp w22	75254A F2 Amp w23	75254A F2 Amp w25	75254A F2 Amp w26	75257A F3 Amp1
Analysis														
SiO_2	46.83	47.53	52.73	53.28	52.69	53.25	52.72	52.87	52.78	52.65	51.48	52.98	53.00	59.83
TiO_2	0.35	0.23	0.14	0.10	0.07	0.08	0.11	0.11	0.03	0.09	0.10	0.12	0.07	0.00
Al_2O_3	12.66	11.13	1.81	1.89	1.99	1.59	1.79	1.99	0.89	1.95	2.63	1.82	1.67	0.05
Fe_2O_3	3.56	3.80	0.71	0.44	1.23	0.51	1.34	1.14	0.87	0.69	1.17	0.98	0.66	0.00
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
MgO	11.42	12.05	16.35	16.21	16.35	16.49	16.24	16.22	16.25	16.29	16.08	16.62	16.64	28.77
CaO	11.56	11.65	0.77	0.76	0.69	0.68	0.68	0.85	0.57	1.14	0.82	0.74	0.77	0.40
MnO	0.35	0.32	1.08	1.15	1.04	1.13	1.16	1.13	1.17	1.07	1.00	1.17	1.11	0.33
FeO	11.93	11.42	23.74	24.24	23.77	24.05	23.83	23.83	24.23	23.10	22.85	23.34	23.38	7.90
Na_2O	1.06	0.89	0.13	0.16	0.12	0.13	0.17	0.16	0.06	0.19	0.13	0.20	0.14	0.03
K_2O	0.18	0.16	0.01	0.00	0.03	0.02	0.00	0.00	0.04	0.01	0.05	0.01	0.00	0.00
Total	99.90	99.17	97.47	98.24	97.98	97.93	98.03	98.31	96.88	97.18	96.29	97.96	97.43	97.34
Cations														
Si	6.673	6.807	7.786	7.809	7.749	7.824	7.759	7.753	7.866	7.783	7.688	7.775	7.811	8.094
Ti	0.038	0.024	0.015	0.011	0.008	0.009	0.012	0.012	0.003	0.010	0.011	0.013	0.007	0.000
Al	2.127	1.879	0.315	0.326	0.345	0.275	0.310	0.344	0.156	0.339	0.463	0.315	0.289	0.008
Fe^{3+}	0.381	0.409	0.079	0.048	0.136	0.057	0.148	0.126	0.098	0.077	0.131	0.108	0.073	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Mg	2.426	2.573	3.598	3.542	3.583	3.612	3.564	3.546	3.610	3.589	3.579	3.635	3.657	5.802
Ca	1.765	1.788	0.121	0.120	0.108	0.107	0.106	0.134	0.091	0.180	0.131	0.116	0.121	0.059
Mn	0.042	0.039	0.135	0.143	0.130	0.141	0.144	0.140	0.147	0.134	0.126	0.145	0.138	0.038
Fe^{2+}	1.422	1.367	2.931	2.971	2.924	2.955	2.933	2.923	3.020	2.857	2.853	2.864	2.882	0.894
Na	0.294	0.247	0.036	0.046	0.035	0.038	0.048	0.045	0.018	0.055	0.038	0.055	0.040	0.007
K	0.032	0.028	0.002	0.001	0.005	0.003	0.000	0.001	0.007	0.002	0.009	0.001	0.000	0.000
Total	15.199	15.162	15.021	15.017	15.022	15.022	15.024	15.023	15.016	15.027	15.028	15.029	15.020	14.904
%Fe^{2+}	21.150	23.044	2.624	1.597	4.459	1.884	4.802	4.143	3.137	2.627	4.389	3.636	2.482	0.000
X_{Mg}	0.630	0.653	0.551	0.544	0.551	0.550	0.549	0.548	0.545	0.557	0.556	0.559	0.559	0.866

	75257A F3 Amp3	75257A F3 Amp6	75257A F3 Amp7	75257A F3 Amp8	75257A F3 Amp9	75257A F3 Amp11	75257A F3 Amp12	75257A F3 Amp13	75257A F6 Amp2	75257A F6 Amp3	75257A F6 Amp4	75257A F6 Amp5	75257A F6 Amp6	75257A F6 Amp7
Analysis														
SiO_2	59.98	59.95	60.29	60.11	60.01	60.14	60.08	59.73	59.62	59.24	56.53	58.01	57.31	57.25
TiO_2	0.00	0.00	0.00	0.03	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.07	0.01	0.04
Al_2O_3	0.03	0.05	0.04	0.07	0.06	0.08	0.06	0.04	0.04	0.05	0.12	0.92	0.79	1.51
Fe_2O_3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.09	0.00
Cr_2O_3	0.03	0.02	0.05	0.01	0.02	0.02	0.00	0.00	0.04	0.01	0.07	0.33	0.28	0.45
MgO	28.58	28.90	28.90	28.99	29.14	28.79	28.89	29.03	28.49	28.37	29.34	23.28	23.35	22.41
CaO	0.43	0.48	0.44	0.46	0.48	0.61	0.46	0.49	0.44	0.59	0.48	13.00	12.42	13.08
MnO	0.26	0.32	0.27	0.26	0.30	0.26	0.23	0.30	0.25	0.31	0.32	0.05	0.07	0.10
FeO	8.40	7.84	7.93	7.53	7.54	7.95	7.63	7.84	8.11	7.74	7.76	1.73	1.79	1.98
Na_2O	0.03	0.04	0.02	0.02	0.03	0.04	0.01	0.04	0.01	0.02	0.04	0.22	0.21	0.32
K_2O	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Total	97.73	97.60	97.93	97.47	97.61	97.90	97.38	97.47	97.02	96.34	94.66	97.66	96.33	97.15
Cations														
Si	8.097	8.089	8.103	8.102	8.085	8.092	8.108	8.072	8.098	8.097	7.909	7.917	7.924	7.874
Ti	0.000	0.000	0.000	0.003	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.007	0.001	0.004
Al	0.004	0.008	0.006	0.011	0.010	0.013	0.009	0.006	0.006	0.008	0.019	0.148	0.129	0.245
Fe^{3+}	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.000
Cr	0.003	0.002	0.005	0.001	0.002	0.002	0.000	0.000	0.005	0.001	0.008	0.036	0.031	0.049
Mg	5.752	5.812	5.790	5.824	5.852	5.775	5.812	5.850	5.770	5.782	6.119	4.737	4.812	4.594
Ca	0.062	0.070	0.064	0.066	0.070	0.088	0.067	0.071	0.064	0.087	0.072	1.901	1.840	1.927
Mn	0.030	0.036	0.030	0.029	0.035	0.030	0.027	0.035	0.029	0.036	0.037	0.005	0.008	0.011
Fe^{2+}	0.948	0.884	0.892	0.848	0.849	0.894	0.861	0.886	0.922	0.885	0.907	0.198	0.207	0.228
Na	0.007	0.011	0.006	0.006	0.008	0.011	0.003	0.009	0.003	0.006	0.011	0.057	0.055	0.084
K	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.003
Total	14.903	14.912	14.895	14.891	14.914	14.907	14.888	14.929	14.897	14.902	15.084	15.012	15.019	15.019
%Fe^{2+}	0.000	2.536	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.436	19.404	1.360
X_{Mg}	0.858	0.868	0.867	0.873	0.873	0.866	0.871	0.868	0.862	0.867	0.871	0.960	0.959	0.953

	75257A F6 Amp8	75257A F6 Amp9	75257A F6 Amp10	75257A F6 Amp11	75257A F6 Amp12	75295A F1 Amp1	75295A F1 Amp2	75295A F1 Amp3	75295A F1 Amp4	75295A F1 Amp5	75295A F1 Amp6	75295A F1 Amp7	75295A F1 Amp8	75295A F1 Amp9
Analysis														
SiO_2	57.59	57.56	59.58	60.12	59.79	59.80	59.15	58.93	58.62	58.74	58.93	59.49	59.28	51.45
TiO_2	0.03	0.02	0.01	0.00	0.02	0.04	0.00	0.04	0.00	0.03	0.00	0.02	0.00	0.00
Al_2O_3	1.32	1.03	0.03	0.03	0.04	0.02	0.18	0.14	0.29	0.40	0.31	0.14	0.30	0.42
Fe_2O_3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Cr_2O_3	0.42	0.36	0.00	0.00	0.01	0.03	0.04	0.02	0.00	0.05	0.08	0.03	0.04	0.10
MgO	22.55	22.77	28.04	28.72	28.52	28.71	23.51	23.33	23.34	23.46	23.34	23.34	23.48	21.59
CaO	12.84	13.00	0.41	0.51	0.52	0.72	13.44	13.57	13.29	13.17	13.28	13.50	13.21	10.45
MnO	0.05	0.02	0.23	0.33	0.20	0.33	0.05	0.02	0.02	0.07	0.05	0.04	0.00	0.01
FeO	1.97	1.84	7.85	8.11	7.78	7.73	1.49	1.49	1.61	1.62	1.63	1.33	1.61	1.64
Na_2O	0.28	0.25	0.04	0.00	0.01	0.03	0.09	0.07	0.13	0.16	0.12	0.07	0.14	0.13
K_2O	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Total	97.07	96.85	96.19	97.82	96.88	97.41	97.94	97.60	97.30	97.69	97.74	97.95	98.06	85.86
Cations														
Si	7.912	7.924	8.144	8.100	8.116	8.088	8.027	8.028	8.012	7.998	8.018	8.061	8.031	7.957
Ti	0.003	0.002	0.001	0.000	0.002	0.004	0.000	0.004	0.000	0.003	0.000	0.002	0.000	0.000
Al	0.214	0.167	0.005	0.005	0.006	0.003	0.028	0.022	0.047	0.064	0.050	0.022	0.048	0.077
Fe^{3+}	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
Cr	0.046	0.039	0.000	0.000	0.001	0.004	0.005	0.002	0.000	0.005	0.008	0.004	0.004	0.012
Mg	4.618	4.674	5.714	5.768	5.771	5.787	4.757	4.738	4.755	4.762	4.734	4.714	4.742	4.977
Ca	1.891	1.917	0.061	0.073	0.075	0.105	1.954	1.980	1.946	1.921	1.936	1.960	1.917	1.731
Mn	0.006	0.003	0.026	0.037	0.023	0.038	0.005	0.002	0.002	0.007	0.006	0.004	0.000	0.002
Fe^{2+}	0.226	0.212	0.897	0.914	0.883	0.874	0.169	0.169	0.184	0.185	0.186	0.150	0.183	0.212
Na	0.074	0.067	0.010	0.000	0.004	0.007	0.023	0.019	0.034	0.041	0.032	0.019	0.035	0.040
K	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Total	14.992	15.004	14.858	14.897	14.880	14.909	14.968	14.965	14.981	14.986	14.969	14.934	14.961	15.015
%Fe^{2+}	0.000	5.445	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.221
X_{Mg}	0.953	0.957	0.864	0.863	0.867	0.869	0.966	0.965	0.963	0.963	0.962	0.969	0.963	0.959

	75295A F1 Amp10	75295A F1 Amp11	75295A F1 Amp12	75295A F1 Amp13	75295A F1 Amp14	75295A F1 Amp15	75295A F1 Amp16	75295A F1 Amp17	75295B F1 Amp1	75295B F1 Amp2	75295B F1 Amp3	75295B F1 Amp4	75295B F1 Amp5	75295B F1 Amp6
Analysis														
SiO_2	58.83	55.97	59.29	59.01	59.21	52.44	59.16	60.30	57.80	59.00	59.21	58.35	59.82	59.17
TiO_2	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.03	0.00	0.04	0.02
Al_2O_3	0.38	0.23	0.28	0.15	0.19	0.10	0.04	0.02	1.50	0.58	0.83	0.64	0.38	0.27
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.18	0.00	0.00
Cr_2O_3	0.04	0.02	0.11	0.05	0.04	0.03	0.04	0.01	0.30	0.17	0.16	0.11	0.11	0.06
MgO	23.78	25.59	23.30	24.57	23.52	28.55	29.07	29.13	23.02	23.26	23.48	23.76	23.44	23.38
CaO	12.78	11.23	13.35	11.02	13.24	8.37	0.50	0.49	13.70	13.76	13.78	13.25	13.76	13.87
MnO	0.01	0.04	0.02	0.11	0.04	0.05	0.31	0.36	0.08	0.02	0.02	0.04	0.02	0.08
FeO	2.01	2.10	1.63	2.62	1.62	3.12	7.61	7.69	1.49	1.45	1.35	1.14	1.25	1.20
Na_2O	0.15	0.08	0.12	0.06	0.10	0.05	0.01	0.02	0.46	0.17	0.28	0.21	0.13	0.13
K_2O	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Total	97.98	95.25	98.11	97.60	97.96	92.71	96.76	98.01	98.36	98.42	99.14	97.68	98.95	98.17
Cations														
Si	7.989	7.830	8.034	8.025	8.033	7.569	8.053	8.094	7.849	7.980	7.950	7.942	8.028	8.014
Ti	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.003	0.000	0.004	0.002
Al	0.060	0.037	0.044	0.024	0.030	0.017	0.006	0.003	0.240	0.093	0.131	0.102	0.060	0.043
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.018	0.000	0.000
Cr	0.005	0.002	0.011	0.005	0.004	0.003	0.004	0.001	0.032	0.018	0.016	0.012	0.012	0.006
Mg	4.815	5.337	4.707	4.980	4.757	6.145	5.899	5.829	4.660	4.690	4.699	4.821	4.689	4.720
Ca	1.860	1.683	1.938	1.605	1.925	1.295	0.073	0.070	1.994	1.994	1.982	1.933	1.979	2.013
Mn	0.001	0.004	0.002	0.013	0.005	0.006	0.036	0.041	0.009	0.002	0.002	0.005	0.002	0.009
Fe^{2+}	0.228	0.246	0.185	0.298	0.183	0.377	0.866	0.863	0.169	0.164	0.152	0.130	0.141	0.136
Na	0.041	0.022	0.033	0.015	0.025	0.013	0.003	0.004	0.122	0.045	0.074	0.056	0.033	0.034
K	0.000	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.001	0.001	0.002	0.000	0.002	0.000
Total	14.999	15.161	14.956	14.967	14.963	15.426	14.944	14.906	15.076	14.987	15.011	15.019	14.949	14.977
%Fe^{2+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.544	0.000	0.000	0.000	31.238	0.000	0.000
X_{Mg}	0.955	0.956	0.962	0.943	0.963	0.942	0.872	0.871	0.965	0.966	0.969	0.974	0.971	0.972

	75295B F1 Amp7	75295B F1 Amp8	75295B F1 Amp9	75295B F1 Amp10	75295B F3 Amp1	75295B F3 Amp2	75295B F3 Amp3	75295B F3 Amp4	75295B F3 Amp5	75295B F3 Amp6	75295B F3 Amp7	75295B F3 Amp8	75295B F3 Amp9	75295B F3 Amp10
Analysis														
SiO_2	59.24	58.74	58.46	58.50	59.11	58.68	58.78	58.97	58.85	57.61	58.25	58.66	58.42	58.10
TiO_2	0.02	0.01	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.02	0.00	0.03	0.00	0.00
Al_2O_3	0.37	0.58	0.68	0.86	0.34	0.72	0.61	0.40	0.65	0.57	0.69	0.57	0.71	0.63
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr_2O_3	0.11	0.22	0.14	0.12	0.05	0.08	0.07	0.12	0.10	0.06	0.15	0.12	0.17	0.12
MgO	23.55	23.28	23.35	23.16	23.44	23.10	23.09	23.33	23.07	23.95	23.65	23.32	23.54	23.17
CaO	13.82	13.86	13.73	13.81	13.92	13.81	13.95	13.89	13.79	12.85	12.17	13.78	13.72	13.91
MnO	0.03	0.06	0.02	0.05	0.00	0.06	0.05	0.05	0.06	0.02	0.02	0.05	0.04	0.07
FeO	1.40	1.43	1.29	1.38	1.29	1.36	1.32	1.47	1.30	1.31	1.42	1.43	1.29	1.52
Na_2O	0.14	0.19	0.25	0.28	0.15	0.23	0.24	0.16	0.25	0.23	0.30	0.22	0.28	0.26
K_2O	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00
Total	98.70	98.38	97.92	98.15	98.29	98.07	98.14	98.41	98.08	96.63	96.65	98.18	98.18	97.79
Cations														
Si	7.988	7.957	7.950	7.941	7.999	7.967	7.977	7.983	7.984	7.928	7.990	7.961	7.928	7.931
Ti	0.002	0.001	0.000	0.000	0.000	0.002	0.002	0.002	0.001	0.002	0.000	0.003	0.000	0.000
Al	0.059	0.093	0.108	0.137	0.054	0.115	0.097	0.063	0.103	0.093	0.112	0.091	0.114	0.102
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.012	0.024	0.015	0.012	0.005	0.008	0.008	0.013	0.011	0.007	0.016	0.013	0.019	0.013
Mg	4.735	4.702	4.733	4.686	4.730	4.676	4.670	4.708	4.666	4.913	4.835	4.717	4.762	4.714
Ca	1.997	2.011	2.001	2.009	2.018	2.008	2.028	2.014	2.004	1.895	1.788	2.003	1.994	2.034
Mn	0.003	0.006	0.002	0.005	0.000	0.006	0.005	0.005	0.007	0.002	0.003	0.005	0.004	0.008
Fe^{2+}	0.158	0.162	0.147	0.157	0.146	0.154	0.150	0.166	0.148	0.151	0.162	0.162	0.147	0.174
Na	0.038	0.050	0.065	0.073	0.038	0.061	0.064	0.043	0.066	0.061	0.080	0.058	0.074	0.070
K	0.001	0.002	0.000	0.002	0.001	0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.001
Total	14.993	15.010	15.021	15.022	14.991	15.000	15.002	14.999	14.990	15.052	14.987	15.013	15.043	15.047
%Fe^{2+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X_{Mg}	0.968	0.967	0.970	0.968	0.970	0.968	0.969	0.966	0.969	0.970	0.968	0.967	0.970	0.965

	75295B F3 Amp11	75295B F3 Amp12	75295B F3 Amp13	75295B F3 Amp14	75295B F3 Amp15	76017B F1 Amp1	76017B F1 Amp2	76017B F1 Amp3	76017B F1 Amp4	76017B F1 Amp5	76017B F1 Amp6	76017B F1 Amp7	76017B F2 Amp1	76017B F2 Amp2
Analysis														
SiO_2	58.86	58.30	58.17	57.81	58.45	43.09	42.92	43.04	43.45	43.30	43.97	43.22	50.43	48.74
TiO_2	0.00	0.05	0.01	0.01	0.00	0.43	0.39	0.39	0.40	0.37	0.27	0.36	0.15	0.18
Al_2O_3	0.35	0.46	0.53	1.04	0.48	15.74	15.51	15.14	15.06	15.15	14.50	15.32	5.93	8.49
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.05	0.08	0.08	0.06	0.08	0.07	0.09	0.00	0.00
Cr_2O_3	0.11	0.21	0.21	0.19	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	23.34	23.21	23.27	22.94	23.20	6.44	6.28	6.57	6.32	6.22	6.50	6.42	11.14	9.92
CaO	13.86	13.88	13.91	13.88	13.83	10.01	10.05	10.42	10.07	10.07	10.05	9.91	11.78	11.67
MnO	0.03	0.09	0.07	0.02	0.06	0.08	0.09	0.14	0.14	0.17	0.16	0.10	0.25	0.23
FeO	1.29	1.36	1.29	1.58	1.26	18.76	18.97	19.30	19.32	19.46	19.35	18.92	17.17	17.80
Na_2O	0.14	0.15	0.20	0.36	0.18	2.75	2.58	2.60	2.62	2.61	2.57	2.70	1.06	1.19
K_2O	0.00	0.00	0.00	0.00	0.01	0.56	0.56	0.56	0.54	0.61	0.58	0.61	0.17	0.29
Total	97.98	97.71	97.65	97.83	97.58	97.91	97.42	98.23	97.98	98.04	98.02	97.63	98.06	98.52
Cations														
Si	7.994	7.955	7.942	7.893	7.974	6.444	6.457	6.445	6.507	6.491	6.580	6.486	7.412	7.163
Ti	0.000	0.005	0.001	0.001	0.000	0.049	0.044	0.043	0.045	0.041	0.030	0.041	0.016	0.020
Al	0.056	0.074	0.085	0.167	0.077	2.774	2.751	2.671	2.658	2.677	2.558	2.710	1.027	1.471
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.006	0.010	0.009	0.007	0.009	0.008	0.010	0.000	0.000
Cr	0.011	0.023	0.023	0.020	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	4.726	4.721	4.737	4.669	4.719	1.435	1.408	1.466	1.411	1.390	1.450	1.436	2.440	2.174
Ca	2.017	2.030	2.035	2.031	2.021	1.603	1.620	1.672	1.617	1.618	1.611	1.593	1.855	1.838
Mn	0.004	0.011	0.008	0.002	0.007	0.010	0.011	0.018	0.017	0.021	0.020	0.012	0.031	0.028
Fe^{2+}	0.146	0.155	0.147	0.180	0.144	2.346	2.387	2.416	2.420	2.440	2.422	2.374	2.111	2.189
Na	0.036	0.039	0.052	0.095	0.048	0.797	0.752	0.755	0.762	0.759	0.746	0.785	0.301	0.340
K	0.000	0.001	0.000	0.000	0.002	0.106	0.107	0.107	0.103	0.116	0.110	0.117	0.031	0.054
Total	14.990	15.012	15.029	15.059	15.006	15.569	15.547	15.603	15.547	15.562	15.535	15.565	15.224	15.278
%Fe^{2+}	0.000	0.000	0.000	0.000	0.000	5.001	6.128	5.859	5.159	5.776	5.697	6.277	0.000	1.206
X_{Mg}	0.970	0.968	0.970	0.963	0.970	0.379	0.371	0.378	0.368	0.363	0.375	0.377	0.536	0.498

	76017B F2 Amp3	76017B F2 Amp4	76017B F2 Amp5	76017B F2 Amp6	76017B F2 Amp8	76017B F2 Amp9	76017B F2 Amp10	76017B F2 Amp11	76017B F2 Amp12	76022B F3 Amp	76022B F3 Amp	76022B F3 Amp	76022B F3 Amp	76022B F2 Amp
Analysis														
SiO_2	53.33	52.84	47.34	47.16	45.70	43.93	49.68	49.40	52.34	57.05	57.00	57.34	57.51	57.03
TiO_2	0.07	0.11	0.20	0.08	0.30	0.26	0.18	0.15	0.11	0.02	0.04	0.01	0.03	0.03
Al_2O_3	2.32	3.47	9.55	7.51	11.70	13.49	5.42	7.73	4.10	1.01	0.53	0.61	0.83	0.58
Fe_2O_3	0.00	0.00	0.00	0.95	0.08	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.54	12.21	9.09	11.46	7.95	7.17	11.11	10.28	12.01	17.58	17.84	17.92	17.52	17.59
CaO	12.12	11.82	11.53	9.84	9.91	9.89	11.28	11.76	11.88	12.92	12.86	13.01	13.05	13.20
MnO	0.13	0.13	0.27	0.21	0.10	0.13	0.21	0.32	0.22	0.21	0.25	0.21	0.20	0.18
FeO	16.68	16.36	18.17	14.78	17.87	17.96	16.38	17.76	16.55	9.01	8.82	8.93	9.27	8.91
Na_2O	0.41	0.63	1.40	0.73	2.27	2.32	0.93	1.17	0.73	0.13	0.15	0.17	0.22	0.10
K_2O	0.08	0.10	0.29	0.14	0.37	0.60	0.16	0.23	0.13	0.03	0.03	0.03	0.01	0.01
Total	97.69	97.67	97.84	92.86	96.24	95.82	95.35	98.80	98.07	97.94	97.52	98.23	98.64	97.63
Cations														
Si	7.810	7.725	7.036	7.243	6.890	6.681	7.481	7.236	7.641	8.010	8.037	8.029	8.028	8.037
Ti	0.008	0.012	0.023	0.010	0.034	0.030	0.020	0.017	0.012	0.002	0.005	0.001	0.003	0.003
Al	0.400	0.598	1.673	1.359	2.079	2.419	0.962	1.335	0.705	0.166	0.087	0.101	0.137	0.096
Fe^{3+}	0.000	0.000	0.000	0.110	0.009	0.007	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	2.737	2.662	2.013	2.624	1.786	1.626	2.493	2.244	2.614	3.680	3.750	3.741	3.646	3.695
Ca	1.902	1.851	1.836	1.620	1.600	1.612	1.819	1.845	1.858	1.943	1.943	1.953	1.952	1.993
Mn	0.016	0.015	0.034	0.027	0.013	0.016	0.027	0.040	0.028	0.025	0.030	0.025	0.024	0.021
Fe^{2+}	2.043	2.000	2.258	1.898	2.254	2.284	2.063	2.175	2.021	1.057	1.040	1.046	1.082	1.050
Na	0.116	0.179	0.404	0.216	0.664	0.685	0.270	0.331	0.207	0.035	0.040	0.045	0.058	0.028
K	0.015	0.018	0.055	0.027	0.070	0.117	0.031	0.043	0.024	0.005	0.006	0.004	0.002	0.002
Total	15.048	15.062	15.333	15.134	15.399	15.477	15.168	15.267	15.110	14.925	14.938	14.944	14.931	14.926
%Fe^{2+}	0.000	0.000	0.000	21.328	6.016	5.511	2.574	1.743	0.000	0.000	0.000	0.000	0.000	0.000
X_{Mg}	0.573	0.571	0.471	0.580	0.442	0.416	0.547	0.508	0.564	0.777	0.783	0.781	0.771	0.779

	76022B F2 Amp	76022B F2 Amp	76022B F2 Amp	76022B F1 Amp	76022B F1 Amp	76022B F1 Amp	76022B F1 Amp	76022B F1 Amp	76022B F1 Amp	760027B F1 Amp	760027B F1 Amp	760027B F1 Amp	760027B F1 Amp	760027B F2 Amp
Analysis														
SiO_2	55.10	57.10	56.79	57.24	57.46	57.05	56.92	57.00	57.12	55.11	55.23	55.57	55.29	56.26
TiO_2	2.94	0.00	0.05	0.04	0.01	0.00	0.00	0.00	0.01	0.05	0.04	0.04	0.10	0.16
Al_2O_3	0.72	0.73	0.74	0.82	0.67	0.63	0.70	0.81	0.91	2.57	1.66	1.65	2.79	2.58
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.37	4.08	9.59	14.01	13.25
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	16.38	17.28	17.86	17.59	17.39	17.44	17.80	17.40	17.63	12.28	14.16	11.74	9.37	9.88
CaO	14.11	13.11	13.11	13.08	12.93	13.12	13.07	12.91	12.83	5.88	9.40	5.24	1.24	1.19
MnO	0.16	0.21	0.20	0.17	0.20	0.19	0.23	0.20	0.19	0.23	0.33	0.26	0.20	0.14
FeO	8.28	9.43	9.28	9.36	9.18	9.05	8.97	9.54	9.47	9.83	10.77	9.93	8.14	8.18
Na_2O	0.15	0.12	0.10	0.18	0.21	0.20	0.17	0.18	0.20	3.96	2.07	4.41	6.76	6.82
K_2O	0.01	0.02	0.00	0.02	0.04	0.02	0.04	0.02	0.02	0.14	0.18	0.12	0.06	0.07
Total	97.84	98.00	98.11	98.49	98.08	97.70	97.90	98.05	98.38	97.41	97.91	98.53	97.95	98.52
Cations														
Si	7.792	8.033	7.982	8.009	8.060	8.040	8.007	8.016	8.002	7.918	7.908	7.942	7.931	7.993
Ti	0.313	0.000	0.005	0.004	0.001	0.000	0.000	0.000	0.001	0.005	0.004	0.004	0.010	0.017
Al	0.119	0.120	0.122	0.136	0.110	0.105	0.116	0.135	0.150	0.436	0.280	0.278	0.471	0.432
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.796	0.440	1.032	1.512	1.416
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	3.454	3.624	3.741	3.669	3.637	3.663	3.733	3.648	3.682	2.629	3.022	2.502	2.005	2.093
Ca	2.138	1.976	1.974	1.960	1.943	1.981	1.970	1.945	1.926	0.906	1.442	0.802	0.190	0.180
Mn	0.019	0.025	0.024	0.020	0.024	0.023	0.028	0.024	0.023	0.028	0.040	0.031	0.024	0.016
Fe^{2+}	0.980	1.110	1.091	1.095	1.077	1.066	1.055	1.123	1.110	1.181	1.289	1.187	0.977	0.972
Na	0.040	0.032	0.026	0.049	0.056	0.054	0.047	0.048	0.054	1.102	0.575	1.223	1.879	1.880
K	0.002	0.004	0.000	0.003	0.006	0.003	0.006	0.003	0.003	0.025	0.032	0.021	0.012	0.013
Total	14.857	14.925	14.965	14.944	14.915	14.936	14.962	14.942	14.950	15.025	15.032	15.021	15.012	15.013
%Fe^{2+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	40.281	25.439	46.502	60.766	59.292
X_{Mg}	0.779	0.766	0.774	0.770	0.772	0.775	0.780	0.765	0.768	0.690	0.701	0.678	0.672	0.683

	760027B F2 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F1 Amp	76027D F2 Amp	76027D F2 Amp	76027D F2 Amp
Analysis														
SiO_2	56.49	55.02	55.17	55.06	54.78	54.03	54.84	54.58	54.82	54.57	54.43	54.83	55.81	54.67
TiO_2	0.05	0.03	0.08	0.08	0.04	0.02	0.01	0.07	0.10	0.08	0.13	0.05	0.00	0.05
Al_2O_3	2.39	1.48	2.48	1.79	1.42	1.75	2.04	1.47	2.82	2.51	2.09	5.09	4.88	3.02
Fe_2O_3	13.54	8.59	14.47	9.17	10.16	9.44	12.99	12.74	16.12	12.86	16.47	9.78	12.40	15.75
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	9.74	12.90	9.06	12.30	12.10	12.46	10.76	10.80	8.86	10.36	8.99	7.89	8.02	8.50
CaO	1.59	7.20	1.36	6.63	6.05	7.51	3.91	3.97	0.85	3.80	1.12	0.39	0.42	0.89
MnO	0.19	0.36	0.25	0.32	0.39	0.39	0.32	0.28	0.22	0.31	0.23	0.16	0.12	0.20
FeO	8.42	9.56	8.66	9.24	8.96	8.79	8.30	8.19	7.08	7.99	7.22	11.13	9.30	7.69
Na_2O	6.74	3.35	6.69	3.84	4.05	3.36	5.31	5.27	7.16	5.52	6.93	6.88	7.36	7.14
K_2O	0.08	0.16	0.06	0.15	0.14	0.18	0.11	0.11	0.05	0.14	0.07	0.24	0.04	0.10
Total	99.22	98.64	98.28	98.56	98.08	97.94	98.58	97.48	98.08	98.13	97.68	96.44	98.34	98.00
Cations														
Si	7.992	7.861	7.925	7.866	7.877	7.790	7.854	7.903	7.872	7.840	7.877	7.971	7.939	7.872
Ti	0.006	0.003	0.009	0.008	0.004	0.002	0.001	0.007	0.010	0.008	0.014	0.005	0.000	0.005
Al	0.398	0.249	0.420	0.302	0.241	0.297	0.344	0.250	0.478	0.424	0.357	0.872	0.818	0.513
Fe^{3+}	1.441	0.923	1.564	0.985	1.100	1.024	1.399	1.388	1.742	1.390	1.794	1.070	1.327	1.706
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	2.054	2.747	1.940	2.619	2.593	2.678	2.297	2.331	1.896	2.219	1.939	1.709	1.701	1.824
Ca	0.242	1.102	0.209	1.014	0.933	1.160	0.599	0.616	0.130	0.585	0.173	0.061	0.064	0.137
Mn	0.023	0.044	0.030	0.038	0.047	0.048	0.039	0.034	0.027	0.037	0.028	0.020	0.014	0.025
Fe^{2+}	0.996	1.142	1.041	1.104	1.077	1.060	0.994	0.992	0.851	0.960	0.874	1.353	1.107	0.926
Na	1.848	0.929	1.862	1.062	1.128	0.940	1.473	1.479	1.994	1.536	1.944	1.939	2.030	1.992
K	0.014	0.029	0.010	0.026	0.025	0.033	0.021	0.021	0.008	0.026	0.012	0.045	0.007	0.018
Total	15.014	15.029	15.010	15.026	15.025	15.033	15.021	15.021	15.008	15.026	15.012	15.045	15.007	15.018
%Fe^{2+}	59.143	44.701	60.043	47.154	50.512	49.157	58.465	58.325	67.189	59.144	67.226	44.169	54.530	64.826
X_{Mg}	0.674	0.706	0.651	0.703	0.706	0.716	0.698	0.701	0.690	0.698	0.689	0.558	0.606	0.663

	76027D F4 Amp	76027D F4 Amp	76027D F4 Amp	76027D F4 Amp	76027D F4 Amp2	76027D F4 Amp2	76045G F2 Amp6	76045G F2 Amp7	76045G F2 Amp8	76045G F2 Amp9	76045G F2 Amp10	76045G F3 Amp1	76045G F3 Amp2	76045G F3 Amp3
Analysis														
SiO_2	57.85	55.10	54.88	54.91	54.22	53.85	51.51	52.34	39.93	39.75	40.37	48.69	51.36	51.79
TiO_2	0.11	0.12	0.10	0.12	0.02	0.00	0.02	0.01	1.50	1.54	1.51	0.12	0.06	0.09
Al_2O_3	8.40	4.90	5.23	3.77	4.82	2.91	3.31	1.81	13.09	12.88	13.06	6.32	2.59	2.86
Fe_2O_3	8.26	13.88	11.65	14.74	14.57	14.54	0.01	0.00	0.21	0.30	0.23	0.01	0.00	0.00
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.00	0.01	0.06
MgO	6.60	8.34	8.44	8.90	8.08	9.81	10.64	10.66	6.80	6.93	6.88	9.40	10.98	10.85
CaO	0.97	0.80	1.01	1.16	0.90	2.75	11.64	11.83	11.24	11.26	11.12	11.73	11.89	12.04
MnO	0.16	0.19	0.22	0.20	0.18	0.31	0.60	0.63	0.57	0.61	0.69	0.71	0.58	0.60
FeO	8.46	8.04	8.70	7.09	7.63	7.42	18.71	19.23	19.37	18.86	18.99	18.86	18.27	18.37
Na_2O	8.42	7.22	6.94	7.08	7.17	5.93	0.57	0.31	1.60	1.49	1.40	0.65	0.30	0.46
K_2O	0.03	0.02	0.03	0.04	0.05	0.10	0.23	0.19	1.65	1.68	1.64	0.49	0.24	0.22
Total	99.26	98.62	97.21	97.99	97.64	97.62	97.25	97.01	95.96	95.33	95.91	96.97	96.26	97.33
Cations														
Si	8.001	7.827	7.880	7.855	7.795	7.784	7.687	7.842	6.250	6.255	6.298	7.337	7.736	7.717
Ti	0.011	0.013	0.011	0.012	0.002	0.000	0.002	0.001	0.177	0.182	0.177	0.013	0.007	0.010
Al	1.370	0.821	0.884	0.635	0.817	0.495	0.583	0.319	2.414	2.389	2.401	1.123	0.460	0.502
Fe^{3+}	0.860	1.484	1.259	1.586	1.577	1.582	0.001	0.000	0.025	0.036	0.027	0.001	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.002	0.000	0.001	0.007
Mg	1.360	1.767	1.807	1.899	1.732	2.114	2.368	2.382	1.586	1.626	1.600	2.111	2.465	2.410
Ca	0.143	0.121	0.155	0.177	0.138	0.426	1.861	1.900	1.885	1.899	1.859	1.893	1.918	1.922
Mn	0.019	0.023	0.027	0.024	0.022	0.038	0.076	0.079	0.076	0.082	0.091	0.091	0.073	0.075
Fe^{2+}	0.978	0.955	1.044	0.849	0.917	0.897	2.335	2.410	2.535	2.482	2.478	2.377	2.301	2.289
Na	2.259	1.989	1.931	1.963	1.999	1.663	0.165	0.090	0.487	0.455	0.425	0.189	0.086	0.132
K	0.005	0.003	0.006	0.007	0.010	0.018	0.043	0.036	0.329	0.338	0.326	0.093	0.046	0.042
Total	15.005	15.003	15.006	15.007	15.010	15.018	15.123	15.059	15.762	15.746	15.686	15.229	15.093	15.106
%Fe^{2+}	46.772	60.853	54.662	65.148	63.222	63.808	2.324	0.000	9.382	11.273	9.913	2.119	0.151	0.000
X_{Mg}	0.582	0.649	0.634	0.691	0.654	0.702	0.503	0.497	0.385	0.396	0.392	0.470	0.517	0.513

	76045G F3 Amp4	76045G F3 Amp5	76045G F3 Amp6	76045G F3 Amp7	76045G F3 Amp8	76045G F3 Amp9	76045G F3 Amp10	76045G F3 Amp11	76045G F3 Amp12	76045G F3 Amp13	76046A F1 Amp1	76046A F1 Amp2	76046A F1 Amp3	76046A F1 Amp4
Analysis														
SiO_2	41.04	40.69	40.75	40.24	40.33	40.46	40.90	52.48	52.66	51.47	40.57	40.85	41.40	40.92
TiO_2	1.23	1.30	1.36	1.51	1.44	1.37	1.51	0.13	0.95	0.80	2.51	2.07	2.09	2.04
Al_2O_3	12.53	12.56	13.06	13.17	13.20	13.65	13.11	2.54	1.77	2.50	13.15	13.18	13.25	13.21
Fe_2O_3	0.09	0.23	0.13	0.20	0.09	0.33	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Cr_2O_3	0.00	0.02	0.01	0.02	0.02	0.01	0.03	0.00	0.02	0.03	0.00	0.00	0.00	0.00
MgO	6.67	6.82	6.71	6.66	6.39	6.35	6.24	10.87	10.60	9.22	5.10	5.18	5.06	4.96
CaO	11.16	11.07	11.04	11.19	11.10	9.94	11.07	11.99	11.93	11.60	10.94	11.26	11.32	11.27
MnO	0.67	0.73	0.71	0.69	0.66	0.55	0.76	0.59	0.61	0.61	0.40	0.38	0.41	0.35
FeO	20.19	19.49	19.86	19.60	19.96	19.16	20.32	17.95	18.21	18.71	22.42	22.75	22.97	22.69
Na_2O	1.61	1.46	1.65	1.50	1.41	1.29	1.41	0.35	0.31	0.48	1.57	1.58	1.66	1.67
K_2O	1.59	1.71	1.73	1.74	1.79	2.27	1.74	0.19	0.18	0.23	1.33	1.38	1.34	1.38
Total	96.77	96.06	96.99	96.53	96.37	95.36	97.19	97.08	97.24	95.64	98.04	98.64	99.50	98.49
Cations														
Si	6.373	6.356	6.311	6.264	6.291	6.341	6.328	7.804	7.832	7.811	6.263	6.278	6.303	6.296
Ti	0.144	0.153	0.159	0.177	0.169	0.161	0.175	0.015	0.106	0.092	0.292	0.239	0.239	0.237
Al	2.293	2.312	2.383	2.416	2.426	2.521	2.391	0.444	0.310	0.447	2.393	2.388	2.378	2.395
Fe^{3+}	0.010	0.026	0.015	0.024	0.010	0.039	0.010	0.000	0.000	0.000	0.003	0.000	0.000	0.000
Cr	0.000	0.002	0.001	0.003	0.002	0.001	0.004	0.000	0.003	0.003	0.000	0.000	0.000	0.000
Mg	1.545	1.588	1.548	1.545	1.487	1.482	1.439	2.410	2.350	2.087	1.174	1.186	1.149	1.137
Ca	1.856	1.852	1.831	1.867	1.855	1.668	1.835	1.910	1.901	1.886	1.809	1.854	1.847	1.857
Mn	0.088	0.097	0.092	0.091	0.087	0.072	0.100	0.074	0.077	0.079	0.053	0.049	0.052	0.045
Fe^{2+}	2.622	2.545	2.572	2.552	2.604	2.510	2.629	2.233	2.265	2.375	2.895	2.924	2.925	2.920
Na	0.484	0.441	0.495	0.454	0.425	0.392	0.424	0.100	0.089	0.140	0.471	0.471	0.489	0.498
K	0.314	0.340	0.342	0.346	0.355	0.454	0.344	0.037	0.035	0.044	0.262	0.271	0.261	0.270
Total	15.731	15.712	15.750	15.738	15.711	15.641	15.678	15.027	14.967	14.964	15.614	15.660	15.644	15.654
%Fe^{2+}	5.992	9.690	7.319	9.159	6.134	11.691	5.992	0.000	0.000	0.000	3.280	1.203	0.000	0.000
X_{Mg}	0.371	0.384	0.376	0.377	0.363	0.371	0.354	0.519	0.509	0.468	0.288	0.289	0.282	0.280

	76046A F1 Amp5	76046A F1 Amp6	76046A F1 Amp7	76046A F1 Amp8	76046A F1 Amp9	76046A F1 Amp10	76046A F1 Amp11	76046A F1 Amp12	76046A F1 Amp13	76046A F1 Amp14	76046A F1 Amp15	76046A F1 Amp16	76046A F2 Amp1	76046A F2 Amp2
Analysis														
SiO_2	40.72	40.86	40.31	40.46	41.03	40.83	40.82	40.51	40.68	40.53	40.65	41.08	41.72	41.43
TiO_2	2.00	1.97	1.95	2.14	2.12	2.05	1.90	2.13	2.10	2.15	2.18	2.07	2.09	2.04
Al_2O_3	13.28	13.19	13.19	13.11	13.16	13.22	12.72	12.92	13.02	13.00	12.88	12.67	11.84	12.04
Fe_2O_3	0.00	0.00	0.01	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	5.00	4.99	5.00	5.07	5.06	5.05	5.22	4.99	4.88	4.97	4.85	4.69	5.58	5.70
CaO	11.39	11.25	11.32	11.23	11.39	11.37	11.04	11.38	11.24	11.31	11.31	11.37	11.20	11.20
MnO	0.42	0.40	0.44	0.51	0.38	0.42	0.50	0.46	0.43	0.40	0.50	0.51	0.42	0.45
FeO	23.03	22.80	22.92	22.92	23.02	23.15	22.57	23.21	23.41	23.37	23.29	23.79	22.74	22.58
Na_2O	1.73	1.55	1.62	1.64	1.65	1.64	1.65	1.61	1.68	1.65	1.55	1.58	1.66	1.80
K_2O	1.33	1.39	1.34	1.42	1.38	1.38	1.33	1.33	1.39	1.43	1.36	1.28	1.27	1.25
Total	98.91	98.41	98.08	98.53	99.19	99.12	97.78	98.54	98.82	98.80	98.58	99.05	98.52	98.50
Cations														
Si	6.255	6.295	6.247	6.244	6.278	6.260	6.327	6.257	6.266	6.248	6.275	6.318	6.413	6.373
Ti	0.231	0.228	0.227	0.248	0.244	0.237	0.221	0.247	0.243	0.250	0.253	0.240	0.242	0.236
Al	2.405	2.396	2.409	2.385	2.373	2.389	2.324	2.352	2.364	2.362	2.344	2.298	2.145	2.183
Fe^{3+}	0.000	0.000	0.001	0.003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.144	1.146	1.156	1.167	1.153	1.154	1.207	1.150	1.120	1.142	1.117	1.076	1.279	1.306
Ca	1.875	1.857	1.879	1.858	1.867	1.868	1.834	1.882	1.855	1.868	1.871	1.873	1.845	1.847
Mn	0.055	0.053	0.057	0.067	0.050	0.055	0.065	0.060	0.056	0.052	0.065	0.067	0.054	0.058
Fe^{2+}	2.958	2.937	2.970	2.959	2.946	2.968	2.926	2.998	3.017	3.013	3.007	3.060	2.924	2.905
Na	0.516	0.462	0.485	0.490	0.490	0.487	0.495	0.482	0.500	0.494	0.465	0.472	0.494	0.537
K	0.260	0.273	0.265	0.279	0.269	0.270	0.262	0.261	0.274	0.281	0.269	0.251	0.248	0.246
Total	15.699	15.647	15.697	15.698	15.671	15.688	15.667	15.691	15.695	15.708	15.666	15.655	15.644	15.691
%Fe^{2+}	0.000	0.000	1.676	3.003	0.000	0.454	3.835	0.921	1.066	1.095	0.000	0.000	0.000	0.746
X_{Mg}	0.279	0.281	0.280	0.283	0.281	0.280	0.292	0.277	0.271	0.275	0.271	0.260	0.304	0.310

	76046A F2 Amp3	76046A F2 Amp4	76046A F2 Amp5	76046A F2 Amp6	76046A F2 Amp7	76046A F2 Amp8	76046A F2 Amp9	76046A F2 Amp10	76046A F2 Amp11	76046A F2 Amp12	76053A F3 Amp1	76053A F3 Amp2	76053A F3 Amp3	76053A F3 Amp4
Analysis														
SiO_2	41.42	41.13	41.62	40.63	40.68	40.82	40.19	41.13	40.90	41.78	53.38	53.02	52.62	47.04
TiO_2	2.04	2.01	2.13	2.03	2.04	2.21	2.20	2.26	2.13	2.07	0.00	0.04	0.04	0.04
Al_2O_3	12.65	12.80	12.74	12.81	13.04	13.25	13.25	13.02	12.67	12.30	1.68	2.07	2.49	6.28
Fe_2O_3	0.00	0.01	0.00	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.12	0.09	0.07	0.88
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.06
MgO	5.78	5.90	5.78	5.89	5.71	5.87	5.82	5.78	5.79	5.95	14.55	13.53	13.21	12.31
CaO	11.31	11.31	11.29	11.32	11.20	11.31	11.34	11.42	11.25	11.24	11.73	11.53	11.62	8.79
MnO	0.39	0.34	0.32	0.33	0.40	0.30	0.32	0.30	0.30	0.35	0.24	0.33	0.35	0.35
FeO	22.28	21.98	22.22	21.89	21.90	21.86	21.98	22.34	21.98	22.10	14.25	14.81	15.29	14.53
Na_2O	1.75	1.72	1.60	1.66	1.68	1.67	1.84	1.70	1.66	1.68	0.24	0.62	0.72	0.61
K_2O	1.31	1.28	1.32	1.38	1.40	1.38	1.40	1.38	1.35	1.30	0.03	0.09	0.12	0.12
Total	98.94	98.48	99.02	97.96	98.07	98.67	98.34	99.32	98.03	98.75	96.21	96.15	96.54	91.01
Cations														
Si	6.329	6.307	6.343	6.272	6.272	6.247	6.192	6.265	6.305	6.383	7.846	7.831	7.768	7.350
Ti	0.235	0.232	0.244	0.236	0.237	0.254	0.255	0.259	0.247	0.238	0.000	0.004	0.004	0.005
Al	2.279	2.313	2.288	2.332	2.370	2.389	2.407	2.338	2.303	2.214	0.290	0.361	0.432	1.157
Fe^{3+}	0.000	0.001	0.000	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.013	0.010	0.008	0.104
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.007
Mg	1.317	1.349	1.312	1.356	1.311	1.338	1.336	1.313	1.330	1.355	3.188	2.979	2.907	2.867
Ca	1.852	1.859	1.843	1.872	1.849	1.854	1.873	1.863	1.858	1.839	1.848	1.824	1.838	1.472
Mn	0.051	0.044	0.042	0.043	0.053	0.039	0.042	0.039	0.039	0.045	0.029	0.042	0.043	0.046
Fe^{2+}	2.847	2.819	2.832	2.827	2.824	2.798	2.832	2.846	2.834	2.823	1.752	1.829	1.888	1.899
Na	0.519	0.510	0.472	0.497	0.501	0.494	0.549	0.502	0.497	0.497	0.069	0.177	0.205	0.185
K	0.255	0.249	0.256	0.272	0.276	0.269	0.275	0.268	0.266	0.252	0.005	0.017	0.023	0.024
Total	15.684	15.684	15.633	15.709	15.694	15.685	15.761	15.692	15.678	15.647	15.040	15.076	15.120	15.116
%Fe^{2+}	0.024	2.254	1.190	2.868	2.892	2.941	2.048	0.493	0.139	0.364	8.193	7.275	6.263	20.787
X_{Mg}	0.316	0.324	0.317	0.324	0.317	0.324	0.321	0.316	0.319	0.324	0.645	0.620	0.606	0.602

	76053A F2 Amp1	76053A F2 Amp2	76053A F2 Amp3	76053A F2 Amp4	76053A F2 Amp5	76053A F1 Amp1	76053A F1 Amp2	76057A F1 Amp1	76057A F1 Amp2	76057A F1 Amp3	76057A F1 Amp21	76057A F1 Amp22	76057A F2 Amp1	76057A F2 Amp2
Analysis														
SiO_2	50.91	53.34	50.75	52.36	53.84	52.14	52.11	51.06	48.50	49.60	50.04	50.04	49.02	49.53
TiO_2	0.09	0.03	0.09	0.05	0.04	0.04	0.04	0.07	0.15	0.13	0.10	0.11	0.11	0.11
Al_2O_3	5.52	2.58	5.37	3.27	2.02	3.34	3.47	5.07	7.01	6.20	5.69	5.75	6.28	7.04
Fe_2O_3	0.18	0.06	0.27	0.11	0.04	0.12	0.08	9.35	11.88	11.36	10.76	11.10	12.91	11.04
Cr_2O_3	0.01	0.01	0.03	0.07	0.01	0.06	0.01	0.01	0.02	0.05	0.01	0.00	0.01	0.02
MgO	11.60	12.53	11.30	12.49	12.86	12.34	12.29	11.03	9.87	10.47	10.59	10.70	10.09	9.51
CaO	10.25	11.14	9.55	10.70	11.40	10.82	10.59	8.16	8.31	8.26	8.19	8.30	8.06	7.49
MnO	0.33	0.37	0.42	0.33	0.37	0.41	0.38	0.37	0.30	0.34	0.36	0.40	0.32	0.26
FeO	15.59	15.95	15.73	15.22	16.15	15.52	15.27	9.30	8.09	8.11	8.76	8.35	7.47	8.87
Na_2O	1.55	0.84	1.91	1.05	0.68	1.01	1.20	2.89	3.00	2.99	2.95	2.93	3.19	3.44
K_2O	0.21	0.10	0.18	0.11	0.08	0.12	0.11	0.19	0.36	0.24	0.28	0.22	0.25	0.32
Total	96.24	96.94	95.60	95.77	97.49	95.93	95.55	97.48	97.49	97.75	97.72	97.90	97.72	97.63
Cations														
Si	7.546	7.839	7.578	7.771	7.873	7.746	7.756	7.435	7.113	7.229	7.300	7.281	7.166	7.231
Ti	0.010	0.003	0.010	0.005	0.004	0.004	0.004	0.007	0.016	0.014	0.011	0.012	0.012	0.012
Al	0.965	0.448	0.946	0.572	0.348	0.585	0.609	0.870	1.212	1.064	0.978	0.986	1.082	1.211
Fe^{3+}	0.020	0.006	0.031	0.012	0.005	0.014	0.009	1.024	1.311	1.246	1.181	1.215	1.420	1.213
Cr	0.002	0.001	0.003	0.008	0.001	0.007	0.002	0.001	0.002	0.005	0.001	0.000	0.001	0.003
Mg	2.564	2.745	2.515	2.764	2.804	2.732	2.727	2.395	2.158	2.275	2.303	2.322	2.199	2.070
Ca	1.628	1.754	1.528	1.702	1.787	1.723	1.689	1.274	1.306	1.290	1.281	1.294	1.263	1.172
Mn	0.042	0.045	0.053	0.042	0.045	0.052	0.047	0.045	0.037	0.042	0.044	0.049	0.040	0.033
Fe^{2+}	1.933	1.960	1.964	1.889	1.975	1.928	1.901	1.132	0.993	0.989	1.069	1.016	0.913	1.083
Na	0.446	0.238	0.554	0.302	0.192	0.291	0.347	0.815	0.852	0.845	0.833	0.827	0.905	0.973
K	0.039	0.019	0.035	0.021	0.015	0.023	0.021	0.035	0.068	0.044	0.052	0.042	0.046	0.060
Total	15.194	15.058	15.216	15.088	15.050	15.104	15.113	15.035	15.068	15.044	15.052	15.042	15.046	15.060
%Fe^{2+}	9.643	5.588	11.778	7.803	4.780	8.079	6.731	47.491	56.911	55.759	52.487	54.457	60.870	52.816
X_{Mg}	0.570	0.583	0.561	0.594	0.587	0.586	0.589	0.679	0.685	0.697	0.683	0.696	0.707	0.656

	76057A F2 Amp3	76057A F2 Amp4	76111A F5 Amp2	76111A F5 Amp3	76111A F5 Amp4	76111A F5 Amp5	76111A F5 Amp6	76111A F5 Amp7	76111A F5 Amp8	76111A F5 Amp9	76111A F5 Amp10	76111A F5 Amp11	76111A F5 Amp12	76111A F5 Amp13
Analysis														
SiO_2	50.68	50.66	42.50	42.36	41.70	42.09	42.14	42.16	42.34	42.52	42.46	42.32	42.76	42.71
TiO_2	0.10	0.09	0.77	0.81	0.66	0.78	0.80	0.83	0.74	0.79	0.74	0.74	0.73	0.76
Al_2O_3	5.10	4.71	14.72	15.05	15.53	15.24	14.97	14.79	15.09	15.02	14.62	14.93	14.51	14.64
Fe_2O_3	10.89	10.01	0.01	0.04	0.44	0.11	0.12	0.09	0.02	0.07	0.09	0.05	0.03	0.08
Cr_2O_3	0.01	0.00	0.03	0.02	0.06	0.03	0.01	0.01	0.03	0.03	0.04	0.06	0.06	0.03
MgO	11.20	11.65	9.02	9.05	8.98	9.38	9.30	9.33	9.18	9.40	9.83	9.69	9.78	9.93
CaO	8.43	8.91	11.78	11.55	10.42	11.38	11.32	11.56	11.76	11.48	11.31	11.49	11.57	11.55
MnO	0.37	0.29	0.08	0.07	0.15	0.12	0.09	0.07	0.09	0.10	0.08	0.06	0.09	0.07
FeO	8.49	8.46	14.59	14.37	12.66	13.62	13.86	13.98	14.26	13.77	13.15	13.25	13.50	13.13
Na_2O	2.83	2.55	1.42	1.63	1.34	1.73	1.68	1.54	1.57	1.67	1.81	1.72	1.71	1.59
K_2O	0.21	0.22	0.04	0.03	0.09	0.04	0.05	0.03	0.05	0.03	0.03	0.03	0.04	0.03
Total	98.30	97.55	94.96	94.98	92.03	94.51	94.34	94.39	95.12	94.89	94.16	94.35	94.78	94.52
Cations														
Si	7.339	7.378	6.432	6.403	6.436	6.377	6.401	6.405	6.392	6.415	6.440	6.410	6.453	6.448
Ti	0.011	0.010	0.088	0.092	0.077	0.089	0.092	0.095	0.084	0.089	0.085	0.084	0.083	0.086
Al	0.870	0.809	2.626	2.681	2.825	2.722	2.680	2.648	2.684	2.670	2.613	2.665	2.581	2.606
Fe^{3+}	1.186	1.097	0.001	0.005	0.051	0.013	0.014	0.011	0.002	0.008	0.010	0.006	0.003	0.010
Cr	0.001	0.000	0.004	0.002	0.007	0.004	0.001	0.001	0.003	0.003	0.005	0.007	0.007	0.003
Mg	2.418	2.529	2.034	2.040	2.065	2.117	2.106	2.112	2.066	2.115	2.223	2.188	2.199	2.234
Ca	1.307	1.390	1.911	1.871	1.723	1.847	1.842	1.882	1.902	1.856	1.838	1.865	1.871	1.869
Mn	0.046	0.035	0.010	0.009	0.020	0.015	0.012	0.009	0.012	0.013	0.010	0.008	0.012	0.009
Fe^{2+}	1.028	1.031	1.846	1.816	1.635	1.725	1.760	1.776	1.800	1.737	1.669	1.679	1.704	1.658
Na	0.795	0.721	0.415	0.478	0.401	0.507	0.494	0.454	0.459	0.489	0.531	0.506	0.500	0.465
K	0.038	0.040	0.007	0.006	0.017	0.008	0.010	0.006	0.009	0.007	0.006	0.006	0.007	0.006
Total	15.038	15.040	15.376	15.403	15.256	15.422	15.412	15.400	15.413	15.403	15.430	15.424	15.421	15.392
%Fe^{2+}	53.583	51.551	2.774	5.075	16.202	8.217	8.565	7.505	3.586	6.674	7.544	5.860	4.226	7.315
X_{Mg}	0.702	0.710	0.524	0.529	0.558	0.551	0.545	0.543	0.534	0.549	0.571	0.566	0.563	0.574

	76111A F5 Amp14	76111A F5 Amp15	76111A F5 Amp16	76111A F5 Amp17	76111A F5 Amp18	76111A F5 Amp19	76111A F5 Amp21	76111A F5 Amp22	76111A F5 Amp23	76111A F5 Amp25	76111A F5 Amp27	76163F F2 Amp L1	76163F F2 Amp L2	76163F F2 Amp L3
Analysis														
SiO_2	42.02	42.79	42.97	42.90	42.40	42.19	44.43	43.14	42.35	43.07	42.71	46.31	45.40	45.88
TiO_2	0.78	0.76	0.71	0.78	0.69	0.72	0.56	0.70	0.78	0.75	0.77	0.76	0.72	0.70
Al_2O_3	15.07	14.19	14.29	14.43	14.61	15.25	12.11	14.47	14.99	14.63	14.04	12.18	13.67	11.80
Fe_2O_3	0.08	0.13	0.04	0.08	0.04	0.08	0.02	0.14	0.08	0.06	0.04	2.39	2.86	1.79
Cr_2O_3	0.01	0.01	0.00	0.00	0.02	0.01	0.02	0.00	0.06	0.05	0.04	0.00	0.00	0.00
MgO	9.77	10.13	9.99	9.89	9.58	9.13	10.38	10.32	9.87	10.05	9.54	10.27	9.93	10.29
CaO	11.70	11.32	11.55	11.38	11.53	11.68	11.82	11.54	11.50	11.73	11.60	11.36	11.18	11.73
MnO	0.07	0.08	0.01	0.04	0.10	0.08	0.11	0.04	0.05	0.06	0.14	0.11	0.09	0.17
FeO	13.29	12.77	13.22	13.14	13.48	14.21	14.42	13.08	12.96	13.25	13.79	14.11	13.31	14.54
Na_2O	1.67	1.55	1.60	1.60	1.60	1.52	1.60	1.70	1.69	1.58	1.45	1.15	0.97	1.04
K_2O	0.04	0.06	0.04	0.06	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.43	0.48	0.64
Total	94.50	93.79	94.43	94.30	94.11	94.91	95.50	95.15	94.37	95.26	94.15	99.07	98.60	98.57
Cations														
Si	6.363	6.496	6.492	6.486	6.445	6.380	6.679	6.466	6.404	6.453	6.496	6.709	6.588	6.708
Ti	0.089	0.087	0.081	0.089	0.079	0.082	0.063	0.078	0.088	0.085	0.088	0.083	0.078	0.077
Al	2.689	2.539	2.544	2.571	2.618	2.717	2.145	2.556	2.672	2.583	2.517	2.079	2.337	2.034
Fe^{3+}	0.009	0.015	0.005	0.009	0.005	0.009	0.002	0.016	0.009	0.007	0.005	0.261	0.312	0.197
Cr	0.002	0.001	0.000	0.000	0.002	0.001	0.002	0.000	0.007	0.005	0.004	0.000	0.000	0.000
Mg	2.207	2.293	2.251	2.229	2.170	2.057	2.326	2.306	2.225	2.245	2.163	2.219	2.148	2.242
Ca	1.899	1.841	1.870	1.843	1.877	1.892	1.904	1.853	1.862	1.883	1.889	1.764	1.738	1.837
Mn	0.009	0.010	0.002	0.006	0.013	0.010	0.013	0.004	0.007	0.008	0.018	0.014	0.012	0.020
Fe^{2+}	1.684	1.622	1.671	1.662	1.714	1.797	1.813	1.640	1.639	1.661	1.754	1.710	1.615	1.778
Na	0.490	0.457	0.469	0.469	0.472	0.446	0.465	0.494	0.495	0.460	0.428	0.322	0.273	0.294
K	0.007	0.011	0.007	0.011	0.011	0.008	0.009	0.005	0.006	0.006	0.006	0.080	0.088	0.120
Total	15.447	15.373	15.391	15.375	15.405	15.401	15.420	15.419	15.415	15.397	15.370	15.239	15.190	15.307
%Fe^{2+}	6.956	9.121	5.290	7.240	5.066	6.901	3.346	9.401	7.207	6.331	5.028	13.226	16.186	9.984
X_{Mg}	0.567	0.586	0.574	0.573	0.559	0.534	0.562	0.584	0.576	0.575	0.552	0.565	0.571	0.558

	76163F F2 Amp L4	76163F F2 Amp L5	76163F F2 Amp L6	76163F F2 Amp L7	76163F F2 Amp L8	76163F F2 Amp L9	76163F F2 Amp L10	76163F F2 Amp L11	76163F F2 Amp L12	76163F F2 Amp L13	76163F F2 Amp L14	76163F F2 Amp L15	76163F F4 Amp L1	76163F F4 Amp L2
Analysis														
SiO_2	46.29	46.11	46.24	46.32	46.40	46.51	46.44	46.41	46.43	46.33	46.73	46.59	46.02	46.39
TiO_2	0.81	0.83	0.83	0.90	0.87	0.89	0.90	0.88	0.88	0.89	0.86	0.90	0.69	0.78
Al_2O_3	11.76	11.44	11.93	11.76	11.60	11.44	11.38	11.63	11.64	11.58	11.40	11.35	12.81	11.84
Fe_2O_3	2.53	2.87	2.34	3.44	2.33	2.80	3.70	2.98	3.13	3.59	2.49	3.53	2.31	3.28
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	10.45	10.42	10.47	10.45	10.48	10.58	10.77	10.70	10.77	10.68	10.80	10.92	10.18	10.62
CaO	11.42	11.08	11.50	11.12	11.40	11.29	10.85	11.25	11.26	10.96	11.42	11.22	11.52	11.03
MnO	0.15	0.19	0.14	0.16	0.06	0.10	0.16	0.12	0.09	0.09	0.09	0.14	0.09	0.09
FeO	14.11	13.80	14.26	13.81	14.29	13.96	13.51	13.64	13.54	13.42	13.69	13.35	14.11	13.43
Na_2O	1.14	1.17	1.26	1.09	1.19	1.09	1.14	1.10	1.08	1.13	1.01	1.02	1.10	1.06
K_2O	0.45	0.46	0.46	0.46	0.48	0.44	0.47	0.48	0.45	0.48	0.44	0.42	0.52	0.46
Total	99.09	98.38	99.42	99.50	99.08	99.10	99.32	99.20	99.26	99.14	98.93	99.43	99.35	98.97
Cations														
Si	6.715	6.735	6.691	6.693	6.732	6.739	6.716	6.715	6.710	6.707	6.766	6.722	6.652	6.717
Ti	0.088	0.091	0.091	0.098	0.094	0.097	0.097	0.096	0.096	0.096	0.094	0.098	0.075	0.085
Al	2.010	1.969	2.035	2.002	1.983	1.955	1.940	1.982	1.983	1.975	1.946	1.930	2.182	2.020
Fe^{3+}	0.276	0.316	0.255	0.374	0.255	0.305	0.403	0.325	0.340	0.391	0.271	0.383	0.251	0.357
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	2.259	2.270	2.259	2.251	2.267	2.286	2.321	2.309	2.320	2.305	2.331	2.348	2.194	2.292
Ca	1.775	1.734	1.783	1.722	1.771	1.753	1.681	1.744	1.744	1.700	1.772	1.735	1.784	1.710
Mn	0.019	0.024	0.017	0.020	0.007	0.012	0.020	0.015	0.010	0.011	0.012	0.017	0.012	0.012
Fe^{2+}	1.711	1.686	1.725	1.668	1.733	1.691	1.634	1.650	1.637	1.625	1.657	1.611	1.705	1.626
Na	0.320	0.332	0.353	0.304	0.334	0.307	0.319	0.310	0.302	0.317	0.284	0.284	0.308	0.298
K	0.083	0.086	0.085	0.084	0.088	0.082	0.086	0.088	0.083	0.088	0.081	0.077	0.096	0.085
Total	15.255	15.241	15.292	15.216	15.266	15.228	15.218	15.234	15.225	15.216	15.214	15.205	15.258	15.201
%Fe^{2+}	13.899	15.774	12.869	18.311	12.805	15.294	19.782	16.455	17.214	19.380	14.075	19.217	12.818	18.002
X_{Mg}	0.569	0.574	0.567	0.574	0.567	0.575	0.587	0.583	0.586	0.586	0.584	0.593	0.563	0.585

	76163F F4 Amp L3	76163F F4 Amp L4	76163F F4 Amp L5	76163F F4 Amp L6	76163F F4 Amp L7	76163F F4 Amp L8	76163F F4 Amp L9	76163F F4 Amp L10	76163F F4 Amp L11	76163F F4 Amp L12	76163F F4 Amp L13	76163F F4 Amp L14	76163F F4 Amp L15	76163F F4 Amp L16
Analysis														
SiO_2	46.54	46.88	47.36	46.54	46.53	46.05	46.52	46.18	46.73	46.59	46.33	46.74	46.67	46.46
TiO_2	0.79	0.82	0.83	0.92	0.95	0.96	0.98	0.97	0.95	0.88	0.79	0.86	0.86	0.91
Al_2O_3	11.36	11.31	10.60	11.09	11.19	11.84	11.31	11.46	11.40	11.42	11.86	11.30	11.18	11.34
Fe_2O_3	2.58	3.00	3.40	3.61	2.58	1.76	2.08	3.58	3.06	2.31	2.52	3.22	2.77	3.73
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	10.79	11.07	11.14	10.87	10.57	10.20	10.62	10.48	10.75	10.64	10.74	10.76	10.71	10.52
CaO	11.42	11.48	10.00	10.78	11.31	11.79	11.57	11.00	11.40	11.34	11.63	11.12	11.32	10.89
MnO	0.19	0.11	0.18	0.17	0.14	0.11	0.14	0.09	0.16	0.12	0.12	0.19	0.08	0.09
FeO	13.61	13.52	14.87	13.62	14.20	14.84	14.23	13.91	14.02	13.80	13.78	13.50	14.08	13.97
Na_2O	1.05	1.05	1.09	1.11	1.17	1.06	1.06	1.17	1.13	1.06	1.04	1.06	1.17	1.16
K_2O	0.42	0.41	0.45	0.46	0.47	0.51	0.49	0.46	0.44	0.47	0.46	0.46	0.44	0.49
Total	98.75	99.63	99.91	99.17	99.11	99.12	98.99	99.31	100.03	98.63	99.26	99.20	99.28	99.56
Cations														
Si	6.757	6.745	6.817	6.741	6.752	6.697	6.754	6.694	6.719	6.770	6.700	6.757	6.757	6.717
Ti	0.087	0.088	0.090	0.100	0.104	0.105	0.107	0.106	0.102	0.096	0.086	0.094	0.093	0.099
Al	1.943	1.918	1.798	1.894	1.914	2.029	1.935	1.957	1.932	1.956	2.021	1.925	1.907	1.932
Fe^{3+}	0.282	0.325	0.368	0.394	0.282	0.193	0.227	0.390	0.331	0.253	0.274	0.350	0.302	0.406
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	2.335	2.374	2.390	2.347	2.286	2.212	2.297	2.265	2.304	2.304	2.315	2.320	2.312	2.268
Ca	1.777	1.770	1.542	1.673	1.758	1.837	1.799	1.709	1.756	1.766	1.801	1.722	1.755	1.687
Mn	0.023	0.013	0.022	0.021	0.017	0.014	0.017	0.011	0.019	0.015	0.014	0.023	0.010	0.011
Fe^{2+}	1.653	1.628	1.790	1.649	1.724	1.805	1.728	1.686	1.686	1.677	1.666	1.632	1.705	1.689
Na	0.297	0.292	0.303	0.311	0.329	0.297	0.299	0.329	0.315	0.298	0.290	0.298	0.329	0.325
K	0.077	0.075	0.082	0.085	0.087	0.095	0.091	0.086	0.080	0.087	0.084	0.085	0.082	0.091
Total	15.231	15.228	15.203	15.214	15.254	15.284	15.254	15.233	15.245	15.221	15.253	15.204	15.251	15.223
%Fe^{2+}	14.588	16.640	17.066	19.279	14.040	9.646	11.611	18.805	16.408	13.105	14.118	17.667	15.043	19.381
X_{Mg}	0.585	0.593	0.572	0.587	0.570	0.551	0.571	0.573	0.577	0.579	0.581	0.587	0.576	0.573

	76163F F4 Amp L17	76163F F4 Amp L18	76163F F4 Amp L19	76163F F4 Amp L20	76163F F4 Amp L21	760210A F3 Amp1	760210A F3 Amp2	760210A F3 Amp3	760210A F3 Amp4	760210A F3 Amp5	760210A F3 Amp6	760210A F3 Amp7	760210A F3 Amp8	760210A F3 Amp9
Analysis														
SiO_2	46.51	46.48	46.62	46.48	46.85	54.75	52.43	54.19	53.67	54.01	55.42	54.52	52.61	52.49
TiO_2	0.91	0.95	0.93	0.89	0.82	0.04	0.03	0.06	0.01	0.02	0.03	0.05	0.05	0.05
Al_2O_3	11.44	11.41	11.33	11.39	11.53	3.52	2.95	3.74	3.69	2.42	4.46	4.61	3.87	3.95
Fe_2O_3	3.43	2.67	2.92	2.53	2.37	7.18	10.04	12.91	11.99	6.59	11.22	14.34	10.81	11.67
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.03
MgO	10.49	10.70	10.75	10.58	10.70	11.60	12.72	10.28	11.48	14.02	8.89	9.42	11.47	11.64
CaO	10.90	11.35	11.15	11.38	11.50	6.16	8.79	3.53	5.34	9.26	1.49	1.55	6.47	6.49
MnO	0.17	0.15	0.15	0.13	0.09	0.32	0.41	0.32	0.31	0.36	0.24	0.18	0.42	0.45
FeO	14.01	13.72	13.64	14.13	13.99	10.47	8.05	8.26	7.49	9.28	10.00	7.36	8.53	7.40
Na_2O	1.09	1.04	1.17	1.15	1.07	3.87	2.63	5.42	4.49	2.13	6.47	6.59	3.71	3.84
K_2O	0.47	0.47	0.44	0.46	0.41	0.10	0.12	0.06	0.09	0.09	0.05	0.04	0.14	0.13
Total	99.40	98.94	99.10	99.12	99.33	98.04	98.18	98.79	98.56	98.19	98.27	98.68	98.06	98.14
Cations														
Si	6.727	6.740	6.748	6.740	6.762	7.838	7.558	7.729	7.658	7.726	7.910	7.746	7.585	7.549
Ti	0.099	0.104	0.101	0.097	0.089	0.005	0.004	0.006	0.001	0.002	0.003	0.006	0.005	0.006
Al	1.951	1.950	1.934	1.947	1.961	0.594	0.502	0.629	0.621	0.407	0.750	0.772	0.658	0.670
Fe^{3+}	0.373	0.291	0.318	0.276	0.257	0.774	1.089	1.385	1.288	0.710	1.204	1.533	1.173	1.263
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.003
Mg	2.263	2.314	2.321	2.288	2.302	2.476	2.734	2.187	2.442	2.990	1.891	1.994	2.466	2.496
Ca	1.690	1.764	1.730	1.769	1.779	0.945	1.357	0.540	0.817	1.419	0.227	0.236	0.999	0.999
Mn	0.020	0.019	0.018	0.016	0.011	0.039	0.050	0.039	0.037	0.043	0.029	0.022	0.051	0.054
Fe^{2+}	1.694	1.664	1.651	1.713	1.689	1.254	0.970	0.985	0.894	1.111	1.193	0.874	1.028	0.890
Na	0.305	0.292	0.329	0.324	0.299	1.073	0.736	1.498	1.242	0.591	1.790	1.816	1.037	1.069
K	0.086	0.086	0.081	0.085	0.076	0.018	0.023	0.011	0.017	0.016	0.009	0.007	0.026	0.025
Total	15.208	15.224	15.230	15.256	15.227	15.018	15.023	15.011	15.016	15.016	15.009	15.007	15.026	15.025
%Fe^{2+}	18.044	14.896	16.156	13.880	13.220	38.168	52.886	58.436	59.020	38.992	50.232	63.681	53.290	58.658
X_{Mg}	0.572	0.582	0.584	0.572	0.577	0.664	0.738	0.689	0.732	0.729	0.613	0.695	0.706	0.737

	760210A F2 Amp1	760210A F2 Amp2	760210A F2 Amp3	760210A F2 Amp4	760210A F2 Amp5	760210A F2 Amp6	760210A F2 Amp7	760210A F2 Amp8	760210A F2 Amp9	760210A F1 Amp1	760210A F1 Amp2	760210A F1 Amp3	760210A F1 Amp4	760210A F1 Amp5
Analysis														
SiO_2	51.94	52.37	55.33	55.11	52.93	52.27	52.37	52.39	54.32	53.16	52.55	53.64	52.91	55.10
TiO_2	0.06	0.04	0.05	0.09	0.01	0.03	0.07	0.04	0.01	0.04	0.08	0.02	0.05	0.02
Al_2O_3	4.00	4.11	5.09	5.08	3.10	3.46	4.17	3.90	2.66	2.94	3.45	2.83	3.46	4.94
Fe_2O_3	10.44	11.03	11.35	11.25	9.08	9.84	10.51	11.77	7.75	8.78	9.46	7.31	9.91	11.76
Cr_2O_3	0.00	0.00	0.01	0.00	0.04	0.06	0.02	0.00	0.00	0.00	0.02	0.00	0.03	0.02
MgO	11.45	11.10	9.05	9.30	12.65	11.95	11.06	11.18	12.33	13.05	12.25	13.07	11.93	8.97
CaO	7.87	6.75	1.42	1.63	7.86	7.87	6.86	6.98	7.17	8.47	8.01	8.08	7.44	1.36
MnO	0.35	0.39	0.21	0.21	0.33	0.33	0.42	0.41	0.35	0.42	0.48	0.34	0.39	0.25
FeO	9.00	8.90	9.30	9.03	8.64	8.85	9.23	8.26	10.48	8.89	8.63	9.85	8.83	8.88
Na_2O	3.10	3.64	6.54	6.41	2.93	3.00	3.55	3.68	3.17	2.59	2.93	2.62	3.27	6.62
K_2O	0.20	0.16	0.01	0.04	0.12	0.16	0.14	0.15	0.05	0.12	0.11	0.09	0.13	0.03
Total	98.38	98.50	98.37	98.15	97.68	97.82	98.38	98.74	98.29	98.45	97.96	97.84	98.34	97.95
Cations														
Si	7.501	7.542	7.861	7.842	7.640	7.570	7.550	7.528	7.792	7.623	7.583	7.719	7.608	7.864
Ti	0.006	0.005	0.005	0.010	0.001	0.003	0.007	0.005	0.001	0.004	0.008	0.002	0.005	0.002
Al	0.681	0.698	0.852	0.852	0.527	0.590	0.708	0.660	0.450	0.497	0.587	0.480	0.586	0.830
Fe^{3+}	1.135	1.196	1.214	1.205	0.986	1.073	1.140	1.272	0.837	0.947	1.028	0.791	1.073	1.263
Cr	0.000	0.000	0.001	0.000	0.004	0.006	0.002	0.000	0.000	0.000	0.002	0.000	0.003	0.003
Mg	2.464	2.383	1.916	1.973	2.722	2.580	2.377	2.394	2.636	2.790	2.634	2.804	2.558	1.909
Ca	1.217	1.041	0.217	0.249	1.215	1.222	1.060	1.074	1.101	1.301	1.239	1.245	1.146	0.208
Mn	0.042	0.048	0.026	0.025	0.041	0.041	0.051	0.050	0.043	0.050	0.059	0.041	0.047	0.031
Fe^{2+}	1.087	1.072	1.106	1.075	1.043	1.072	1.113	0.993	1.257	1.066	1.042	1.185	1.062	1.060
Na	0.867	1.016	1.803	1.768	0.821	0.843	0.991	1.025	0.883	0.721	0.818	0.731	0.912	1.831
K	0.036	0.030	0.003	0.007	0.021	0.029	0.026	0.027	0.010	0.022	0.019	0.016	0.024	0.005
Total	15.036	15.030	15.003	15.007	15.021	15.029	15.026	15.027	15.010	15.022	15.019	15.016	15.024	15.005
%Fe^{2+}	51.082	52.739	52.327	52.850	48.606	50.010	50.610	56.177	39.963	47.044	49.651	40.038	50.251	54.368
X_{Mg}	0.694	0.690	0.634	0.647	0.723	0.706	0.681	0.707	0.677	0.723	0.717	0.703	0.707	0.643

	760210A F1 Amp6	760210A F1 Amp7	760210A F1 Amp8	760210A F1 Amp1	760210A F1 Amp2	760210A F1 Amp3	760210A F1 Amp4	760210A F1 Amp5	760210A F1 Amp7	760210A F1 Amp8	760210A F1 Amp9	760210A F4tg Amp1	760210A F4tg Amp2	760210A F4tg Amp3
Analysis														
SiO_2	56.36	55.31	53.95	52.86	55.87	53.78	53.47	53.67	53.32	53.56	53.63	52.34	54.07	52.77
TiO_2	0.02	0.02	0.05	0.05	0.10	0.08	0.07	0.07	0.13	0.07	0.06	0.04	0.00	0.08
Al_2O_3	5.41	4.62	4.13	6.14	5.47	4.98	5.25	4.92	3.02	2.98	2.95	3.98	2.47	3.77
Fe_2O_3	9.67	12.55	11.23	13.21	10.36	12.11	12.72	12.61	8.64	6.26	6.89	10.90	7.93	11.78
Cr_2O_3	0.03	0.03	0.01	0.00	0.00	0.01	0.04	0.03	0.04	0.00	0.02	0.01	0.01	0.00
MgO	8.92	9.29	10.39	9.47	9.14	9.78	8.56	8.96	12.93	13.28	13.56	10.89	13.33	11.28
CaO	0.89	1.63	4.12	2.18	1.49	3.19	2.57	2.75	8.21	8.84	9.01	6.61	8.40	6.41
MnO	0.16	0.23	0.36	0.29	0.18	0.26	0.29	0.20	0.42	0.35	0.42	0.37	0.40	0.40
FeO	10.25	8.21	8.52	8.08	9.29	8.37	9.28	8.85	8.42	10.15	9.14	9.13	9.15	8.19
Na_2O	6.80	6.62	5.10	5.85	6.64	5.61	5.97	5.92	2.87	2.26	2.32	3.70	2.66	3.91
K_2O	0.03	0.04	0.09	0.16	0.04	0.10	0.07	0.06	0.12	0.14	0.13	0.12	0.08	0.12
Total	98.55	98.54	97.96	98.28	98.58	98.28	98.30	98.05	98.12	97.88	98.12	98.08	98.49	98.69
Cations														
Si	7.960	7.848	7.740	7.562	7.890	7.687	7.682	7.712	7.651	7.704	7.682	7.570	7.727	7.569
Ti	0.003	0.002	0.005	0.006	0.011	0.009	0.008	0.008	0.014	0.007	0.006	0.004	0.000	0.009
Al	0.901	0.773	0.699	1.035	0.910	0.839	0.890	0.832	0.510	0.506	0.498	0.679	0.416	0.638
Fe^{3+}	1.028	1.340	1.213	1.422	1.101	1.303	1.375	1.363	0.933	0.677	0.743	1.186	0.852	1.272
Cr	0.003	0.003	0.002	0.000	0.000	0.002	0.005	0.004	0.005	0.000	0.002	0.001	0.001	0.000
Mg	1.878	1.964	2.223	2.018	1.925	2.084	1.834	1.920	2.764	2.848	2.895	2.349	2.839	2.411
Ca	0.135	0.247	0.634	0.333	0.226	0.489	0.396	0.423	1.262	1.362	1.383	1.024	1.286	0.984
Mn	0.019	0.028	0.044	0.035	0.022	0.031	0.035	0.025	0.051	0.043	0.051	0.045	0.048	0.048
Fe^{2+}	1.211	0.974	1.022	0.967	1.097	1.001	1.114	1.063	1.010	1.221	1.095	1.105	1.094	0.982
Na	1.862	1.821	1.419	1.621	1.819	1.555	1.662	1.650	0.799	0.631	0.644	1.037	0.737	1.087
K	0.005	0.007	0.016	0.029	0.007	0.018	0.014	0.011	0.022	0.026	0.024	0.022	0.014	0.021
Total	15.005	15.007	15.016	15.029	15.007	15.018	15.014	15.011	15.022	15.026	15.024	15.022	15.014	15.021
%Fe^{2+}	45.919	57.891	54.260	59.533	50.086	56.558	55.229	56.182	48.019	35.679	40.426	51.774	43.794	56.428
X_{Mg}	0.608	0.668	0.685	0.676	0.637	0.676	0.622	0.644	0.732	0.700	0.726	0.680	0.722	0.711

	760210A F5tg Amp1	760210A F5tg Amp2	760210A F5tg Amp3	760210A F5tg Amp4	760210A F5tg Amp5	760210A F5tg Amp6	760210A F5tg Amp7	760210A F5tg Amp8	760210A F5tg Amp9	760210A F5tg Amp10	760210A F6tg Amp1	760210A F6tg Amp2	760210A F6tg Amp3	760210A F6tg Amp4
Analysis														
SiO_2	52.77	53.84	55.24	54.42	54.85	54.46	54.24	55.34	55.36	54.68	53.36	52.95	53.44	52.76
TiO_2	0.03	0.03	0.05	0.06	0.04	0.08	0.05	0.01	0.04	0.04	0.02	0.02	0.05	0.02
Al_2O_3	3.17	2.91	5.03	4.70	5.43	5.21	5.08	4.63	5.23	4.62	2.60	3.08	3.22	3.42
Fe_2O_3	10.78	8.23	10.88	12.09	11.76	10.60	11.92	12.56	11.38	12.19	6.47	9.69	8.23	10.24
Cr_2O_3	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00
MgO	11.91	12.83	9.46	9.31	8.82	8.86	8.93	9.41	9.39	9.72	14.13	12.92	11.89	11.48
CaO	6.79	7.57	1.91	2.11	1.72	1.61	1.89	1.44	1.34	2.22	9.52	8.31	7.43	6.89
MnO	0.38	0.43	0.27	0.29	0.24	0.27	0.23	0.20	0.26	0.23	0.43	0.41	0.39	0.34
FeO	8.05	9.16	9.42	8.65	8.94	10.30	9.13	7.94	8.60	8.43	8.71	7.82	9.76	8.97
Na_2O	3.60	3.04	6.20	6.17	6.51	6.14	6.24	6.70	6.58	6.08	1.97	2.85	3.22	3.54
K_2O	0.12	0.12	0.04	0.04	0.05	0.03	0.04	0.03	0.02	0.01	0.10	0.08	0.08	0.14
Total	97.59	98.18	98.50	97.85	98.35	97.55	97.75	98.24	98.22	98.22	97.33	98.12	97.70	97.82
Cations														
Si	7.633	7.717	7.841	7.797	7.805	7.831	7.785	7.860	7.853	7.794	7.692	7.603	7.717	7.632
Ti	0.003	0.003	0.005	0.007	0.004	0.008	0.005	0.001	0.005	0.005	0.002	0.002	0.005	0.002
Al	0.541	0.491	0.842	0.794	0.911	0.882	0.860	0.774	0.875	0.775	0.442	0.521	0.548	0.584
Fe^{3+}	1.173	0.887	1.163	1.303	1.259	1.147	1.288	1.343	1.215	1.307	0.701	1.047	0.895	1.115
Cr	0.000	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000
Mg	2.568	2.742	2.002	1.989	1.870	1.899	1.912	1.992	1.987	2.066	3.036	2.765	2.559	2.476
Ca	1.052	1.162	0.291	0.325	0.262	0.249	0.291	0.219	0.203	0.339	1.471	1.279	1.150	1.068
Mn	0.046	0.053	0.032	0.035	0.028	0.033	0.028	0.024	0.031	0.028	0.052	0.049	0.047	0.042
Fe^{2+}	0.974	1.098	1.118	1.036	1.064	1.239	1.096	0.943	1.020	1.005	1.051	0.939	1.178	1.086
Na	1.009	0.843	1.705	1.713	1.796	1.713	1.736	1.844	1.810	1.681	0.551	0.794	0.901	0.994
K	0.023	0.022	0.007	0.007	0.009	0.005	0.007	0.005	0.003	0.002	0.019	0.014	0.015	0.026
Total	15.023	15.022	15.007	15.007	15.009	15.005	15.007	15.005	15.003	15.002	15.019	15.014	15.015	15.026
%Fe^{2+}	54.633	44.685	50.979	55.707	54.200	48.069	54.014	58.744	54.363	56.526	40.032	52.734	43.154	50.657
X_{Mg}	0.725	0.714	0.642	0.658	0.637	0.605	0.636	0.679	0.661	0.673	0.743	0.747	0.685	0.695

	760210A F6tg Amp5	760210A F6tg Amp6	760210A F6tg Amp7	760210A F6tg Amp8	760210A F6tg Amp9	811042C F2 Amp	811065A F1	811065A F1	811065A F1	811065A F1	811065A F1	811065A F1	811065A F1 Amp2
Analysis													
SiO_2	55.57	54.24	54.85	54.19	54.27	51.88	56.78	40.31	43.89	43.23	43.20	46.19	45.92	51.67
TiO_2	0.03	0.07	0.04	0.03	0.02	0.07	0.17	1.91	2.38	2.15	2.78	0.63	1.93	0.11
Al_2O_3	5.13	4.68	5.20	4.94	3.56	6.07	15.27	14.13	12.09	12.63	13.94	15.13	10.07	4.69
Fe_2O_3	11.71	10.79	11.62	12.42	10.70	0.04	0.00	1.83	0.33	0.34	0.00	0.00	0.35	0.00
Cr_2O_3	0.01	0.00	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	9.37	9.03	8.98	9.69	10.95	11.06	7.40	11.96	12.37	11.97	10.41	7.30	12.80	13.73
CaO	1.29	1.91	2.08	2.71	4.99	9.49	5.55	10.02	10.73	10.86	10.94	16.40	11.19	12.32
MnO	0.24	0.22	0.27	0.28	0.34	0.35	0.08	0.21	0.27	0.28	0.23	0.30	0.33	0.24
FeO	8.01	9.80	8.79	8.55	9.43	15.34	7.30	9.84	11.36	11.99	13.06	11.64	11.98	13.48
Na_2O	6.79	6.07	6.37	5.81	4.53	1.96	0.39	2.72	2.34	2.49	1.87	0.22	1.70	0.54
K_2O	0.01	0.03	0.04	0.05	0.09	0.12	3.73	0.23	0.28	0.26	0.97	0.14	0.24	0.21
Total	98.15	96.84	98.25	98.70	98.88	96.37	96.65	93.16	96.04	96.20	97.40	97.94	96.52	96.99
Cations														
Si	7.875	7.854	7.812	7.712	7.742	7.630	7.834	6.169	6.504	6.427	6.369	6.690	6.765	7.541
Ti	0.003	0.007	0.004	0.003	0.002	0.008	0.018	0.220	0.266	0.240	0.308	0.069	0.214	0.012
Al	0.856	0.799	0.872	0.829	0.599	1.051	2.482	2.549	2.111	2.213	2.422	2.582	1.748	0.807
Fe^{3+}	1.249	1.176	1.245	1.331	1.148	0.004	0.000	0.211	0.037	0.038	0.000	0.000	0.039	0.000
Cr	0.001	0.000	0.002	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.979	1.949	1.907	2.056	2.328	2.425	1.522	2.729	2.732	2.652	2.287	1.576	2.812	2.986
Ca	0.195	0.297	0.317	0.413	0.763	1.495	0.820	1.643	1.704	1.729	1.728	2.545	1.766	1.927
Mn	0.029	0.027	0.032	0.033	0.041	0.043	0.009	0.027	0.034	0.035	0.028	0.037	0.041	0.030
Fe^{2+}	0.949	1.187	1.047	1.017	1.125	1.886	0.842	1.259	1.408	1.490	1.610	1.409	1.476	1.645
Na	1.864	1.704	1.760	1.603	1.252	0.559	0.104	0.806	0.673	0.716	0.534	0.060	0.487	0.153
K	0.002	0.006	0.008	0.009	0.017	0.022	0.657	0.044	0.052	0.050	0.183	0.025	0.045	0.039
Total	15.002	15.006	15.008	15.009	15.017	15.125	14.287	15.657	15.520	15.591	15.470	14.993	15.393	15.140
%Fe^{2+}	56.826	49.777	54.322	56.671	50.498	4.692	0.000	33.393	14.926	14.801	0.000	0.000	15.006	0.000
X_{Mg}	0.676	0.622	0.646	0.669	0.674	0.562	0.644	0.684	0.660	0.640	0.587	0.528	0.656	0.645

	811065A F1 Amp2	811065A F1 Amp2	811065A F1 Amp2	811065A F1 Amp2	811065A F1 Amp2	811065A F2 Amp-nadel	811065A F2 Amp-nadel	811065A F2 Amp-nadel2	811065A F2 Amp-nadel2	811065A F2 Amp-nadel3	811065A F2 Amp-nadel3	811065A F2	811065A F2	811065A F2
Analysis														
SiO_2	46.10	44.95	46.38	45.83	52.97	47.49	49.73	46.81	49.03	47.52	51.94	50.58	44.46	44.33
TiO_2	0.55	2.02	1.31	0.96	0.09	1.93	0.04	0.15	0.06	0.09	0.26	1.11	2.22	2.22
Al_2O_3	9.26	10.22	9.47	7.12	3.30	6.81	4.93	7.54	6.83	26.49	4.81	7.11	11.05	11.39
Fe_2O_3	3.08	0.33	0.17	0.09	0.00	0.26	0.10	0.21	0.02	0.00	0.03	0.01	0.57	0.48
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	14.62	11.25	10.61	11.38	13.86	12.41	13.88	13.74	13.39	4.38	13.19	11.84	11.66	12.20
CaO	9.36	10.44	10.65	12.76	12.41	10.36	11.06	9.06	9.81	1.89	11.27	10.43	10.41	10.56
MnO	0.28	0.41	0.53	0.40	0.61	0.40	0.20	0.19	0.21	0.03	0.27	0.31	0.33	0.32
FeO	8.63	13.76	15.38	14.05	13.90	12.66	11.64	12.13	12.91	5.23	13.40	13.95	13.33	12.45
Na_2O	0.88	2.16	2.12	1.22	0.38	1.36	0.49	0.48	0.48	0.36	0.76	1.13	1.87	2.32
K_2O	0.24	0.19	0.18	0.25	0.12	0.16	0.22	0.40	0.36	7.69	0.19	0.25	0.21	0.23
Total	93.01	95.72	96.81	94.06	97.63	93.82	92.29	90.70	93.09	93.67	96.10	96.71	96.11	96.49
Cations														
Si	6.923	6.740	6.910	7.034	7.689	7.180	7.554	7.245	7.400	6.822	7.618	7.391	6.625	6.567
Ti	0.062	0.227	0.146	0.111	0.010	0.219	0.004	0.018	0.006	0.010	0.029	0.122	0.249	0.248
Al	1.640	1.805	1.663	1.289	0.565	1.213	0.882	1.374	1.216	4.482	0.831	1.224	1.940	1.988
Fe^{3+}	0.348	0.038	0.019	0.010	0.000	0.030	0.011	0.024	0.002	0.000	0.003	0.001	0.064	0.054
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	3.273	2.515	2.357	2.603	2.999	2.796	3.144	3.169	3.012	0.936	2.883	2.578	2.590	2.695
Ca	1.505	1.677	1.700	2.098	1.930	1.677	1.800	1.502	1.587	0.290	1.770	1.633	1.662	1.676
Mn	0.036	0.051	0.067	0.052	0.075	0.051	0.026	0.025	0.027	0.004	0.033	0.038	0.042	0.040
Fe^{2+}	1.083	1.726	1.916	1.804	1.687	1.600	1.479	1.570	1.629	0.628	1.644	1.704	1.662	1.542
Na	0.257	0.628	0.613	0.364	0.107	0.399	0.145	0.144	0.140	0.100	0.216	0.320	0.540	0.665
K	0.047	0.037	0.035	0.048	0.021	0.030	0.042	0.080	0.069	1.409	0.035	0.047	0.039	0.043
Total	15.173	15.443	15.426	15.412	15.083	15.194	15.088	15.150	15.089	14.682	15.062	15.059	15.413	15.518
%Fe^{2+}	42.825	13.719	9.488	7.281	0.000	12.754	8.303	11.648	3.406	0.000	4.440	1.892	17.738	17.000
X_{Mg}	0.751	0.593	0.552	0.591	0.640	0.636	0.680	0.669	0.649	0.598	0.637	0.602	0.609	0.636

	811065A F2	811065A F2	811065A F2	811084A F3 Amp1	811084A F3 Amp2	811084A F3 Amp3	811084A F3 Amp4	811084A F3 Amp5	811084A F3 Amp6	811084A F3 Amp7	811084A F3 Amp8	811084A F3 Amp9	811084A F3 Amp10	811081A F2 Amp1
Analysis														
SiO_2	43.96	47.12	50.78	43.98	44.29	44.47	44.44	44.47	44.34	44.51	44.53	44.14	44.66	43.69
TiO_2	2.78	2.06	0.59	0.97	0.87	0.94	0.90	0.90	0.94	0.87	0.89	0.93	0.80	1.11
Al_2O_3	11.32	7.70	4.97	13.48	13.89	14.04	14.21	14.51	14.92	14.82	14.80	15.08	14.54	13.71
Fe_2O_3	0.23	0.08	0.01	0.09	0.09	0.08	0.10	0.04	0.09	0.11	0.07	0.10	0.13	0.13
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.15	12.62	13.82	9.45	9.42	9.45	9.43	9.19	9.33	9.43	9.10	9.02	9.39	9.11
CaO	10.73	11.01	11.38	10.45	9.71	9.45	9.31	9.43	9.48	9.37	9.21	9.08	9.01	10.57
MnO	0.30	0.23	0.15	0.07	0.09	0.10	0.03	0.05	0.06	0.07	0.05	0.07	0.06	0.21
FeO	12.10	12.04	11.73	15.89	15.26	15.01	14.92	15.32	15.06	14.73	15.00	14.92	14.85	15.91
Na_2O	2.38	1.05	0.63	2.77	3.18	3.32	3.34	3.45	3.51	3.35	3.37	3.51	3.62	2.29
K_2O	0.25	0.33	0.26	0.80	0.87	0.95	0.96	0.95	0.87	0.93	0.98	0.93	0.91	0.82
Total	96.19	94.22	94.32	97.93	97.67	97.81	97.65	98.31	98.57	98.18	98.01	97.75	97.97	97.55
Cations														
Si	6.531	7.077	7.547	6.520	6.552	6.559	6.557	6.531	6.486	6.522	6.542	6.502	6.559	6.501
Ti	0.310	0.233	0.066	0.108	0.097	0.104	0.100	0.099	0.103	0.096	0.099	0.103	0.089	0.124
Al	1.982	1.363	0.871	2.354	2.421	2.441	2.472	2.512	2.572	2.559	2.563	2.617	2.517	2.404
Fe^{3+}	0.026	0.009	0.001	0.010	0.010	0.009	0.012	0.004	0.009	0.013	0.008	0.011	0.014	0.015
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	2.690	2.826	3.062	2.088	2.078	2.078	2.075	2.013	2.036	2.059	1.993	1.980	2.056	2.020
Ca	1.708	1.771	1.813	1.659	1.539	1.494	1.472	1.483	1.485	1.472	1.449	1.433	1.419	1.686
Mn	0.037	0.029	0.019	0.008	0.011	0.012	0.004	0.007	0.007	0.009	0.006	0.008	0.007	0.027
Fe^{2+}	1.503	1.513	1.458	1.970	1.888	1.852	1.842	1.882	1.842	1.805	1.843	1.838	1.824	1.980
Na	0.686	0.306	0.182	0.796	0.911	0.949	0.956	0.981	0.997	0.950	0.960	1.002	1.031	0.660
K	0.048	0.062	0.049	0.150	0.165	0.178	0.181	0.177	0.161	0.173	0.184	0.174	0.171	0.155
Total	15.521	15.188	15.066	15.663	15.673	15.676	15.670	15.691	15.699	15.658	15.646	15.668	15.687	15.572
%Fe^{2+}	12.260	7.469	2.712	6.770	7.081	6.781	7.604	4.678	6.888	8.018	6.258	7.526	8.457	8.360
X_{Mg}	0.642	0.651	0.677	0.514	0.524	0.529	0.530	0.517	0.525	0.533	0.520	0.519	0.530	0.505

	811081A F2 Amp2	811081A F2 Amp3	811081A F2 Amp4	811081A F2 Amp5	811081A F2 Amp6	811081A F2 Amp7	811081A F2 Amp8	811081A F2 Amp9	811081A F2 Amp10	811081A F2 Amp11	811081A F2 Amp12	811081A F2 Amp13	811081A F2 Amp14	811081A F2 Amp15
Analysis														
SiO_2	44.15	45.60	45.28	46.05	45.17	45.17	43.73	43.67	45.09	44.23	44.52	43.77	43.60	44.04
TiO_2	1.01	0.93	0.77	0.79	0.80	0.79	0.80	0.99	0.94	0.80	0.83	0.81	0.92	0.85
Al_2O_3	15.26	14.27	13.89	13.68	13.71	13.77	14.88	14.19	13.55	13.80	14.23	14.48	14.72	13.80
Fe_2O_3	0.34	0.21	0.21	0.24	0.24	0.29	0.14	0.29	0.25	0.37	0.37	0.27	0.27	0.21
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	8.98	9.97	10.07	10.20	9.73	10.06	8.88	9.44	9.99	9.99	9.92	8.88	9.29	9.50
CaO	9.36	9.10	9.25	9.18	9.28	9.53	10.40	10.08	9.92	10.08	9.91	10.16	10.24	10.14
MnO	0.11	0.04	0.09	0.09	0.11	0.06	0.18	0.09	0.03	0.08	0.12	0.17	0.15	0.12
FeO	15.03	13.98	13.92	13.91	14.46	14.17	15.65	15.13	14.60	14.60	14.39	15.96	15.29	15.08
Na_2O	2.69	3.02	2.98	2.92	2.85	2.72	2.41	2.41	2.46	2.34	2.51	2.41	2.45	2.40
K_2O	1.06	1.06	1.01	0.97	0.93	0.89	0.83	0.93	0.88	0.99	0.85	0.88	0.91	0.88
Total	97.98	98.18	97.47	98.04	97.29	97.45	97.91	97.21	97.70	97.27	97.65	97.78	97.84	97.01
Cations														
Si	6.487	6.637	6.647	6.706	6.657	6.637	6.463	6.490	6.625	6.549	6.548	6.488	6.445	6.552
Ti	0.112	0.102	0.085	0.087	0.089	0.088	0.089	0.111	0.104	0.089	0.092	0.090	0.102	0.095
Al	2.643	2.448	2.402	2.348	2.382	2.385	2.592	2.485	2.347	2.408	2.467	2.530	2.564	2.419
Fe^{3+}	0.037	0.023	0.024	0.027	0.027	0.032	0.016	0.033	0.027	0.041	0.041	0.030	0.030	0.024
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.966	2.163	2.204	2.214	2.138	2.204	1.956	2.092	2.189	2.204	2.176	1.961	2.047	2.106
Ca	1.474	1.420	1.454	1.432	1.466	1.500	1.646	1.605	1.562	1.598	1.561	1.614	1.622	1.616
Mn	0.013	0.005	0.012	0.011	0.014	0.008	0.022	0.011	0.004	0.009	0.014	0.022	0.018	0.015
Fe^{2+}	1.847	1.702	1.708	1.694	1.782	1.741	1.935	1.880	1.794	1.808	1.770	1.978	1.890	1.876
Na	0.765	0.853	0.848	0.823	0.814	0.776	0.692	0.694	0.699	0.673	0.715	0.692	0.701	0.692
K	0.198	0.197	0.189	0.181	0.175	0.167	0.157	0.177	0.165	0.187	0.160	0.167	0.172	0.167
Total	15.543	15.550	15.574	15.522	15.544	15.538	15.568	15.576	15.516	15.567	15.544	15.572	15.593	15.561
%Fe^{2+}	13.254	10.951	11.096	11.758	11.546	12.675	8.720	12.329	11.586	13.935	14.077	11.579	11.913	10.643
X_{Mg}	0.516	0.560	0.563	0.566	0.545	0.559	0.503	0.527	0.550	0.549	0.551	0.498	0.520	0.529

	811081A F2 Amp16	811084A F3 Amp1	811084A F3 Amp2	811084A F3 Amp3	811084A F3 Amp4	811084A F3 Amp5	811084A F3 Amp6	811084A F3 Amp7	811084A F3 Amp8	811084A F3 Amp9	811084A F3 Amp10	D7625A F7 Amp1	D7625A F7 Amp2	D7625A F7 Amp3
Analysis														
SiO_2	44.22	43.98	44.29	44.47	44.44	44.47	44.34	44.51	44.53	44.14	44.66	43.04	42.82	43.53
TiO_2	0.92	0.97	0.87	0.94	0.90	0.90	0.94	0.87	0.89	0.93	0.80	0.39	0.30	0.35
Al_2O_3	13.48	13.48	13.89	14.04	14.21	14.51	14.92	14.82	14.80	15.08	14.54	17.63	18.37	18.27
Fe_2O_3	0.19	0.09	0.09	0.08	0.10	0.04	0.09	0.11	0.07	0.10	0.13	0.13	0.11	0.16
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.01
MgO	9.42	9.45	9.42	9.45	9.43	9.19	9.33	9.43	9.10	9.02	9.39	8.93	8.51	8.74
CaO	10.13	10.45	9.71	9.45	9.31	9.43	9.48	9.37	9.21	9.08	9.01	11.65	11.55	11.23
MnO	0.16	0.07	0.09	0.10	0.03	0.05	0.06	0.07	0.05	0.07	0.06	0.30	0.37	0.32
FeO	15.41	15.89	15.26	15.01	14.92	15.32	15.06	14.73	15.00	14.92	14.85	13.42	13.35	12.86
Na_2O	2.47	2.77	3.18	3.32	3.34	3.45	3.51	3.35	3.37	3.51	3.62	1.22	1.22	1.23
K_2O	0.83	0.80	0.87	0.95	0.96	0.95	0.87	0.93	0.98	0.93	0.91	0.39	0.37	0.29
Total	97.22	97.93	97.67	97.81	97.65	98.31	98.57	98.18	98.01	97.75	97.97	97.11	96.99	96.98
Cations														
Si	6.575	6.520	6.552	6.559	6.557	6.531	6.486	6.522	6.542	6.502	6.559	6.318	6.286	6.355
Ti	0.102	0.108	0.097	0.104	0.100	0.099	0.103	0.096	0.099	0.103	0.089	0.043	0.033	0.038
Al	2.362	2.354	2.421	2.441	2.472	2.512	2.572	2.559	2.563	2.617	2.517	3.050	3.178	3.143
Fe^{3+}	0.021	0.010	0.010	0.009	0.012	0.004	0.009	0.013	0.008	0.011	0.014	0.015	0.013	0.017
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001
Mg	2.087	2.088	2.078	2.078	2.075	2.013	2.036	2.059	1.993	1.980	2.056	1.953	1.862	1.902
Ca	1.613	1.659	1.539	1.494	1.472	1.483	1.485	1.472	1.449	1.433	1.419	1.833	1.817	1.757
Mn	0.020	0.008	0.011	0.012	0.004	0.007	0.007	0.009	0.006	0.008	0.007	0.037	0.046	0.040
Fe^{2+}	1.915	1.970	1.888	1.852	1.842	1.882	1.842	1.805	1.843	1.838	1.824	1.648	1.639	1.570
Na	0.713	0.796	0.911	0.949	0.956	0.981	0.997	0.950	0.960	1.002	1.031	0.346	0.346	0.347
K	0.158	0.150	0.165	0.178	0.181	0.177	0.161	0.173	0.184	0.174	0.171	0.074	0.069	0.053
Total	15.567	15.663	15.673	15.676	15.670	15.691	15.699	15.658	15.646	15.668	15.687	15.316	15.292	15.226
%Fe^{2+}	9.996	6.770	7.081	6.781	7.604	4.678	6.888	8.018	6.258	7.526	8.457	8.983	8.402	9.980
X_{Mg}	0.521	0.514	0.524	0.529	0.530	0.517	0.525	0.533	0.520	0.519	0.530	0.542	0.532	0.548

	D7625A F7 Amp4	D7625A F7 Amp5	D7625A F7 Amp6	D7625A F7 Amp7	D7625A F7 Amp8	D7625A F7 Amp9	D7625A F7 Amp10	D7625A F7 Amp11	D7625A F8 Amp1	D7625A F8 Amp2	D7625A F8 Amp3	D7625A F8 Amp4	D7625A F8 Amp5	D7625A F8 Amp6
Analysis														
SiO_2	42.96	47.58	44.34	43.62	43.48	44.45	43.71	43.51	43.45	43.53	43.06	43.46	42.13	42.29
TiO_2	0.37	0.38	0.32	0.44	0.33	0.36	0.38	0.39	0.39	0.36	0.36	0.42	0.32	0.31
Al_2O_3	17.62	12.70	16.42	17.34	16.60	15.23	17.16	16.85	17.32	17.28	17.56	16.96	18.80	19.00
Fe_2O_3	0.18	0.09	0.28	0.17	0.12	0.18	0.16	0.12	0.11	0.19	0.12	0.17	0.14	0.14
Cr_2O_3	0.03	0.10	0.01	0.03	0.02	0.06	0.03	0.03	0.22	0.03	0.13	0.13	0.00	0.03
MgO	8.85	11.38	9.75	8.98	9.33	10.41	9.27	9.42	9.12	9.22	8.71	9.12	8.19	8.15
CaO	11.20	11.49	11.15	11.15	11.41	11.67	11.56	11.42	11.58	11.30	11.57	11.47	11.55	11.61
MnO	0.30	0.34	0.38	0.34	0.35	0.27	0.33	0.32	0.31	0.31	0.30	0.36	0.30	0.36
FeO	12.76	11.96	12.24	12.87	12.67	12.31	13.07	12.59	13.02	12.77	13.41	13.12	13.75	13.77
Na_2O	1.17	0.98	1.15	1.25	1.18	1.08	1.20	1.24	1.19	1.25	1.12	1.16	1.25	1.24
K_2O	0.33	0.17	0.27	0.31	0.29	0.29	0.31	0.35	0.36	0.32	0.36	0.32	0.40	0.40
Total	95.77	97.17	96.32	96.49	95.79	96.30	97.18	96.22	97.07	96.55	96.70	96.69	96.83	97.29
Cations														
Si	6.361	6.881	6.501	6.408	6.438	6.536	6.390	6.412	6.364	6.393	6.342	6.393	6.214	6.208
Ti	0.041	0.042	0.035	0.049	0.037	0.039	0.042	0.044	0.043	0.040	0.040	0.046	0.035	0.034
Al	3.075	2.164	2.838	3.002	2.897	2.639	2.957	2.926	2.989	2.991	3.049	2.939	3.267	3.287
Fe^{3+}	0.020	0.010	0.031	0.018	0.013	0.020	0.018	0.013	0.013	0.021	0.013	0.019	0.016	0.015
Cr	0.004	0.012	0.002	0.004	0.003	0.007	0.004	0.003	0.025	0.003	0.015	0.015	0.000	0.003
Mg	1.954	2.453	2.131	1.966	2.058	2.283	2.019	2.069	1.992	2.019	1.913	2.000	1.801	1.783
Ca	1.776	1.781	1.752	1.755	1.811	1.839	1.810	1.803	1.818	1.778	1.825	1.808	1.826	1.825
Mn	0.037	0.041	0.047	0.042	0.044	0.034	0.040	0.039	0.038	0.039	0.038	0.044	0.038	0.045
Fe^{2+}	1.580	1.446	1.501	1.581	1.569	1.513	1.598	1.552	1.595	1.568	1.651	1.614	1.696	1.690
Na	0.336	0.275	0.327	0.357	0.339	0.308	0.340	0.355	0.339	0.356	0.320	0.329	0.356	0.353
K	0.062	0.032	0.051	0.057	0.055	0.054	0.058	0.066	0.068	0.061	0.067	0.060	0.076	0.075
Total	15.247	15.137	15.217	15.238	15.265	15.273	15.277	15.283	15.283	15.268	15.273	15.269	15.325	15.319
%Fe^{2+}	10.649	7.970	13.435	10.180	8.851	10.883	9.955	8.742	8.483	10.819	8.499	10.247	9.149	8.989
X_{Mg}	0.553	0.629	0.587	0.554	0.567	0.601	0.558	0.571	0.555	0.563	0.537	0.553	0.515	0.513

	D7625A F8 Amp7	D7625A F8 Amp8	D7625A F8 Amp9	D7625A F8 Amp10	D7625A F8 Amp11	D7625A F8 Amp12	D7625A F8 Amp13	D7625A F8 Amp14	D7625A F8 Amp15	D7625A F8 Amp16	D7625A F8 Amp17	D7625A F8 Amp18	Q 09 B F10 Amp	Q 09 B F10 Amp
Analysis														
SiO_2	42.80	42.99	43.56	42.61	42.82	43.17	43.66	42.94	43.42	42.71	43.26	43.48	38.56	37.38
TiO_2	0.32	0.37	0.32	0.33	0.39	0.38	0.40	0.32	0.38	0.40	0.38	0.37	0.09	0.14
Al_2O_3	18.50	17.80	16.62	18.32	18.11	17.39	16.71	17.58	17.78	18.08	17.20	16.52	22.13	21.26
Fe_2O_3	0.10	0.19	0.14	0.17	0.16	0.18	0.23	0.16	0.11	0.21	0.11	0.20	6.67	6.81
Cr_2O_3	0.02	0.01	0.06	0.00	0.08	0.08	0.17	0.05	0.01	0.00	0.01	0.36	0.00	0.00
MgO	8.20	8.71	9.05	8.54	8.54	8.74	9.20	8.87	8.94	8.87	9.13	9.44	5.19	4.74
CaO	11.43	11.44	11.40	11.52	11.40	11.42	11.32	11.52	11.44	11.32	11.48	11.18	11.85	11.98
MnO	0.28	0.34	0.33	0.36	0.38	0.35	0.35	0.32	0.22	0.29	0.29	0.35	0.28	0.26
FeO	13.87	13.47	13.17	13.35	13.36	13.54	13.14	13.30	13.02	12.80	12.95	12.36	16.32	16.70
Na_2O	1.33	1.23	1.13	1.18	1.24	1.21	1.19	1.22	1.20	1.22	1.24	1.22	2.12	2.04
K_2O	0.36	0.32	0.28	0.35	0.34	0.30	0.32	0.35	0.35	0.31	0.36	0.30	0.47	0.58
Total	97.20	96.86	96.06	96.71	96.80	96.75	96.68	96.63	96.87	96.21	96.42	95.79	103.67	101.87
Cations														
Si	6.281	6.321	6.444	6.275	6.299	6.357	6.420	6.329	6.360	6.301	6.375	6.434	5.523	5.488
Ti	0.035	0.041	0.035	0.036	0.043	0.042	0.044	0.036	0.041	0.044	0.042	0.041	0.010	0.016
Al	3.199	3.085	2.897	3.179	3.139	3.018	2.896	3.053	3.069	3.143	2.988	2.881	3.736	3.678
Fe^{3+}	0.011	0.021	0.016	0.018	0.018	0.020	0.025	0.017	0.012	0.023	0.012	0.023	0.718	0.752
Cr	0.003	0.001	0.007	0.000	0.009	0.010	0.019	0.006	0.001	0.000	0.001	0.042	0.000	0.000
Mg	1.793	1.909	1.997	1.874	1.872	1.918	2.017	1.949	1.952	1.951	2.006	2.081	1.107	1.037
Ca	1.797	1.802	1.806	1.818	1.796	1.801	1.784	1.819	1.795	1.789	1.812	1.773	1.818	1.884
Mn	0.034	0.042	0.041	0.045	0.047	0.043	0.044	0.040	0.028	0.037	0.036	0.044	0.034	0.032
Fe^{2+}	1.702	1.657	1.629	1.644	1.644	1.667	1.616	1.640	1.595	1.579	1.596	1.530	1.955	2.051
Na	0.378	0.351	0.323	0.335	0.353	0.345	0.339	0.350	0.341	0.349	0.354	0.351	0.589	0.579
K	0.067	0.060	0.053	0.066	0.064	0.057	0.059	0.066	0.066	0.059	0.068	0.056	0.085	0.108
Total	15.300	15.290	15.249	15.291	15.284	15.278	15.264	15.305	15.261	15.275	15.292	15.255	15.577	15.625
%Fe^{2+}	7.852	10.744	9.461	10.009	9.885	10.370	11.743	9.793	8.462	11.473	8.460	11.438	26.868	26.829
X_{Mg}	0.513	0.535	0.551	0.533	0.533	0.535	0.555	0.543	0.550	0.553	0.557	0.576	0.362	0.336

	Q 09 B F7 Amph 1 14	Q 09 B F7 Amph 2 1	Q 09 B F7 Amph 2 2	Q 09 B F7 Amph 2 3	Q 09 B F7 Amph 2 4	Q 09 B F7 Amph 2 5	Q 09 B F6 Amph 1 1	Q 09 B F6 Amph 1 2	Q 09 B F6 Amph 1 3	Q 09 B F6 Amph 1 4	Q 09 B F6 Amph 1 5	Q 09 B F6 Amph 1 6	Q 09 B F6 Amph 1 7	Q 09 B F6 Amph 1 8
Analysis														
SiO_2	44.86	44.66	44.51	45.72	45.87	46.23	45.15	45.03	44.92	45.19	47.04	45.11	45.59	46.36
TiO_2	0.76	0.67	0.77	0.66	0.64	0.53	0.63	0.82	0.63	0.63	0.61	0.64	0.65	0.65
Al_2O_3	15.60	15.47	15.68	14.00	14.43	13.95	15.22	15.42	15.56	15.62	13.73	15.74	14.70	14.24
Fe_2O_3	3.95	4.11	4.27	4.16	3.76	4.39	4.20	4.34	4.15	4.18	4.56	3.57	4.08	4.19
Cr_2O_3	0.04	0.06	0.06	0.08	0.07	0.04	0.01	0.02	0.05	0.00	0.04	0.01	0.02	0.02
MgO	12.20	11.79	11.90	12.90	12.31	12.86	11.92	12.24	12.02	12.22	13.29	11.92	12.47	12.86
CaO	10.98	10.80	10.85	11.20	10.62	10.41	11.31	10.68	10.62	10.51	10.46	10.83	10.59	10.45
MnO	0.05	0.09	0.06	0.12	0.07	0.07	0.16	0.10	0.05	0.09	0.06	0.05	0.08	0.05
FeO	10.20	10.42	10.19	9.69	10.03	9.12	10.86	9.78	9.90	9.66	8.91	10.42	9.61	9.32
Na_2O	2.31	2.20	2.13	1.92	2.12	2.03	1.94	2.28	2.29	2.38	2.13	2.29	2.19	2.26
K_2O	0.57	0.57	0.60	0.50	0.68	0.71	0.52	0.54	0.53	0.64	0.55	0.69	0.61	0.58
Total	101.52	100.83	101.03	100.96	100.59	100.33	101.91	101.25	100.74	101.13	101.38	101.27	100.59	101.00
Cations														
Si	6.288	6.309	6.273	6.428	6.464	6.509	6.323	6.316	6.329	6.338	6.541	6.332	6.420	6.486
Ti	0.080	0.071	0.081	0.070	0.068	0.056	0.066	0.087	0.067	0.066	0.064	0.068	0.068	0.068
Al	2.578	2.576	2.604	2.320	2.397	2.316	2.513	2.549	2.584	2.582	2.250	2.604	2.440	2.348
Fe^{3+}	0.417	0.437	0.453	0.440	0.398	0.466	0.443	0.458	0.440	0.441	0.477	0.377	0.432	0.441
Cr	0.005	0.007	0.007	0.009	0.007	0.004	0.001	0.002	0.006	0.000	0.005	0.002	0.002	0.003
Mg	2.550	2.482	2.501	2.704	2.587	2.699	2.489	2.559	2.526	2.554	2.755	2.495	2.618	2.682
Ca	1.649	1.634	1.639	1.686	1.604	1.570	1.697	1.605	1.604	1.580	1.558	1.629	1.598	1.567
Mn	0.005	0.011	0.007	0.014	0.008	0.008	0.019	0.012	0.006	0.011	0.007	0.006	0.009	0.006
Fe^{2+}	1.195	1.231	1.201	1.140	1.182	1.074	1.272	1.147	1.167	1.133	1.036	1.223	1.132	1.091
Na	0.629	0.602	0.583	0.524	0.578	0.555	0.528	0.619	0.626	0.647	0.575	0.623	0.599	0.614
K	0.102	0.102	0.108	0.090	0.122	0.127	0.092	0.096	0.096	0.115	0.098	0.123	0.109	0.104
Total	15.498	15.462	15.459	15.424	15.416	15.383	15.443	15.450	15.450	15.465	15.365	15.482	15.428	15.409
%Fe^{2+}	25.854	26.191	27.405	27.841	25.209	30.235	25.803	28.547	27.385	28.020	31.542	23.581	27.628	28.793
X_{Mg}	0.681	0.669	0.676	0.703	0.686	0.715	0.662	0.690	0.684	0.693	0.727	0.671	0.698	0.711

	Q 09 B F10 Amp	Q 09 B F7 Amph 1 1	Q 09 B F7 Amph 1 2	Q 09 B F7 Amph 1 3	Q 09 B F7 Amph 1 4	Q 09 B F7 Amph 1 5	Q 09 B F7 Amph 1 6	Q 09 B F7 Amph 1 7	Q 09 B F7 Amph 1 8	Q 09 B F7 Amph 1 9	Q 09 B F7 Amph 1 10	Q 09 B F7 Amph 1 11	Q 09 B F7 Amph 1 12	Q 09 B F7 Amph 1 13
Analysis														
SiO_2	39.93	46.74	45.26	45.09	45.05	47.99	47.23	45.81	45.31	46.06	45.54	44.81	45.04	45.18
TiO_2	0.27	0.53	0.73	0.70	0.66	0.47	0.53	0.53	0.67	0.69	0.71	0.69	0.66	0.75
Al_2O_3	18.90	12.01	15.23	15.51	15.08	12.84	13.51	14.54	15.76	15.02	15.61	15.63	15.40	15.36
Fe_2O_3	4.91	3.78	3.40	4.02	3.90	4.48	3.36	4.06	3.99	3.65	3.93	3.37	3.97	3.82
Cr_2O_3	0.00	0.07	0.10	0.10	0.06	0.03	0.12	0.12	0.12	0.04	0.07	0.05	0.03	0.01
MgO	5.91	12.35	11.29	11.58	11.75	13.76	13.00	12.55	12.01	12.36	11.96	11.93	12.16	12.21
CaO	11.39	14.57	11.74	11.17	10.80	10.61	10.67	10.77	10.32	10.45	10.32	11.17	10.82	11.05
MnO	0.30	0.12	0.09	0.14	0.06	0.09	0.09	0.05	0.11	0.04	0.07	0.08	0.08	0.04
FeO	16.94	10.22	12.33	11.44	10.74	8.91	9.63	9.64	9.81	9.81	9.83	10.71	10.31	10.37
Na_2O	2.00	1.15	1.76	2.19	2.16	2.10	2.17	2.10	2.51	2.33	2.25	2.14	2.46	2.25
K_2O	0.43	0.35	0.54	0.56	0.58	0.49	0.57	0.51	0.66	0.68	0.80	0.78	0.55	0.52
Total	100.97	101.90	102.47	102.51	100.82	101.79	100.87	100.66	101.29	101.12	101.10	101.35	101.47	101.58
Cations														
Si	5.854	6.560	6.334	6.297	6.365	6.639	6.604	6.443	6.344	6.443	6.381	6.304	6.318	6.326
Ti	0.030	0.056	0.077	0.074	0.070	0.049	0.055	0.056	0.071	0.072	0.075	0.073	0.070	0.079
Al	3.267	1.987	2.512	2.552	2.512	2.094	2.227	2.409	2.601	2.476	2.579	2.592	2.546	2.535
Fe^{3+}	0.542	0.399	0.359	0.422	0.414	0.467	0.353	0.429	0.420	0.384	0.414	0.357	0.419	0.403
Cr	0.000	0.007	0.011	0.011	0.007	0.004	0.013	0.013	0.013	0.005	0.008	0.005	0.003	0.001
Mg	1.291	2.585	2.355	2.410	2.474	2.838	2.710	2.631	2.508	2.577	2.499	2.501	2.542	2.550
Ca	1.789	2.191	1.760	1.671	1.634	1.573	1.598	1.622	1.548	1.566	1.549	1.684	1.626	1.659
Mn	0.037	0.015	0.011	0.017	0.007	0.011	0.011	0.006	0.013	0.004	0.009	0.010	0.010	0.005
Fe^{2+}	2.077	1.200	1.443	1.336	1.269	1.030	1.126	1.134	1.149	1.147	1.152	1.260	1.210	1.215
Na	0.568	0.312	0.477	0.593	0.591	0.564	0.589	0.572	0.682	0.633	0.612	0.583	0.668	0.611
K	0.081	0.062	0.097	0.099	0.104	0.086	0.102	0.092	0.119	0.122	0.142	0.140	0.098	0.094
Total	15.535	15.375	15.436	15.483	15.447	15.355	15.389	15.407	15.468	15.430	15.421	15.508	15.511	15.477
%Fe^{2+}	20.698	24.949	19.897	24.028	24.624	31.181	23.886	27.461	26.794	25.062	26.443	22.096	25.737	24.889
X_{Mg}	0.383	0.683	0.620	0.643	0.661	0.734	0.706	0.699	0.686	0.692	0.684	0.665	0.678	0.677

	Q 09 B F6 Amph 1 9	Q 09 B F6 Amph 1 10	Q 09 B F6 Amph 1 11	Q 09 B F6 Amph 1 12	Q 09 B F6 Amph 1 13	Q 09 B Amph1 1	Q 09 B F1 Amph1 2	Q 09 B F1 Amph1 3	Q 09 B F1 Amph1 4	Q 09 B F1 Amph1 5	Q 09 B F1 Amph1 6	Q 09 B F1 Amph1 7	Q 09 B F1 Amph1 9	Q 09 B F1 Amph1 10
Analysis														
SiO_2	46.20	44.73	45.09	45.44	45.00	45.02	45.24	45.99	46.67	45.90	44.45	44.07	45.57	45.97
TiO_2	0.68	0.89	0.87	0.81	0.83	0.62	0.75	0.62	0.71	0.76	0.69	0.68	0.60	0.58
Al_2O_3	14.45	16.25	16.38	15.49	15.44	15.46	15.64	14.45	13.25	14.35	15.59	15.37	14.91	14.44
Fe_2O_3	4.44	4.56	4.70	4.56	4.44	3.28	3.80	3.87	3.89	4.03	3.61	3.32	3.57	4.12
Cr_2O_3	0.05	0.00	0.05	0.04	0.01	0.04	0.05	0.03	0.04	0.00	0.00	0.03	0.01	0.01
MgO	12.96	11.89	11.80	12.22	12.05	12.00	12.25	12.83	13.33	12.77	11.74	12.08	12.55	12.97
CaO	10.68	10.30	10.28	10.30	10.34	11.28	11.16	11.14	11.06	10.97	10.83	11.30	11.43	11.49
MnO	0.07	0.07	0.09	0.06	0.07	0.06	0.04	0.06	0.03	0.08	0.05	0.08	0.07	0.06
FeO	9.32	9.61	10.00	9.58	9.86	10.75	10.13	9.81	9.32	9.75	10.40	10.29	10.19	9.77
Na_2O	2.19	2.28	2.43	2.28	2.32	2.18	2.06	2.05	1.84	2.06	2.20	2.11	1.95	1.84
K_2O	0.59	0.79	0.77	0.75	0.73	0.56	0.60	0.54	0.48	0.54	0.62	0.61	0.54	0.41
Total	101.64	101.37	102.46	101.52	101.08	101.26	101.72	101.38	100.62	101.20	100.18	99.93	101.41	101.65
Cations														
Si	6.433	6.264	6.258	6.346	6.326	6.332	6.317	6.430	6.549	6.429	6.312	6.283	6.382	6.411
Ti	0.072	0.094	0.091	0.085	0.088	0.066	0.079	0.065	0.074	0.080	0.073	0.073	0.063	0.061
Al	2.372	2.682	2.680	2.550	2.557	2.562	2.574	2.381	2.192	2.369	2.610	2.582	2.462	2.373
Fe^{3+}	0.466	0.480	0.491	0.479	0.470	0.347	0.399	0.408	0.411	0.425	0.386	0.356	0.376	0.432
Cr	0.005	0.000	0.006	0.005	0.001	0.005	0.005	0.004	0.004	0.000	0.000	0.003	0.002	0.001
Mg	2.691	2.483	2.442	2.544	2.525	2.515	2.550	2.674	2.788	2.667	2.486	2.567	2.620	2.697
Ca	1.594	1.545	1.528	1.541	1.558	1.699	1.670	1.669	1.663	1.646	1.648	1.727	1.715	1.717
Mn	0.008	0.008	0.010	0.008	0.008	0.007	0.005	0.007	0.003	0.009	0.006	0.010	0.009	0.007
Fe^{2+}	1.085	1.125	1.161	1.119	1.159	1.265	1.183	1.147	1.094	1.143	1.235	1.226	1.193	1.139
Na	0.592	0.618	0.654	0.617	0.632	0.595	0.558	0.554	0.500	0.560	0.607	0.583	0.530	0.497
K	0.104	0.142	0.136	0.134	0.132	0.101	0.107	0.096	0.087	0.097	0.113	0.110	0.097	0.073
Total	15.422	15.441	15.457	15.427	15.454	15.493	15.448	15.434	15.366	15.423	15.476	15.520	15.449	15.409
%Fe^{2+}	30.029	29.913	29.721	29.971	28.840	21.539	25.207	26.210	27.323	27.088	23.796	22.482	23.982	27.516
X_{Mg}	0.713	0.688	0.678	0.695	0.685	0.665	0.683	0.700	0.718	0.700	0.668	0.677	0.687	0.703

	Q 09 B F1 Amph1 11	Q 09 B F1 Amph1 12	Q 09 B F1 Amph1 13	Q 09 B F1 Amph1 14	Q 09 B F1 Amph1 15	Q 09 B F1 Amph1 16	Q 09 B F1 Amph1 17	Q 09 B F1 Amph1 18	Q 09 B F1 Amph1 19	Q 09 B F1 Amph1 20	Q 09 B F1 Amph1 21	Q 09 B F1 Amph1 22	Q 09 B F1 Amph1 23	Q 09 B F1 Amph1 24
Analysis														
SiO_2	46.48	46.81	47.01	46.71	46.73	46.95	47.60	47.20	47.17	47.32	45.92	46.23	45.70	44.29
TiO_2	0.63	0.35	0.51	0.44	0.48	0.47	0.52	0.48	0.44	0.48	0.61	0.53	0.63	0.71
Al_2O_3	13.30	13.31	13.22	13.80	13.51	12.95	13.38	13.22	13.55	13.41	14.82	14.52	14.55	15.84
Fe_2O_3	4.21	4.35	4.35	5.00	6.10	3.73	4.69	4.47	3.92	3.57	3.98	4.89	4.61	4.10
Cr_2O_3	0.02	0.02	0.00	0.01	0.04	0.03	0.01	0.03	0.03	0.02	0.08	0.07	0.03	0.06
MgO	13.42	13.47	13.47	13.45	13.09	13.78	13.55	13.59	13.45	13.31	12.60	13.11	12.76	11.61
CaO	10.92	11.05	10.74	10.45	9.84	11.06	9.89	10.05	10.17	9.95	10.35	10.06	10.02	10.10
MnO	0.07	0.07	0.06	0.06	0.06	0.07	0.05	0.03	0.05	0.03	0.09	0.03	0.09	0.05
FeO	9.21	9.17	8.95	8.35	8.58	8.61	8.07	8.10	8.36	8.52	9.16	8.20	8.79	9.81
Na_2O	2.08	1.93	1.99	1.96	2.06	1.80	2.20	2.20	2.27	2.43	2.29	2.18	2.38	2.40
K_2O	0.48	0.46	0.47	0.63	0.62	0.55	0.62	0.58	0.63	0.60	0.65	0.71	0.75	0.79
Total	100.82	100.99	100.77	100.85	101.12	99.99	100.57	99.94	100.03	99.66	100.54	100.52	100.30	99.76
Cations														
Si	6.519	6.548	6.576	6.522	6.526	6.605	6.633	6.624	6.615	6.655	6.449	6.472	6.437	6.305
Ti	0.067	0.037	0.054	0.046	0.051	0.050	0.054	0.050	0.047	0.051	0.064	0.056	0.067	0.076
Al	2.198	2.194	2.179	2.272	2.224	2.148	2.198	2.186	2.239	2.224	2.452	2.395	2.415	2.658
Fe^{3+}	0.444	0.458	0.458	0.525	0.641	0.395	0.491	0.472	0.414	0.378	0.421	0.515	0.489	0.439
Cr	0.003	0.002	0.000	0.001	0.005	0.004	0.001	0.004	0.003	0.002	0.009	0.008	0.004	0.006
Mg	2.807	2.810	2.809	2.799	2.725	2.891	2.814	2.843	2.812	2.791	2.638	2.737	2.680	2.465
Ca	1.640	1.656	1.610	1.563	1.473	1.666	1.477	1.511	1.528	1.500	1.558	1.508	1.512	1.540
Mn	0.008	0.008	0.007	0.007	0.007	0.008	0.006	0.004	0.006	0.004	0.010	0.003	0.011	0.006
Fe^{2+}	1.080	1.073	1.047	0.975	1.003	1.013	0.940	0.951	0.981	1.002	1.075	0.960	1.035	1.168
Na	0.566	0.523	0.540	0.529	0.558	0.491	0.594	0.599	0.617	0.663	0.623	0.592	0.649	0.661
K	0.086	0.082	0.084	0.112	0.110	0.099	0.109	0.104	0.114	0.108	0.116	0.127	0.134	0.144
Total	15.418	15.391	15.363	15.354	15.322	15.367	15.319	15.346	15.375	15.378	15.415	15.373	15.434	15.470
%Fe^{2+}	29.150	29.918	30.438	34.993	39.017	28.054	34.325	33.155	29.658	27.382	28.117	34.908	32.073	27.321
X_{Mg}	0.722	0.724	0.728	0.742	0.731	0.741	0.750	0.749	0.741	0.736	0.710	0.740	0.721	0.678

	Q63B F12 Amph 3 2	Q63B F12 Amph 3 3	Q63B F12 Amph 3 4	Q63B F12 Amph 3 5	Q63B F12 Amph 3 6	Q63B F12 Amph 3 7	Q63B F12 Amph 3 8	Q63B F12 Amph 3 9	Q63B F13 Amph 3 1	Q63B F13 Amph 3 2	Q63B F13 Amph 3 3	Q63B F13 Amph 3 4	Q63B F13 Amph 3 5	Q63B F13 Amph 3 6
Analysis														
SiO_2	40.87	40.60	40.28	40.65	40.53	40.61	40.51	40.71	40.87	41.03	40.83	40.79	41.11	41.16
TiO_2	1.84	1.70	1.97	1.87	1.82	1.82	1.62	1.43	1.86	1.83	2.01	1.90	2.04	1.89
Al_2O_3	12.09	11.95	11.94	11.99	12.09	12.02	11.73	12.13	11.67	11.72	11.71	11.66	11.66	11.61
Fe_2O_3	3.57	3.75	3.19	3.58	3.26	4.08	4.33	4.62	3.92	3.52	2.75	3.85	3.60	3.54
Cr_2O_3	0.00	0.00	0.01	0.01	0.01	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.00
MgO	7.12	7.01	6.99	7.18	7.09	7.14	7.33	7.22	7.37	7.16	7.12	7.36	7.29	7.42
CaO	11.83	11.78	11.83	11.69	11.70	11.94	11.85	11.95	11.96	11.86	11.77	11.48	11.77	11.81
MnO	0.27	0.27	0.28	0.26	0.24	0.25	0.27	0.29	0.29	0.26	0.28	0.27	0.27	0.30
FeO	18.33	18.34	18.71	18.06	18.32	18.12	17.39	17.46	17.72	18.33	18.73	17.80	18.24	18.00
Na_2O	0.86	0.91	1.03	0.81	0.92	0.85	0.80	0.81	0.75	0.78	0.93	0.88	0.76	0.82
K_2O	1.69	1.68	1.74	1.75	1.72	1.72	1.61	1.60	1.64	1.68	1.68	1.67	1.72	1.65
Total	98.47	97.98	97.97	97.86	97.71	98.56	97.45	98.23	98.07	98.19	97.82	97.66	98.46	98.20
Cations														
Si	6.239	6.238	6.204	6.241	6.236	6.204	6.242	6.223	6.256	6.279	6.277	6.267	6.272	6.288
Ti	0.211	0.196	0.229	0.216	0.211	0.209	0.188	0.165	0.214	0.211	0.232	0.220	0.234	0.217
Al	2.175	2.163	2.167	2.169	2.193	2.165	2.129	2.186	2.105	2.114	2.122	2.111	2.096	2.091
Fe^{3+}	0.410	0.433	0.369	0.414	0.378	0.469	0.502	0.532	0.452	0.405	0.318	0.445	0.413	0.407
Cr	0.000	0.000	0.002	0.002	0.001	0.003	0.000	0.000	0.002	0.003	0.000	0.000	0.001	0.000
Mg	1.620	1.606	1.605	1.643	1.626	1.625	1.684	1.646	1.682	1.634	1.633	1.686	1.658	1.690
Ca	1.936	1.940	1.953	1.923	1.929	1.954	1.955	1.958	1.962	1.944	1.940	1.890	1.923	1.933
Mn	0.035	0.035	0.037	0.034	0.031	0.032	0.035	0.037	0.038	0.034	0.037	0.036	0.035	0.038
Fe^{2+}	2.340	2.357	2.410	2.318	2.357	2.314	2.241	2.232	2.269	2.346	2.409	2.286	2.328	2.300
Na	0.256	0.271	0.307	0.242	0.274	0.251	0.240	0.241	0.222	0.230	0.277	0.261	0.225	0.243
K	0.328	0.329	0.342	0.343	0.337	0.335	0.317	0.312	0.320	0.327	0.330	0.328	0.335	0.321
Total	15.550	15.568	15.623	15.543	15.573	15.561	15.533	15.530	15.522	15.528	15.574	15.530	15.520	15.529
%Fe^{2+}	14.897	15.529	13.282	15.141	13.815	16.863	18.316	19.239	16.610	14.737	11.663	16.300	15.074	15.037
X_{Mg}	0.409	0.405	0.400	0.415	0.408	0.413	0.429	0.424	0.426	0.411	0.404	0.424	0.416	0.424

	Q63B F13 Amph 3 7	Q63B F13 Amph 3 8	Q63B F13 Amph 3 9	Q63B F13 Amph 3 10	Q63B F13 Amph 3 11	Q63B F13 Amph 3 12	Q63B F13 Amph 3 13	Q63B F13 Amph 3 14	Q63B F13 Amph 3 15	Q63B F13 Amph 3 16	Q63B F13 Amph 3 17	Q63B F13 Amph 3 18	Q63B F13 Amph 3 20	Q63B F13 Amph blau 4 1
Analysis														
SiO_2	41.00	40.96	40.93	40.75	40.74	40.69	40.64	40.80	40.84	40.65	41.18	41.06	41.25	41.10
TiO_2	1.87	2.00	2.05	2.18	1.95	2.22	1.93	1.94	2.08	2.07	2.01	1.84	1.57	0.82
Al_2O_3	11.54	11.72	11.63	11.76	11.72	11.49	11.46	11.57	11.59	11.62	11.62	11.66	11.44	12.37
Fe_2O_3	3.52	3.56	3.51	3.16	3.22	3.52	2.99	3.01	2.71	2.99	3.07	3.10	3.36	5.36
Cr_2O_3	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.03	0.03	0.00	0.00	0.03
MgO	7.30	7.30	7.36	7.17	7.14	7.38	7.26	7.20	7.22	7.37	7.26	7.37	7.43	7.74
CaO	11.58	12.04	11.56	11.58	11.61	11.67	11.69	11.65	11.72	11.75	11.69	11.76	11.88	12.01
MnO	0.30	0.29	0.25	0.30	0.27	0.28	0.25	0.27	0.28	0.32	0.28	0.32	0.28	0.23
FeO	18.15	18.13	18.04	18.56	18.59	18.19	18.57	18.44	18.76	18.27	18.81	18.24	17.98	16.43
Na_2O	0.83	0.81	0.83	0.95	1.00	0.96	1.05	0.89	1.00	0.98	1.02	0.91	0.81	0.84
K_2O	1.74	1.59	1.69	1.72	1.70	1.67	1.68	1.71	1.67	1.73	1.70	1.68	1.62	1.63
Total	97.83	98.40	97.84	98.15	97.96	98.10	97.54	97.50	97.86	97.77	98.66	97.95	97.61	98.55
Cations														
Si	6.294	6.253	6.277	6.247	6.259	6.240	6.273	6.288	6.277	6.252	6.280	6.293	6.335	6.237
Ti	0.216	0.230	0.236	0.251	0.226	0.256	0.224	0.225	0.241	0.239	0.230	0.213	0.181	0.094
Al	2.087	2.109	2.102	2.125	2.123	2.077	2.085	2.102	2.100	2.106	2.089	2.106	2.071	2.212
Fe^{3+}	0.407	0.409	0.405	0.364	0.372	0.407	0.347	0.350	0.313	0.347	0.352	0.358	0.388	0.612
Cr	0.002	0.000	0.000	0.001	0.001	0.002	0.001	0.002	0.000	0.003	0.003	0.000	0.000	0.004
Mg	1.669	1.661	1.682	1.639	1.636	1.688	1.671	1.655	1.654	1.691	1.651	1.683	1.701	1.750
Ca	1.904	1.969	1.899	1.903	1.910	1.918	1.934	1.924	1.930	1.936	1.910	1.932	1.954	1.953
Mn	0.039	0.038	0.033	0.040	0.036	0.037	0.032	0.035	0.036	0.042	0.036	0.041	0.036	0.029
Fe^{2+}	2.330	2.315	2.314	2.379	2.389	2.333	2.397	2.377	2.411	2.350	2.400	2.338	2.309	2.084
Na	0.246	0.240	0.245	0.282	0.298	0.286	0.313	0.265	0.298	0.291	0.302	0.272	0.241	0.247
K	0.340	0.309	0.331	0.336	0.332	0.326	0.331	0.336	0.328	0.339	0.330	0.328	0.317	0.315
Total	15.535	15.533	15.523	15.566	15.583	15.568	15.608	15.559	15.588	15.596	15.583	15.562	15.534	15.537
%Fe^{2+}	14.854	15.022	14.883	13.286	13.477	14.841	12.637	12.819	11.501	12.850	12.803	13.262	14.382	22.685
X_{Mg}	0.417	0.418	0.421	0.408	0.407	0.420	0.411	0.410	0.407	0.418	0.408	0.419	0.424	0.456

	Q63B F13 Amph blau 4 2	Q63B F13 Amph blau 4 3	Q63B F13 Amph blau 4 4	Q63B F13 Amph blau 4 5	Q63B F13 Amph blau 4 6	Q63B F13 Amph blau 4 7	Q63B F13 Amph blau 4 8	Q63B F13 Amph blau 4 9	Q63B F13 Amph blau	Q63B F13 Amph blau	Q63B F13 Amph blau	Q63B F13 Amph blau	Q63B F13 Amph blau	Q64E F10 Amph 1 12
Analysis														
SiO_2	41.64	41.17	41.06	41.31	41.18	41.47	41.77	41.41	42.08	41.41	40.99	41.60	40.93	40.61
TiO_2	0.72	0.97	0.93	1.02	0.88	0.84	0.77	0.89	0.89	1.00	1.00	0.75	0.68	1.78
Al_2O_3	12.07	12.53	12.38	12.55	11.95	11.94	11.96	12.00	11.63	11.83	12.87	12.41	13.21	14.15
Fe_2O_3	4.83	4.56	4.97	4.65	5.44	5.23	5.39	4.97	4.85	4.98	4.31	4.33	4.57	5.51
Cr_2O_3	0.00	0.00	0.01	0.00	0.01	0.00	0.03	0.03	0.02	0.02	0.01	0.00	0.00	0.02
MgO	7.78	7.68	7.67	7.58	7.88	7.71	7.90	7.80	7.90	7.77	7.39	7.70	7.12	9.08
CaO	11.91	11.87	11.90	11.90	12.03	11.78	12.08	11.93	11.98	12.05	11.97	11.94	11.85	11.43
MnO	0.29	0.24	0.26	0.28	0.25	0.24	0.27	0.26	0.29	0.29	0.26	0.26	0.32	0.12
FeO	16.54	16.73	16.71	17.03	16.48	16.71	16.57	16.53	16.87	16.39	17.12	16.64	16.68	13.03
Na_2O	0.80	0.87	0.92	0.91	0.92	0.83	0.87	0.80	0.81	0.67	0.91	0.84	0.74	0.90
K_2O	1.51	1.63	1.62	1.61	1.60	1.58	1.51	1.56	1.50	1.48	1.56	1.39	1.44	1.20
Total	98.09	98.24	98.42	98.84	98.60	98.32	99.12	98.19	98.82	97.87	98.39	97.86	97.55	97.84
Cations														
Si	6.328	6.257	6.241	6.250	6.253	6.304	6.296	6.297	6.356	6.311	6.229	6.325	6.252	6.082
Ti	0.082	0.110	0.107	0.116	0.100	0.096	0.087	0.102	0.101	0.114	0.115	0.086	0.078	0.201
Al	2.162	2.245	2.217	2.238	2.138	2.139	2.125	2.150	2.070	2.125	2.305	2.225	2.378	2.497
Fe^{3+}	0.552	0.522	0.569	0.530	0.622	0.598	0.611	0.569	0.552	0.571	0.492	0.495	0.526	0.621
Cr	0.000	0.000	0.001	0.000	0.001	0.000	0.004	0.003	0.003	0.002	0.001	0.000	0.000	0.002
Mg	1.763	1.740	1.737	1.710	1.783	1.746	1.776	1.768	1.778	1.764	1.674	1.744	1.622	2.026
Ca	1.940	1.932	1.938	1.928	1.957	1.919	1.951	1.944	1.940	1.968	1.949	1.946	1.940	1.834
Mn	0.037	0.032	0.033	0.035	0.032	0.031	0.034	0.034	0.038	0.037	0.033	0.034	0.041	0.015
Fe^{2+}	2.103	2.126	2.124	2.155	2.092	2.124	2.089	2.102	2.131	2.089	2.176	2.116	2.131	1.632
Na	0.236	0.256	0.270	0.268	0.270	0.244	0.254	0.236	0.238	0.197	0.269	0.247	0.219	0.262
K	0.293	0.315	0.315	0.310	0.309	0.306	0.291	0.302	0.288	0.287	0.302	0.269	0.281	0.229
Total	15.497	15.535	15.551	15.540	15.557	15.506	15.519	15.509	15.494	15.467	15.543	15.488	15.468	15.403
%Fe^{2+}	20.807	19.696	21.130	19.734	22.913	21.973	22.632	21.304	20.562	21.473	18.451	18.966	19.792	27.567
X_{Mg}	0.456	0.450	0.450	0.443	0.460	0.451	0.460	0.457	0.455	0.458	0.435	0.452	0.432	0.554

	Q64E F10 Amph 1 13	Q64E F10 Amph 1 14	Q64E F10 Amph 1 15	Q64E F10 Amph 1 16	Q64E F10 Amph 1 17	Q64E F10 Amph 1 18	Q64E F10 Amph 1 19	Q64E F10 Amph 1 20	Q64E F10 Amph 1 21	Q64E F10 Amph 1 22	Q64E F10 Amph 1 23	Q64E F10 Amph 1 24	Q64E F10 Amph 1 25	Q64E F10 Amph 1 26
Analysis														
SiO_2	40.95	40.52	40.78	40.54	40.66	41.24	41.29	41.23	40.82	40.76	40.62	41.23	40.64	42.94
TiO_2	1.65	1.65	1.89	1.85	1.65	1.71	1.74	1.80	1.72	1.75	1.77	1.72	1.67	0.70
Al_2O_3	14.00	14.15	14.32	14.02	14.07	14.14	14.32	14.33	14.31	14.54	14.00	14.29	13.84	12.79
Fe_2O_3	5.43	5.01	5.49	5.19	5.77	5.06	5.49	5.75	6.36	5.50	5.77	5.41	5.60	6.33
Cr_2O_3	0.02	0.01	0.00	0.04	0.05	0.04	0.01	0.05	0.01	0.03	0.03	0.02	0.07	0.03
MgO	9.25	9.08	9.27	8.96	9.18	9.20	9.23	9.27	9.24	9.02	9.16	9.17	9.13	10.03
CaO	11.36	11.16	11.32	11.23	11.42	11.40	11.42	11.49	11.34	11.31	11.35	11.49	11.30	11.47
MnO	0.10	0.13	0.16	0.13	0.13	0.09	0.14	0.10	0.09	0.11	0.14	0.13	0.12	0.17
FeO	13.08	13.19	12.93	13.21	12.58	13.45	12.98	13.07	12.58	13.07	12.97	13.24	12.91	11.70
Na_2O	0.99	1.04	0.97	0.86	0.79	0.99	0.85	0.90	0.85	0.91	0.96	0.90	0.92	0.90
K_2O	1.21	1.26	1.28	1.25	1.21	1.20	1.19	1.25	1.26	1.21	1.23	1.21	1.17	0.47
Total	98.04	97.21	98.41	97.27	97.50	98.53	98.66	99.23	98.58	98.21	97.99	98.82	97.37	97.54
Cations														
Si	6.116	6.104	6.068	6.106	6.099	6.128	6.116	6.084	6.063	6.074	6.079	6.108	6.112	6.369
Ti	0.185	0.187	0.211	0.209	0.187	0.192	0.194	0.200	0.193	0.197	0.199	0.191	0.189	0.079
Al	2.464	2.513	2.511	2.488	2.487	2.475	2.500	2.493	2.505	2.554	2.469	2.495	2.454	2.235
Fe^{3+}	0.611	0.568	0.615	0.588	0.652	0.565	0.611	0.639	0.710	0.616	0.649	0.603	0.634	0.706
Cr	0.003	0.002	0.000	0.005	0.005	0.005	0.002	0.005	0.002	0.003	0.003	0.003	0.009	0.004
Mg	2.060	2.040	2.056	2.011	2.052	2.038	2.038	2.039	2.046	2.003	2.043	2.025	2.047	2.217
Ca	1.818	1.802	1.805	1.812	1.836	1.815	1.813	1.816	1.804	1.807	1.820	1.824	1.820	1.823
Mn	0.013	0.016	0.020	0.017	0.016	0.011	0.018	0.012	0.011	0.013	0.017	0.016	0.015	0.021
Fe^{2+}	1.633	1.662	1.609	1.663	1.578	1.672	1.608	1.614	1.562	1.629	1.623	1.640	1.623	1.451
Na	0.286	0.305	0.280	0.250	0.230	0.286	0.243	0.256	0.245	0.262	0.278	0.260	0.269	0.259
K	0.230	0.242	0.243	0.241	0.231	0.228	0.224	0.236	0.238	0.230	0.235	0.229	0.225	0.090
Total	15.418	15.440	15.419	15.390	15.373	15.415	15.367	15.394	15.378	15.389	15.417	15.395	15.397	15.254
%Fe^{2+}	27.218	25.485	27.657	26.132	29.225	25.270	27.546	28.353	31.259	27.450	28.580	26.869	28.083	32.742
X_{Mg}	0.558	0.551	0.561	0.547	0.565	0.549	0.559	0.558	0.567	0.551	0.557	0.552	0.558	0.604

	Q64E F10 Amph 1 27	Q64E F12 Amph 1 1	Q64E F12 Amph 1 2	Q64E F12 Amph 1 3	Q64E F12 Amph 1 4	Q64E F12 Amph 1 5	Q64E F12 Amph 1 6	Q64E F12 Amph 1 7	Q64E F12 Amph 1 8	Q64E F12 Amph 1 9	Q64E F12 Amph 1 10	Q64E F12 Amph 1 11	Q64E F12 Amph 1 12	Q64E F12 Amph 1 13
Analysis														
SiO_2	41.84	41.92	41.90	42.73	41.69	41.04	41.91	42.49	41.41	41.14	40.91	41.01	40.86	41.38
TiO_2	1.14	1.15	1.10	1.12	1.33	1.36	1.22	1.15	1.03	1.28	1.26	1.28	1.12	1.34
Al_2O_3	13.09	13.48	13.31	12.60	14.09	13.97	13.90	12.98	14.77	14.20	14.56	14.62	14.70	14.56
Fe_2O_3	6.24	5.84	6.37	6.39	6.40	6.32	6.21	6.12	5.86	5.76	5.82	5.56	6.04	6.28
Cr_2O_3	0.05	0.01	0.00	0.01	0.05	0.03	0.01	0.03	0.01	0.05	0.00	0.00	0.02	0.05
MgO	9.51	10.05	10.34	10.74	10.12	9.99	10.21	10.62	9.60	9.87	9.61	9.68	9.66	9.98
CaO	11.22	11.47	11.18	11.39	11.44	11.30	11.47	11.51	11.46	11.53	11.48	11.32	11.43	11.45
MnO	0.11	0.09	0.11	0.14	0.09	0.13	0.14	0.09	0.10	0.11	0.10	0.08	0.09	0.11
FeO	12.34	11.86	11.07	11.16	11.53	11.39	11.58	11.36	11.66	11.83	11.93	11.99	11.64	11.48
Na_2O	0.86	0.91	0.90	0.94	0.89	0.91	0.96	0.88	1.08	0.94	0.85	0.95	0.89	0.92
K_2O	0.85	1.04	1.03	0.95	1.26	1.28	1.17	1.12	0.63	1.25	1.34	1.30	1.27	1.22
Total	97.26	97.83	97.31	98.16	98.88	97.72	98.78	98.37	97.62	97.95	97.86	97.77	97.72	98.76
Cations														
Si	6.263	6.228	6.240	6.308	6.135	6.116	6.170	6.267	6.145	6.120	6.094	6.107	6.088	6.095
Ti	0.129	0.128	0.123	0.124	0.147	0.152	0.135	0.128	0.115	0.143	0.141	0.144	0.126	0.149
Al	2.310	2.361	2.335	2.192	2.444	2.454	2.412	2.257	2.583	2.489	2.556	2.565	2.581	2.527
Fe^{3+}	0.703	0.653	0.714	0.710	0.708	0.708	0.688	0.679	0.654	0.645	0.653	0.623	0.677	0.696
Cr	0.006	0.001	0.000	0.001	0.006	0.003	0.002	0.004	0.002	0.006	0.000	0.000	0.002	0.005
Mg	2.123	2.225	2.295	2.363	2.221	2.220	2.240	2.336	2.123	2.188	2.135	2.149	2.146	2.191
Ca	1.800	1.826	1.784	1.801	1.804	1.804	1.808	1.819	1.823	1.838	1.832	1.805	1.825	1.807
Mn	0.014	0.012	0.014	0.017	0.011	0.017	0.018	0.011	0.013	0.013	0.012	0.010	0.012	0.014
Fe^{2+}	1.545	1.473	1.379	1.378	1.419	1.420	1.425	1.402	1.446	1.472	1.487	1.493	1.450	1.413
Na	0.249	0.263	0.260	0.269	0.253	0.264	0.275	0.252	0.311	0.271	0.246	0.274	0.258	0.262
K	0.162	0.197	0.196	0.178	0.236	0.243	0.219	0.211	0.119	0.237	0.255	0.246	0.242	0.229
Total	15.304	15.367	15.340	15.340	15.383	15.402	15.392	15.366	15.335	15.422	15.411	15.416	15.406	15.388
%Fe^{2+}	31.280	30.723	34.112	34.005	33.298	33.279	32.563	32.629	31.151	30.459	30.515	29.443	31.839	32.997
X_{Mg}	0.579	0.602	0.625	0.632	0.610	0.610	0.611	0.625	0.595	0.598	0.589	0.590	0.597	0.608

	Q64E F12 Amph 1 14	Q64E F12 Amph 1 15	Q64E F12 Amph 1 16	Q64E F12 Amph 1 17	Q64E F12 Amph 1 18	Q64E F12 Amph 1 19	Q64E F12 Amph 1 20	Q64E F12 Amph 1 21
Analysis								
SiO_2	41.03	41.10	41.54	41.27	41.40	41.31	41.56	41.28
TiO_2	1.37	1.22	0.98	1.37	1.31	1.39	1.37	1.35
Al_2O_3	14.49	14.29	14.35	14.28	14.07	14.13	14.25	14.03
Fe_2O_3	5.98	5.84	5.67	6.32	6.03	5.71	6.20	4.84
Cr_2O_3	0.03	0.05	0.04	0.01	0.04	0.02	0.00	0.01
MgO	9.69	9.62	9.55	9.69	9.89	9.85	9.81	9.58
CaO	11.58	11.31	11.69	11.48	11.57	11.55	11.60	11.46
MnO	0.09	0.11	0.15	0.09	0.14	0.14	0.13	0.12
FeO	11.95	11.83	11.92	11.86	11.80	12.01	12.15	12.78
Na_2O	0.91	0.91	0.96	0.82	0.88	0.95	0.96	0.98
K_2O	1.23	1.11	0.71	1.21	1.21	1.21	1.22	1.28
Total	98.35	97.39	97.57	98.40	98.35	98.26	99.25	97.71
Cations								
Si	6.084	6.139	6.179	6.112	6.133	6.128	6.112	6.166
Ti	0.153	0.137	0.110	0.153	0.146	0.155	0.151	0.152
Al	2.533	2.515	2.516	2.493	2.456	2.469	2.469	2.470
Fe^{3+}	0.667	0.657	0.635	0.705	0.672	0.637	0.686	0.545
Cr	0.004	0.006	0.005	0.001	0.004	0.002	0.001	0.001
Mg	2.141	2.142	2.117	2.140	2.184	2.177	2.151	2.134
Ca	1.840	1.810	1.862	1.822	1.837	1.836	1.828	1.834
Mn	0.012	0.014	0.019	0.012	0.017	0.018	0.016	0.015
Fe^{2+}	1.481	1.478	1.482	1.468	1.462	1.489	1.494	1.596
Na	0.262	0.262	0.277	0.234	0.254	0.272	0.275	0.284
K	0.232	0.211	0.135	0.229	0.229	0.230	0.228	0.244
Total	15.408	15.372	15.338	15.368	15.396	15.414	15.410	15.439
%Fe^{2+}	31.065	30.757	29.998	32.424	31.491	29.969	31.462	25.442
X_{Mg}	0.591	0.592	0.588	0.593	0.599	0.594	0.590	0.572

Biotite

Electron microprobe analyses of biotite. Cations based on a 12 oxygen basis. Water was iteratively estimated assuming F + Cl + OH = 2.

	75214D F2 Bt1	75214D F2 Bt2	75214D F2 Bt3	75214D F6 Bt1	75214D F6 Bt3	75214D F6 Bt4	75214D F7 Bt1	75214D F7 Bt2	75214D F7 Bt3	75214D F7 Bt4	75214D F7 Bt5	75223A F4 Bt1	75223A F4 Bt2	75223A F4 Bt4
Analysis														
SiO_2	36.38	36.41	36.60	35.96	36.66	36.38	36.68	36.38	36.44	36.27	36.36	49.33	49.12	49.30
TiO_2	1.65	1.72	1.72	1.55	1.68	1.61	1.63	1.46	1.70	1.74	1.73	1.21	1.00	1.08
Al_2O_3	18.20	18.23	18.33	17.65	18.08	17.79	18.44	18.17	18.30	18.37	18.57	30.07	30.19	29.50
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	10.91	10.64	10.49	10.47	11.02	10.88	10.64	10.80	10.66	10.75	10.71	1.84	1.79	1.92
CaO	0.01	0.01	0.00	0.03	0.01	0.02	0.02	0.01	0.00	0.00	0.02	0.02	0.00	0.00
MnO	0.10	0.16	0.16	0.11	0.10	0.17	0.11	0.10	0.07	0.10	0.13	0.00	0.00	0.03
FeO	19.15	19.10	18.97	18.79	19.29	19.40	18.56	19.01	19.22	19.03	19.06	2.73	2.74	2.92
BaO	0.08	0.03	0.01	0.04	0.08	0.10	0.03	0.06	0.05	0.05	0.07	0.00	0.00	0.00
Na_2O	0.27	0.25	0.29	0.25	0.25	0.31	0.30	0.35	0.28	0.25	0.24	0.34	0.36	0.34
K_2O	9.12	9.22	9.06	9.05	9.07	9.18	9.30	9.26	9.23	9.16	8.98	10.00	10.15	9.85
H_2O	3.93	3.94	3.95	3.84	3.93	3.88	3.91	3.92	3.92	3.94	3.97	4.51	4.49	4.48
F	0.11	0.06	0.05	0.11	0.13	0.17	0.16	0.10	0.12	0.06	0.04	0.00	0.00	0.00
Cl	0.00	0.01	0.02	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Total	99.90	99.78	99.65	97.85	100.31	99.90	99.78	99.61	99.99	99.73	99.87	100.05	99.85	99.42
Total cor.	99.86	99.75	99.63	97.80	100.25	99.82	99.72	99.56	99.94	99.71	99.86	100.05	99.85	99.42
Cations														
Si	2.743	2.748	2.760	2.768	2.752	2.751	2.761	2.752	2.745	2.737	2.736	3.281	3.277	3.300
Ti	0.094	0.097	0.098	0.090	0.095	0.092	0.093	0.083	0.097	0.099	0.098	0.061	0.050	0.054
Al	1.617	1.622	1.629	1.600	1.599	1.586	1.636	1.620	1.625	1.634	1.647	2.357	2.373	2.327
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.226	1.197	1.179	1.201	1.234	1.227	1.194	1.217	1.197	1.210	1.201	0.182	0.178	0.192
Ca	0.001	0.001	0.000	0.003	0.001	0.002	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000
Mn	0.007	0.010	0.010	0.007	0.006	0.011	0.007	0.006	0.005	0.006	0.008	0.000	0.000	0.002
Fe^{2+}	1.207	1.206	1.196	1.209	1.211	1.227	1.168	1.202	1.211	1.201	1.200	0.152	0.153	0.164
Ba	0.002	0.001	0.000	0.001	0.002	0.003	0.001	0.002	0.002	0.001	0.002	0.000	0.000	0.000
Na	0.039	0.036	0.042	0.037	0.036	0.045	0.043	0.051	0.041	0.036	0.035	0.044	0.047	0.043
K	0.877	0.888	0.871	0.888	0.869	0.885	0.893	0.893	0.887	0.882	0.862	0.848	0.864	0.841
Total	7.814	7.806	7.785	7.805	7.805	7.829	7.797	7.827	7.809	7.806	7.791	6.926	6.942	6.924
Volatiles														
OH	1.975	1.983	1.986	1.973	1.967	1.956	1.963	1.977	1.970	1.985	1.991	1.999	1.999	2.000
F	0.026	0.015	0.012	0.027	0.032	0.041	0.037	0.023	0.030	0.014	0.009	0.000	0.000	0.000
Cl	0.000	0.002	0.002	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
X_{Mg}	0.504	0.498	0.496	0.498	0.505	0.500	0.505	0.503	0.497	0.502	0.500	0.545	0.538	0.540

	75248C F1 Bt	75248C F1 Bt	75248C F1 Bt	75248C F1 Bt	75248C F1 Bt	75248C F1 Bt1	75248C F1 Bt1	75248C F1 Bt1	75248C F1 Bt1	75248C F1 Bt1	75248C F1 Bt1	75248C F3 Bt2	75248C F3 Bt3
Analysis													
SiO_2	34.72	34.89	35.02	35.21	34.81	35.06	35.01	35.11	35.00	35.10	35.27	35.13	34.84	34.61
TiO_2	3.37	3.10	3.11	3.33	3.81	3.61	3.60	3.46	3.32	3.41	3.71	3.76	3.80	3.78
Al_2O_3	19.03	19.32	19.68	19.64	19.59	19.70	19.58	19.60	19.61	19.72	19.43	19.50	19.48	19.25
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	6.60	6.61	6.42	6.58	6.36	6.38	6.15	6.39	6.40	6.44	6.40	6.28	6.78	6.61
CaO	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.22	0.18	0.18	0.20	0.19	0.23	0.18	0.22	0.23	0.20	0.24	0.17	0.26	0.24
FeO	23.00	23.07	22.57	22.19	21.72	21.45	22.42	22.83	22.66	22.14	22.28	22.46	22.17	21.99
BaO	0.07	0.05	0.08	0.12	0.07	0.10	0.04	0.03	0.04	0.02	0.10	0.06	0.09	0.10
Na_2O	0.07	0.06	0.10	0.07	0.08	0.08	0.10	0.09	0.12	0.09	0.07	0.07	0.08	0.06
K_2O	9.71	9.70	9.67	9.78	9.75	9.82	9.90	9.80	9.90	9.74	9.84	9.71	9.73	9.60
H_2O	3.87	3.90	3.89	3.92	3.91	3.90	3.89	3.92	3.88	3.89	3.92	3.89	3.88	3.87
F	0.08	0.04	0.08	0.06	0.04	0.06	0.09	0.07	0.13	0.09	0.07	0.10	0.13	0.06
Cl	0.04	0.05	0.03	0.02	0.01	0.05	0.03	0.01	0.04	0.05	0.04	0.04	0.06	0.05
Total	100.77	100.95	100.84	101.11	100.34	100.44	100.98	101.52	101.31	100.87	101.36	101.19	101.31	100.22
Total cor.	100.73	100.92	100.79	101.08	100.32	100.41	100.93	101.49	101.25	100.82	101.32	101.14	101.24	100.18
Cations														
Si	2.658	2.662	2.668	2.670	2.657	2.670	2.664	2.659	2.659	2.667	2.671	2.666	2.643	2.651
Ti	0.194	0.178	0.178	0.190	0.219	0.207	0.206	0.197	0.190	0.195	0.211	0.215	0.217	0.218
Al	1.717	1.738	1.766	1.756	1.762	1.768	1.756	1.750	1.756	1.766	1.735	1.744	1.741	1.738
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.754	0.751	0.729	0.744	0.723	0.725	0.698	0.721	0.725	0.729	0.723	0.710	0.766	0.755
Ca	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.014	0.012	0.011	0.013	0.012	0.015	0.012	0.014	0.014	0.013	0.015	0.011	0.017	0.015
Fe^{2+}	1.473	1.472	1.438	1.407	1.387	1.367	1.427	1.446	1.440	1.407	1.411	1.425	1.406	1.409
Ba	0.002	0.001	0.002	0.003	0.002	0.003	0.001	0.001	0.001	0.001	0.003	0.002	0.003	0.003
Na	0.010	0.009	0.015	0.010	0.012	0.012	0.014	0.013	0.017	0.013	0.011	0.011	0.012	0.008
K	0.948	0.944	0.939	0.946	0.949	0.954	0.961	0.947	0.959	0.944	0.951	0.940	0.941	0.938
Total	7.769	7.768	7.748	7.740	7.724	7.722	7.739	7.748	7.762	7.734	7.731	7.723	7.746	7.735
Volatiles														
OH	1.977	1.985	1.976	1.983	1.989	1.981	1.974	1.981	1.964	1.973	1.978	1.970	1.961	1.978
F	0.018	0.009	0.020	0.014	0.010	0.013	0.022	0.018	0.031	0.020	0.017	0.025	0.032	0.015
Cl	0.005	0.006	0.004	0.003	0.001	0.006	0.003	0.002	0.005	0.006	0.005	0.005	0.008	0.007
X_{Mg}	0.339	0.338	0.337	0.346	0.343	0.347	0.329	0.333	0.335	0.341	0.339	0.333	0.353	0.349

	75248C F3 Bt4	75248C F3 Bt5	75251E F3 Bt1	75251E F3 Bt2	75251E F3 Bt3	75251E F3 Bt4	75251E F4 Bt1	75251E F4 Bt2	75251E F4 Bt3	75251E F4 Bt4	75251E F4 Bt5	75251E F4 Bt6	75251E F4 Bt8	75251E F4 Bt9
Analysis														
SiO_2	34.49	34.67	35.45	34.80	35.22	35.34	35.36	35.11	35.37	35.17	35.05	35.03	35.01	34.90
TiO_2	4.14	4.80	3.63	3.44	3.56	3.39	3.23	3.45	3.29	3.37	3.44	3.63	3.63	3.52
Al_2O_3	18.81	18.87	18.70	18.85	19.06	18.61	18.55	18.34	18.72	18.63	18.63	19.08	18.77	18.40
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	6.70	6.39	6.37	6.50	6.46	6.60	6.97	6.85	6.84	6.89	6.96	6.48	6.67	6.95
CaO	0.00	0.01	0.01	0.02	0.02	0.01	0.04	0.00	0.01	0.00	0.01	0.02	0.01	0.02
MnO	0.24	0.25	0.22	0.19	0.20	0.24	0.23	0.22	0.27	0.25	0.20	0.27	0.25	0.24
FeO	22.06	22.24	20.18	21.53	21.80	21.23	20.37	20.69	21.53	22.54	20.41	19.95	22.45	21.57
BaO	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.08	0.09	0.09	0.08	0.08	0.08	0.07
K_2O	9.70	9.74	9.58	9.36	9.63	9.46	9.46	9.67	9.62	9.56	9.51	9.45	9.44	9.64
H_2O	3.87	3.88	3.76	3.84	3.86	3.77	3.77	3.76	3.81	3.83	3.75	3.79	3.79	3.78
F	0.08	0.12	0.22	0.03	0.10	0.21	0.18	0.18	0.17	0.15	0.23	0.15	0.23	0.18
Cl	0.03	0.04	0.07	0.08	0.05	0.07	0.08	0.07	0.07	0.06	0.06	0.06	0.07	0.06
Total	100.25	101.21	98.27	98.73	100.05	99.04	98.34	98.41	99.78	100.56	98.32	97.97	100.40	99.33
Total cor.	100.21	101.15	98.16	98.71	100.00	98.94	98.25	98.32	99.69	100.48	98.21	97.90	100.29	99.24
Cations														
Si	2.646	2.637	2.742	2.695	2.695	2.726	2.736	2.725	2.713	2.689	2.716	2.714	2.680	2.695
Ti	0.239	0.274	0.211	0.200	0.205	0.197	0.188	0.201	0.190	0.194	0.200	0.212	0.209	0.205
Al	1.700	1.691	1.705	1.720	1.719	1.692	1.691	1.677	1.692	1.679	1.701	1.743	1.693	1.674
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.767	0.725	0.734	0.751	0.737	0.759	0.804	0.792	0.782	0.785	0.804	0.749	0.761	0.800
Ca	0.000	0.000	0.001	0.001	0.002	0.001	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.002
Mn	0.015	0.016	0.014	0.012	0.013	0.016	0.015	0.014	0.017	0.016	0.013	0.018	0.016	0.016
Fe^{2+}	1.415	1.415	1.306	1.395	1.394	1.369	1.318	1.342	1.381	1.441	1.322	1.293	1.437	1.393
Ba	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.013	0.013	0.014	0.015	0.014	0.016	0.015	0.012	0.014	0.013	0.012	0.012	0.012	0.011
K	0.950	0.945	0.946	0.925	0.940	0.931	0.934	0.957	0.941	0.933	0.940	0.934	0.922	0.949
Total	7.747	7.722	7.674	7.714	7.719	7.705	7.705	7.721	7.730	7.750	7.709	7.675	7.731	7.744
Volatiles														
OH	1.978	1.966	1.938	1.984	1.970	1.941	1.947	1.947	1.948	1.955	1.936	1.957	1.936	1.947
F	0.018	0.029	0.053	0.006	0.024	0.050	0.043	0.045	0.042	0.037	0.056	0.036	0.055	0.045
Cl	0.004	0.005	0.009	0.010	0.006	0.009	0.010	0.009	0.010	0.008	0.008	0.008	0.009	0.008
X_{Mg}	0.351	0.339	0.360	0.350	0.346	0.357	0.379	0.371	0.362	0.353	0.378	0.367	0.346	0.365

	75254A F5 Bt1	75254A F5 Bt2	75254A F5 Bt3	75254A F5 Bt4	75254A F5 Bt5	75254A F5 Bt6	75254A F6 Bt1	75254A F6 Bt2	75254A F6 Bt3	75254A F6 Bt4	75254A F6 Bt5	75254A F1 Bt1	75254A F1 Bt2	75254A F1 Bt3
Analysis														
SiO_2	37.51	37.59	37.26	37.51	37.44	37.66	36.87	37.08	37.06	37.22	37.44	36.88	37.27	36.91
TiO_2	2.31	2.36	2.50	2.30	2.29	2.48	2.34	2.31	2.20	2.08	2.27	2.10	1.96	2.06
Al_2O_3	16.60	16.75	16.63	16.73	16.84	17.04	16.90	16.79	16.98	17.05	16.86	16.87	16.84	16.91
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.65	12.61	12.45	12.54	12.66	12.17	12.76	12.60	12.98	12.89	12.76	12.43	12.51	12.60
CaO	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02
MnO	0.06	0.13	0.06	0.08	0.08	0.06	0.14	0.07	0.10	0.14	0.05	0.05	0.11	0.13
FeO	17.64	17.45	17.64	17.17	17.38	17.35	17.35	17.23	17.41	16.95	17.38	17.35	17.39	17.43
BaO	0.24	0.17	0.26	0.26	0.16	0.29	0.31	0.20	0.23	0.23	0.29	0.28	0.24	0.35
Na_2O	0.26	0.30	0.24	0.26	0.27	0.25	0.27	0.27	0.26	0.25	0.26	0.30	0.24	0.19
K_2O	9.06	8.89	9.05	8.96	8.97	9.00	8.89	8.84	8.67	9.09	8.84	8.62	8.70	8.81
H_2O	3.95	3.96	3.91	3.92	3.95	3.98	3.92	3.91	3.96	3.93	3.94	3.92	3.91	3.91
F	0.17	0.15	0.21	0.20	0.14	0.13	0.17	0.18	0.12	0.18	0.18	0.11	0.17	0.17
Cl	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Total	100.45	100.35	100.22	99.93	100.20	100.41	99.93	99.48	99.98	100.01	100.26	98.92	99.34	99.48
Total cor.	100.38	100.29	100.13	99.84	100.13	100.35	99.86	99.40	99.93	99.93	100.19	98.87	99.26	99.41
Cations														
Si	2.794	2.797	2.785	2.802	2.790	2.800	2.762	2.783	2.767	2.778	2.788	2.784	2.800	2.776
Ti	0.130	0.132	0.141	0.129	0.128	0.138	0.132	0.130	0.124	0.117	0.127	0.119	0.111	0.116
Al	1.458	1.468	1.465	1.473	1.479	1.493	1.492	1.485	1.494	1.500	1.480	1.501	1.491	1.499
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.405	1.398	1.387	1.397	1.406	1.349	1.425	1.410	1.445	1.434	1.416	1.399	1.402	1.413
Ca	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002
Mn	0.004	0.008	0.004	0.005	0.005	0.004	0.009	0.004	0.006	0.009	0.003	0.003	0.007	0.008
Fe^{2+}	1.099	1.086	1.103	1.072	1.083	1.079	1.087	1.082	1.087	1.058	1.082	1.095	1.093	1.096
Ba	0.007	0.005	0.008	0.008	0.005	0.008	0.009	0.006	0.007	0.007	0.008	0.008	0.007	0.010
Na	0.038	0.044	0.034	0.037	0.039	0.036	0.038	0.039	0.037	0.037	0.038	0.044	0.035	0.027
K	0.861	0.844	0.863	0.853	0.852	0.853	0.849	0.846	0.826	0.865	0.839	0.830	0.833	0.845
Total	7.796	7.781	7.791	7.777	7.788	7.760	7.804	7.786	7.794	7.806	7.783	7.784	7.778	7.794
Volatiles														
OH	1.961	1.964	1.950	1.954	1.965	1.971	1.958	1.957	1.973	1.958	1.959	1.973	1.959	1.960
F	0.039	0.036	0.049	0.047	0.033	0.029	0.041	0.043	0.027	0.042	0.041	0.026	0.041	0.040
Cl	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000
X_{Mg}	0.561	0.563	0.557	0.566	0.565	0.556	0.567	0.566	0.571	0.575	0.567	0.561	0.562	0.563

	75254A F1 Bt4	75254A F1 Bt5	75261C F3 Bt1	75261C F3 Bt2	75261C F3 Bt3	75261C F3 Bt4	75261C F5 Bt2	75261C F5 Bt3	75261C F5 Bt4	75261C F5 Bt5	75261C F5 Bt6	75271A F1 Bt15	75271A F1 Bt16	75271A F4 Bt1
Analysis														
SiO_2	35.99	36.64	36.52	36.89	36.97	36.69	36.76	36.67	36.74	37.11	37.38	36.50	36.69	36.45
TiO_2	2.02	2.12	1.57	1.43	1.50	1.53	1.42	1.48	1.49	1.44	1.48	2.30	2.36	2.65
Al_2O_3	17.38	17.30	18.73	19.04	19.36	19.13	19.39	19.46	19.36	19.38	19.46	16.41	16.50	16.51
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.98	12.99	11.37	11.20	11.58	11.50	11.49	11.73	11.46	11.50	11.52	9.55	9.47	9.40
CaO	0.03	0.00	0.02	0.00	0.02	0.02	0.01	0.03	0.03	0.01	0.02	0.01	0.02	0.16
MnO	0.13	0.10	0.06	0.03	0.00	0.01	0.03	0.00	0.06	0.05	0.02	0.17	0.29	0.18
FeO	16.78	16.56	17.95	17.35	17.24	17.69	16.95	17.32	17.25	17.14	17.26	21.83	21.39	21.23
BaO	0.28	0.25	0.10	0.03	0.12	0.05	0.07	0.08	0.03	0.13	0.08	0.01	0.08	0.08
Na_2O	0.30	0.22	0.12	0.27	0.39	0.38	0.44	0.37	0.48	0.41	0.40	0.17	0.14	0.05
K_2O	8.13	8.67	8.89	8.98	9.06	8.72	8.77	8.83	8.75	8.49	7.83	9.45	9.45	9.50
H_2O	3.87	3.90	3.95	3.96	4.02	3.98	3.97	4.02	3.97	3.99	3.99	3.81	3.82	3.80
F	0.17	0.18	0.08	0.10	0.05	0.09	0.09	0.03	0.11	0.09	0.11	0.23	0.22	0.26
Cl	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.05	0.06	0.06
Total	98.04	98.92	99.36	99.26	100.30	99.78	99.38	100.01	99.73	99.74	99.55	100.50	100.48	100.31
Total cor.	97.97	98.85	99.32	99.22	100.27	99.75	99.34	100.00	99.68	99.70	99.50	100.39	100.38	100.19
Cations														
Si	2.733	2.757	2.745	2.764	2.742	2.738	2.745	2.726	2.738	2.757	2.770	2.782	2.792	2.779
Ti	0.115	0.120	0.089	0.080	0.083	0.086	0.080	0.082	0.083	0.081	0.082	0.132	0.135	0.152
Al	1.556	1.534	1.659	1.681	1.693	1.683	1.706	1.705	1.701	1.697	1.699	1.474	1.479	1.483
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.469	1.457	1.274	1.250	1.280	1.279	1.279	1.300	1.273	1.274	1.273	1.085	1.074	1.068
Ca	0.002	0.000	0.002	0.000	0.002	0.002	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.013
Mn	0.008	0.006	0.004	0.002	0.000	0.001	0.002	0.000	0.004	0.003	0.001	0.011	0.019	0.011
Fe^{2+}	1.066	1.042	1.128	1.087	1.069	1.104	1.058	1.077	1.075	1.065	1.070	1.391	1.361	1.353
Ba	0.008	0.007	0.003	0.001	0.003	0.001	0.002	0.002	0.001	0.004	0.002	0.000	0.002	0.002
Na	0.043	0.032	0.017	0.039	0.056	0.055	0.063	0.053	0.069	0.059	0.057	0.025	0.021	0.007
K	0.787	0.832	0.853	0.858	0.857	0.830	0.836	0.838	0.832	0.805	0.740	0.919	0.917	0.924
Total	7.789	7.788	7.772	7.763	7.785	7.778	7.771	7.785	7.779	7.746	7.697	7.821	7.802	7.792
Volatiles														
OH	1.960	1.957	1.981	1.977	1.988	1.979	1.979	1.993	1.975	1.979	1.973	1.938	1.939	1.930
F	0.040	0.042	0.018	0.023	0.012	0.021	0.020	0.007	0.025	0.021	0.025	0.056	0.054	0.063
Cl	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.006	0.007	0.007
X_{Mg}	0.580	0.583	0.530	0.535	0.545	0.537	0.547	0.547	0.542	0.545	0.543	0.438	0.441	0.441

	75271A F4 Bt2	75271A F4 Bt3	75271A F4 Bt4	75271A F4 Bt5	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt1	75302A F4 Bt2	75302A F4 Bt2	75302A F4 Bt2
Analysis														
SiO_2	36.87	36.60	36.54	36.72	37.89	38.18	37.96	38.11	37.97	38.15	37.90	37.75	37.73	37.87
TiO_2	2.42	2.34	2.23	2.28	2.68	2.69	2.70	2.67	2.71	2.52	2.68	2.75	2.83	2.91
Al_2O_3	16.79	16.74	16.59	16.79	17.94	18.13	18.05	17.87	17.87	18.19	17.79	17.85	17.67	17.97
Cr_2O_3	0.00	0.00	0.00	0.00	0.10	0.06	0.07	0.07	0.07	0.05	0.10	0.06	0.09	0.05
MgO	9.74	9.63	9.82	9.79	12.33	12.27	12.37	12.36	12.39	12.18	12.29	11.82	12.10	12.20
CaO	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.02	0.01	0.03	0.03	0.04	0.00
MnO	0.19	0.17	0.22	0.21	0.06	0.04	0.06	0.04	0.07	0.06	0.05	0.09	0.03	0.07
FeO	21.02	21.61	21.10	21.35	16.14	16.20	16.28	16.90	16.51	16.54	16.47	16.46	16.32	16.18
BaO	0.02	0.05	0.05	0.00	0.09	0.09	0.11	0.09	0.07	0.07	0.08	0.10	0.06	0.10
Na_2O	0.13	0.18	0.12	0.14	0.16	0.27	0.20	0.19	0.19	0.26	0.14	0.27	0.20	0.21
K_2O	9.54	9.44	9.67	9.62	9.47	9.41	9.39	9.34	9.29	9.47	9.47	9.13	9.27	9.70
H_2O	3.85	3.81	3.81	3.83	3.89	4.05	3.97	4.05	3.89	3.96	4.02	3.99	3.99	3.98
F	0.23	0.28	0.25	0.26	0.38	0.09	0.23	0.09	0.40	0.26	0.11	0.12	0.10	0.20
Cl	0.03	0.05	0.04	0.05	0.08	0.06	0.06	0.04	0.06	0.08	0.04	0.06	0.08	0.08
Total	100.83	100.89	100.44	101.04	101.22	101.56	101.46	101.81	101.49	101.81	101.16	100.48	100.51	101.51
Total cor.	100.73	100.77	100.32	100.92	101.05	101.51	101.35	101.77	101.31	101.68	101.11	100.42	100.45	101.41
Cations														
Si	2.786	2.775	2.781	2.777	2.782	2.786	2.778	2.782	2.781	2.785	2.784	2.789	2.786	2.775
Ti	0.138	0.133	0.127	0.130	0.148	0.148	0.149	0.146	0.149	0.138	0.148	0.153	0.157	0.160
Al	1.496	1.495	1.488	1.496	1.553	1.559	1.557	1.537	1.542	1.565	1.540	1.554	1.538	1.552
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.097	1.088	1.114	1.104	1.350	1.335	1.349	1.346	1.353	1.326	1.345	1.302	1.332	1.332
Ca	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.001	0.001	0.003	0.002	0.003	0.000
Mn	0.012	0.011	0.014	0.013	0.004	0.003	0.004	0.002	0.004	0.004	0.003	0.006	0.002	0.004
Fe^{2+}	1.328	1.370	1.343	1.351	0.991	0.989	0.996	1.032	1.012	1.010	1.012	1.017	1.008	0.991
Ba	0.001	0.001	0.002	0.000	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.003	0.002	0.003
Na	0.019	0.026	0.018	0.021	0.023	0.038	0.029	0.027	0.027	0.036	0.020	0.039	0.028	0.030
K	0.920	0.913	0.939	0.928	0.887	0.876	0.876	0.870	0.868	0.882	0.887	0.860	0.873	0.906
Total	7.797	7.814	7.826	7.820	7.740	7.738	7.741	7.745	7.740	7.749	7.743	7.725	7.730	7.753
Volatiles														
OH	1.942	1.926	1.935	1.932	1.903	1.971	1.938	1.973	1.900	1.929	1.969	1.964	1.966	1.944
F	0.054	0.068	0.061	0.062	0.087	0.022	0.054	0.021	0.093	0.060	0.026	0.029	0.024	0.046
Cl	0.004	0.007	0.005	0.006	0.010	0.007	0.008	0.005	0.007	0.010	0.005	0.007	0.010	0.010
X_{Mg}	0.452	0.443	0.454	0.450	0.577	0.574	0.575	0.566	0.572	0.568	0.571	0.561	0.569	0.573

	75302A F4 Bt2	75302A F4 Bt2	75302A F4 Bt2	76017A F6 Bt	76017A F6 Bt	76017A F6 Bt	76017A F6 Bt	76017A F6 Bt	76017A F5 Bt	76017A F5 Bt	76017A F5 Bt	76017A F5 Bt	76017A F3 Bt	76017A F3 Bt
Analysis														
SiO_2	37.80	38.00	37.74	36.37	36.24	35.86	36.62	36.26	36.42	36.53	36.60	36.44	35.94	36.22
TiO_2	2.88	2.77	2.90	2.19	2.19	2.22	2.16	2.07	2.18	2.22	2.09	2.22	2.12	2.04
Al_2O_3	17.74	17.87	17.89	15.99	15.99	15.82	15.88	15.92	15.92	16.09	16.03	15.94	15.94	15.77
Cr_2O_3	0.04	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.15	12.20	12.31	6.33	6.23	6.25	6.21	6.34	6.43	6.31	6.27	6.27	6.33	6.12
CaO	0.01	0.02	0.03	0.06	0.11	0.05	0.10	0.08	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.03	0.03	0.02	0.15	0.17	0.18	0.13	0.15	0.15	0.13	0.15	0.18	0.19	0.14
FeO	16.08	16.01	16.61	26.10	25.95	26.42	26.09	25.89	26.28	26.05	25.98	26.24	25.96	26.51
BaO	0.02	0.07	0.10	0.05	0.12	0.18	0.26	0.08	0.16	0.16	0.18	0.03	0.04	0.08
Na_2O	0.16	0.24	0.19	0.05	0.08	0.06	0.06	0.06	0.06	0.08	0.07	0.06	0.11	0.12
K_2O	9.49	9.43	9.33	9.08	9.16	9.13	9.05	9.06	9.30	9.06	9.29	9.33	8.97	9.03
H_2O	3.92	3.91	3.88	3.78	3.77	3.76	3.81	3.77	3.79	3.81	3.81	3.77	3.75	3.77
F	0.27	0.32	0.40	0.17	0.18	0.14	0.12	0.15	0.16	0.13	0.13	0.19	0.15	0.13
Cl	0.05	0.09	0.07	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.02	0.02	0.01
Total	100.66	100.98	101.50	100.32	100.19	100.07	100.49	99.85	100.87	100.55	100.58	100.69	99.52	99.93
Total cor.	100.54	100.83	101.32	100.25	100.12	100.01	100.44	99.78	100.80	100.50	100.52	100.61	99.46	99.88
Cations														
Si	2.788	2.792	2.768	2.825	2.822	2.805	2.841	2.830	2.821	2.829	2.837	2.825	2.816	2.831
Ti	0.160	0.153	0.160	0.128	0.128	0.131	0.126	0.121	0.127	0.129	0.122	0.130	0.125	0.120
Al	1.542	1.547	1.547	1.464	1.468	1.459	1.452	1.464	1.453	1.468	1.464	1.457	1.471	1.453
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.335	1.336	1.346	0.733	0.723	0.729	0.718	0.737	0.743	0.728	0.724	0.724	0.740	0.714
Ca	0.001	0.001	0.002	0.005	0.010	0.004	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.002	0.002	0.001	0.010	0.011	0.012	0.009	0.010	0.010	0.009	0.010	0.012	0.012	0.009
Fe^{2+}	0.991	0.984	1.019	1.695	1.690	1.729	1.693	1.690	1.702	1.687	1.684	1.702	1.701	1.733
Ba	0.000	0.002	0.003	0.001	0.004	0.005	0.008	0.003	0.005	0.005	0.005	0.001	0.001	0.003
Na	0.023	0.033	0.027	0.008	0.012	0.008	0.009	0.009	0.009	0.011	0.011	0.009	0.017	0.018
K	0.893	0.884	0.873	0.900	0.910	0.911	0.895	0.901	0.919	0.895	0.918	0.923	0.897	0.900
Total	7.736	7.735	7.745	7.769	7.777	7.794	7.759	7.772	7.789	7.761	7.774	7.783	7.780	7.781
Volatiles														
OH	1.930	1.915	1.898	1.957	1.956	1.964	1.971	1.962	1.960	1.968	1.968	1.952	1.960	1.967
F	0.064	0.074	0.093	0.042	0.044	0.036	0.029	0.037	0.038	0.032	0.031	0.046	0.038	0.032
Cl	0.007	0.011	0.009	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.001	0.003	0.002	0.001
X_{Mg}	0.574	0.576	0.569	0.302	0.300	0.297	0.298	0.304	0.304	0.302	0.301	0.299	0.303	0.292

	76017A F3 Bt	76017A F3 Bt	76017A F3 Bt	76017B F2xt Bt	76017B F2xt Bt	76017B F2xt Bt	76017B F2xt Bt	76017B F2xt Bt	76017B F2xt Bt	76017B F2xt Bt	76046A F2 Bt13	76046A F2 Bt14	76046A F2 Bt15	76111A F9 Bt1
Analysis														
SiO_2	36.27	36.58	36.19	37.08	37.08	37.11	36.97	36.98	37.00	36.75	35.24	35.97	36.17	37.45
TiO_2	2.10	2.05	2.09	1.43	1.43	1.39	1.38	1.30	1.33	1.35	1.34	1.38	1.46	1.35
Al_2O_3	15.94	15.90	15.94	16.13	16.27	16.30	16.07	16.25	16.19	16.14	14.85	15.16	14.82	18.83
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
MgO	6.35	6.46	6.32	9.12	8.89	9.09	9.05	8.99	9.26	8.81	6.50	6.75	6.75	7.61
CaO	0.00	0.00	0.00	0.03	0.08	0.02	0.03	0.10	0.11	0.16	0.03	0.02	0.06	0.26
MnO	0.16	0.12	0.17	0.14	0.21	0.15	0.19	0.23	0.19	0.19	0.28	0.24	0.33	0.27
FeO	26.52	26.37	26.40	22.36	22.40	22.85	22.68	22.38	22.33	22.05	27.69	27.16	26.94	19.45
BaO	0.10	0.21	0.14	0.18	0.24	0.25	0.22	0.34	0.33	0.23	0.00	0.00	0.00	0.09
Na_2O	0.06	0.09	0.04	0.06	0.06	0.09	0.09	0.09	0.10	0.12	0.04	0.03	0.02	0.13
K_2O	8.91	9.18	8.97	9.13	8.83	9.10	9.18	8.87	8.87	8.88	9.32	9.26	9.28	7.79
H_2O	3.76	3.82	3.75	3.90	3.90	3.91	3.90	3.88	3.90	3.86	3.55	3.67	3.68	3.80
F	0.21	0.12	0.19	0.00	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.24
Cl	0.00	0.00	0.02	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.82	0.54	0.48	0.00
Total	100.38	100.89	100.22	99.56	99.39	100.30	99.73	99.45	99.60	98.56	99.64	100.18	99.99	97.32
Total cor.	100.29	100.84	100.13	99.56	99.38	100.29	99.73	99.44	99.60	98.55	99.46	100.06	99.88	97.22
Cations														
Si	2.821	2.830	2.820	2.848	2.850	2.836	2.842	2.846	2.841	2.850	2.813	2.831	2.850	2.870
Ti	0.123	0.120	0.122	0.083	0.082	0.080	0.080	0.075	0.077	0.079	0.080	0.082	0.087	0.078
Al	1.461	1.450	1.464	1.460	1.474	1.468	1.456	1.474	1.465	1.475	1.397	1.406	1.376	1.701
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.736	0.745	0.734	1.044	1.019	1.036	1.037	1.031	1.060	1.019	0.773	0.792	0.793	0.870
Ca	0.000	0.000	0.000	0.003	0.007	0.002	0.002	0.008	0.009	0.013	0.002	0.002	0.005	0.021
Mn	0.011	0.008	0.011	0.009	0.014	0.010	0.012	0.015	0.012	0.012	0.019	0.016	0.022	0.018
Fe^{2+}	1.725	1.707	1.721	1.436	1.440	1.461	1.458	1.440	1.434	1.430	1.848	1.788	1.775	1.247
Ba	0.003	0.006	0.004	0.005	0.007	0.007	0.007	0.010	0.010	0.007	0.000	0.000	0.000	0.003
Na	0.009	0.014	0.006	0.009	0.009	0.013	0.013	0.014	0.015	0.017	0.006	0.005	0.003	0.020
K	0.884	0.906	0.892	0.895	0.866	0.888	0.900	0.871	0.869	0.879	0.948	0.929	0.933	0.761
Total	7.772	7.785	7.775	7.791	7.768	7.801	7.807	7.784	7.791	7.782	7.886	7.851	7.844	7.588
Volatiles														
OH	1.948	1.971	1.951	2.000	1.998	1.996	2.000	1.991	2.000	1.998	1.889	1.929	1.936	1.943
F	0.051	0.029	0.047	0.000	0.000	0.002	0.000	0.007	0.000	0.002	0.000	0.000	0.000	0.057
Cl	0.000	0.001	0.002	0.000	0.002	0.002	0.000	0.002	0.000	0.000	0.110	0.071	0.064	0.001
X_{Mg}	0.299	0.304	0.299	0.421	0.414	0.415	0.416	0.417	0.425	0.416	0.295	0.307	0.309	0.411

	76111A F9 Bt3	76111A F11 Bt5	76111A F11 Bt7	76111A F13 Bt2	76111A F13 Bt3	76111A F13 Bt4	76111A F13 Bt5	76111A F13 Bt6	76114C F6 Bt1	76114C F6 Bt2	76114C F6 Bt4	76114C F6 Bt5	76114C F6 Bt6	76114C F6 Bt7
Analysis														
SiO_2	36.50	36.50	37.38	36.90	36.22	36.83	35.67	36.31	35.92	36.20	36.02	36.81	35.96	35.98
TiO_2	1.61	1.33	1.71	1.72	1.73	1.77	1.73	1.71	3.39	3.54	3.31	3.56	3.39	3.38
Al_2O_3	16.73	16.07	17.14	17.06	16.64	17.14	15.85	16.58	17.13	17.45	17.24	17.54	17.35	17.26
Cr_2O_3	0.01	0.01	0.06	0.06	0.04	0.04	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00
MgO	10.08	9.09	10.86	10.64	10.48	10.68	9.39	10.75	9.75	10.60	10.14	10.66	10.11	10.28
CaO	0.31	0.26	0.41	0.40	0.44	0.57	0.25	0.68	0.06	0.02	0.07	0.02	0.06	0.09
MnO	0.32	0.31	0.20	0.22	0.18	0.17	0.23	0.18	0.17	0.09	0.18	0.05	0.18	0.11
FeO	21.27	23.02	18.35	18.80	17.38	18.94	21.31	17.96	19.54	17.90	19.24	16.69	18.66	18.17
BaO	0.04	0.05	0.06	0.00	0.01	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.10	0.03	0.10	0.05	0.07	0.07	0.03	0.11	0.31	0.57	0.35	0.61	0.36	0.42
K_2O	7.51	7.80	6.90	6.86	6.68	6.15	7.21	6.25	8.85	8.78	8.68	8.69	8.76	8.65
H_2O	3.77	3.71	3.77	3.75	3.73	3.81	3.74	3.71	3.93	3.96	3.94	3.97	3.94	3.93
F	0.29	0.29	0.33	0.31	0.14	0.20	0.09	0.24	0.00	0.00	0.00	0.00	0.00	0.00
Cl	0.00	0.06	0.02	0.02	0.03	0.01	0.01	0.03	0.03	0.02	0.04	0.03	0.01	0.02
Total	98.54	98.51	97.29	96.80	93.74	96.43	95.56	94.59	99.08	99.14	99.21	98.62	98.76	98.29
Total cor.	98.42	98.37	97.15	96.67	93.68	96.35	95.52	94.49	99.07	99.14	99.20	98.61	98.76	98.28
Cations														
Si	2.801	2.832	2.848	2.833	2.854	2.829	2.824	2.841	2.739	2.735	2.736	2.773	2.737	2.745
Ti	0.093	0.078	0.098	0.100	0.102	0.102	0.103	0.100	0.194	0.201	0.189	0.202	0.194	0.194
Al	1.513	1.469	1.539	1.544	1.545	1.552	1.479	1.529	1.539	1.554	1.543	1.557	1.556	1.552
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.153	1.052	1.233	1.218	1.231	1.223	1.109	1.254	1.108	1.194	1.148	1.197	1.147	1.170
Ca	0.025	0.021	0.033	0.033	0.037	0.047	0.021	0.057	0.005	0.002	0.006	0.002	0.005	0.008
Mn	0.021	0.020	0.013	0.015	0.012	0.011	0.015	0.012	0.011	0.006	0.012	0.003	0.011	0.007
Fe^{2+}	1.365	1.493	1.169	1.207	1.145	1.217	1.411	1.175	1.246	1.131	1.222	1.051	1.188	1.159
Ba	0.001	0.001	0.002	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.015	0.004	0.015	0.008	0.010	0.010	0.005	0.017	0.046	0.083	0.052	0.089	0.053	0.062
K	0.735	0.772	0.671	0.671	0.671	0.603	0.729	0.624	0.861	0.846	0.841	0.835	0.851	0.842
Total	7.723	7.743	7.621	7.629	7.608	7.596	7.696	7.610	7.750	7.752	7.749	7.708	7.742	7.737
Volatiles														
OH	1.929	1.921	1.918	1.922	1.963	1.951	1.975	1.937	1.996	1.997	1.994	1.997	1.999	1.998
F	0.071	0.071	0.080	0.076	0.034	0.048	0.024	0.060	0.000	0.000	0.000	0.000	0.000	0.000
Cl	0.000	0.008	0.003	0.002	0.004	0.001	0.002	0.003	0.003	0.003	0.006	0.003	0.001	0.002
X_{Mg}	0.458	0.413	0.513	0.502	0.518	0.501	0.440	0.516	0.471	0.513	0.484	0.532	0.491	0.502

	76114C F6 Bt9	76114C F6 Bt13	76114C F6 Bt14	76114C F6 Bt15	76163B F1 Bt1	76163B F1 Bt3	76163B F1 Bt4	76163B F1 Bt12	76163B F1 Bt13	76163B F2 Bt	76163B F2 Bt	76163B F2 Bt	76163B F2 Bt	76163B F2 Bt
Analysis														
SiO_2	35.95	35.95	36.15	36.11	34.57	34.92	38.39	34.91	35.17	35.24	35.13	35.10	35.29	34.80
TiO_2	3.40	3.45	3.53	3.76	3.59	3.49	3.02	4.06	3.92	3.30	3.28	3.23	3.36	3.33
Al_2O_3	17.46	17.08	17.33	17.14	18.44	18.46	19.36	17.60	17.64	18.33	18.16	18.38	18.10	18.23
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	10.31	10.20	10.11	9.78	8.08	8.00	6.86	8.00	7.75	8.45	8.11	8.24	8.50	8.04
CaO	0.03	0.04	0.03	0.06	0.02	0.02	0.88	0.04	0.01	0.00	0.00	0.00	0.00	0.00
MnO	0.16	0.19	0.13	0.18	0.09	0.02	0.08	0.07	0.04	0.06	0.13	0.09	0.04	0.04
FeO	18.76	19.34	18.07	18.48	21.07	20.75	17.92	22.31	21.36	21.80	22.29	22.05	21.03	21.87
BaO	0.00	0.00	0.00	0.00	0.21	0.19	0.21	0.16	0.15	0.26	0.19	0.16	0.24	0.23
Na_2O	0.45	0.36	0.44	0.50	0.08	0.11	1.33	0.13	0.10	0.12	0.12	0.13	0.09	0.14
K_2O	8.32	8.78	8.64	8.68	9.54	9.62	8.24	9.17	9.56	9.56	9.44	9.45	9.40	9.37
H_2O	3.94	3.94	3.93	3.93	3.89	3.89	4.03	3.91	3.89	3.94	3.92	3.93	3.92	3.90
F	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	0.02	0.02	0.02	0.01	0.04	0.06	0.05	0.04	0.05	0.04	0.06	0.05	0.05	0.05
Total	98.80	99.34	98.38	98.62	99.61	99.51	100.37	100.39	99.63	101.10	100.82	100.80	100.03	99.99
Total cor.	98.79	99.34	98.38	98.62	99.61	99.50	100.36	100.38	99.62	101.09	100.81	100.79	100.02	99.98
Cations														
Si	2.730	2.731	2.752	2.750	2.657	2.680	2.846	2.671	2.703	2.672	2.677	2.671	2.694	2.670
Ti	0.194	0.197	0.202	0.216	0.207	0.201	0.168	0.234	0.226	0.188	0.188	0.185	0.193	0.192
Al	1.563	1.529	1.555	1.538	1.670	1.670	1.691	1.587	1.598	1.638	1.631	1.648	1.629	1.649
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.167	1.156	1.147	1.110	0.926	0.915	0.758	0.912	0.887	0.955	0.921	0.935	0.967	0.920
Ca	0.002	0.003	0.002	0.005	0.002	0.001	0.070	0.003	0.001	0.000	0.000	0.000	0.000	0.000
Mn	0.010	0.012	0.008	0.011	0.006	0.001	0.005	0.005	0.003	0.004	0.008	0.006	0.003	0.002
Fe^{2+}	1.191	1.229	1.150	1.177	1.354	1.332	1.111	1.427	1.373	1.383	1.421	1.403	1.342	1.403
Ba	0.000	0.000	0.000	0.000	0.006	0.006	0.006	0.005	0.005	0.008	0.006	0.005	0.007	0.007
Na	0.066	0.052	0.065	0.074	0.011	0.016	0.192	0.019	0.014	0.018	0.018	0.019	0.014	0.020
K	0.806	0.851	0.839	0.843	0.935	0.942	0.779	0.895	0.937	0.925	0.917	0.917	0.915	0.917
Total	7.730	7.759	7.721	7.724	7.774	7.763	7.626	7.759	7.747	7.791	7.787	7.788	7.763	7.782
Volatiles														
OH	1.998	1.996	1.997	1.998	1.996	1.992	1.994	1.995	1.994	1.994	1.993	1.994	1.994	1.994
F	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cl	0.002	0.003	0.003	0.002	0.005	0.008	0.006	0.005	0.006	0.006	0.007	0.007	0.007	0.007
X_{Mg}	0.495	0.485	0.499	0.485	0.406	0.407	0.406	0.390	0.393	0.409	0.393	0.400	0.419	0.396

	76163B F2 Bt	76163B F2 Bt	76163B F2 Bt fg2	76163B F2 Bt fg3	76163F F2 Bt1	76163F F2 Bt2	76163F F2 Bt3	76163F F2 Bt4	76163F F4 Bt1	76163F F4 Bt2	76163F F4 Bt3	76163F F4 Bt5	76163F F4 Bt6	76163F F4 Bt7
Analysis														
SiO_2	34.51	34.53	36.16	35.07	36.95	37.18	36.87	37.17	36.87	37.27	37.21	37.21	37.08	37.40
TiO_2	3.18	3.36	3.30	3.07	3.21	3.32	3.35	3.40	3.35	3.38	3.32	3.42	3.38	3.34
Al_2O_3	17.69	18.35	17.66	18.34	15.49	15.65	15.50	15.40	17.32	17.28	17.13	17.12	17.10	16.96
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	8.14	8.30	7.92	8.09	11.60	11.60	12.00	11.66	11.67	11.75	11.83	11.68	11.59	11.61
CaO	0.04	0.00	0.50	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.00	0.01
MnO	0.06	0.10	0.00	0.09	0.04	0.04	0.03	0.08	0.05	0.03	0.07	0.04	0.04	0.03
FeO	22.76	21.47	21.25	21.24	18.91	18.95	18.53	18.72	18.36	18.39	18.65	18.49	18.63	18.40
BaO	0.24	0.27	0.14	0.16	0.18	0.14	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.08	0.10	0.10	0.13	0.22	0.17	0.15	0.21	0.18	0.13	0.16	0.21	0.16	0.17
K_2O	9.18	9.45	8.84	9.47	9.41	9.38	8.98	9.45	9.23	9.23	9.07	9.35	9.33	9.34
H_2O	3.87	3.89	3.92	3.90	3.82	3.83	3.77	3.82	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.00	0.00	0.00	0.28	0.30	0.38	0.32	0.33	0.35	0.33	0.35	0.29	0.36
Cl	0.03	0.05	0.07	0.04	0.06	0.06	0.06	0.06	0.07	0.06	0.08	0.05	0.07	0.06
Total	99.79	99.87	99.86	99.60	100.15	100.60	99.84	100.40	97.45	97.88	97.84	97.92	97.67	97.68
Total cor.	99.78	99.86	99.84	99.59	100.02	100.46	99.68	100.26	97.30	97.72	97.69	97.76	97.54	97.52
Cations														
Si	2.666	2.653	2.754	2.692	2.793	2.794	2.786	2.800	2.972	2.987	2.987	2.987	2.987	3.007
Ti	0.185	0.194	0.189	0.177	0.182	0.187	0.190	0.192	0.203	0.204	0.201	0.207	0.205	0.202
Al	1.611	1.661	1.585	1.659	1.380	1.386	1.381	1.367	1.646	1.633	1.621	1.620	1.623	1.606
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.938	0.951	0.899	0.926	1.307	1.300	1.352	1.309	1.402	1.404	1.416	1.398	1.391	1.392
Ca	0.004	0.000	0.041	0.001	0.000	0.000	0.002	0.000	0.002	0.001	0.000	0.000	0.000	0.001
Mn	0.004	0.007	0.000	0.006	0.003	0.002	0.002	0.005	0.003	0.002	0.004	0.003	0.002	0.002
Fe^{2+}	1.471	1.379	1.353	1.364	1.195	1.191	1.171	1.179	1.238	1.233	1.252	1.241	1.255	1.237
Ba	0.007	0.008	0.004	0.005	0.005	0.004	0.006	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.012	0.015	0.015	0.019	0.032	0.024	0.022	0.030	0.028	0.020	0.025	0.033	0.025	0.026
K	0.905	0.926	0.858	0.927	0.907	0.899	0.866	0.908	0.950	0.944	0.929	0.957	0.959	0.958
Total	7.802	7.793	7.701	7.775	7.804	7.788	7.777	7.794	8.444	8.427	8.433	8.445	8.447	8.431
Volatiles														
OH	1.996	1.993	1.992	1.995	1.924	1.921	1.902	1.917	0.000	0.000	0.000	0.000	0.000	0.000
F	0.000	0.000	0.000	0.000	0.068	0.072	0.091	0.076	0.085	0.088	0.082	0.088	0.074	0.091
Cl	0.004	0.007	0.009	0.005	0.008	0.007	0.007	0.008	0.009	0.008	0.010	0.007	0.010	0.008
X_{Mg}	0.389	0.408	0.399	0.404	0.522	0.522	0.536	0.526	0.531	0.532	0.531	0.530	0.526	0.529

	76172C F1 Bt1	76172C F1 Bt2	76172C F1 Bt3	76172C F1 Bt4	76172C F1 Bt5	76172C F1 Bt6	76172C F3 Bt1	76172C F3 Bt2	76172C F3 Bt3	76172C F3 Bt4	76172C F3 Bt5	76172C F3 Bt11	76172C F3 Bt12	76172C F3 Bt13
Analysis														
SiO_2	35.98	36.04	36.36	36.63	36.62	36.39	37.02	36.30	37.12	36.91	36.84	36.99	36.80	36.98
TiO_2	1.76	1.66	1.67	1.66	1.72	1.63	2.13	2.31	2.05	2.23	2.30	2.35	2.46	2.18
Al_2O_3	18.30	18.25	18.37	18.26	18.26	18.40	17.74	17.48	17.76	17.32	17.74	17.65	17.75	17.93
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.12	11.89	12.11	12.09	11.69	11.82	11.72	11.81	11.96	11.77	11.64	11.70	11.41	11.72
CaO	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.17	0.20	0.14	0.14	0.17	0.16	0.16	0.17	0.16	0.18	0.18	0.07	0.16	0.16
FeO	17.17	17.50	17.39	17.59	17.87	17.36	17.16	18.43	17.76	17.97	17.66	17.67	17.94	18.05
BaO	0.15	0.25	0.17	0.20	0.26	0.20	0.24	0.19	0.25	0.19	0.19	0.22	0.20	0.19
Na_2O	0.17	0.24	0.22	0.19	0.22	0.18	0.16	0.18	0.23	0.20	0.18	0.18	0.18	0.23
K_2O	9.39	9.25	9.30	9.28	9.19	9.40	9.20	9.05	9.23	9.18	9.23	9.29	9.45	9.23
H_2O	3.93	3.91	3.97	3.95	3.97	3.95	3.93	3.95	3.98	3.99	3.94	3.97	3.96	3.99
F	0.09	0.12	0.06	0.12	0.05	0.08	0.15	0.06	0.11	0.02	0.13	0.09	0.10	0.08
Cl	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.22	99.30	99.75	100.11	100.02	99.57	99.60	99.94	100.60	99.96	100.03	100.18	100.41	100.75
Total cor.	99.18	99.26	99.72	100.06	100.00	99.54	99.54	99.91	100.55	99.95	99.97	100.15	100.37	100.72
Cations														
Si	2.716	2.723	2.728	2.740	2.744	2.736	2.776	2.732	2.764	2.769	2.758	2.764	2.752	2.752
Ti	0.100	0.094	0.094	0.093	0.097	0.092	0.120	0.131	0.115	0.126	0.129	0.132	0.138	0.122
Al	1.628	1.625	1.624	1.610	1.612	1.631	1.568	1.551	1.558	1.531	1.566	1.555	1.564	1.572
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.363	1.339	1.354	1.348	1.306	1.325	1.310	1.325	1.327	1.316	1.300	1.304	1.272	1.300
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.011	0.013	0.009	0.009	0.011	0.010	0.010	0.011	0.010	0.012	0.011	0.004	0.010	0.010
Fe^{2+}	1.084	1.106	1.091	1.100	1.120	1.091	1.077	1.160	1.106	1.128	1.106	1.105	1.122	1.123
Ba	0.004	0.007	0.005	0.006	0.008	0.006	0.007	0.006	0.007	0.006	0.006	0.006	0.006	0.005
Na	0.025	0.034	0.031	0.028	0.031	0.026	0.023	0.027	0.033	0.029	0.026	0.026	0.026	0.033
K	0.904	0.892	0.890	0.885	0.879	0.902	0.880	0.869	0.877	0.879	0.881	0.886	0.902	0.877
Total	7.834	7.833	7.826	7.819	7.808	7.820	7.771	7.810	7.798	7.794	7.783	7.782	7.791	7.795
Volatiles														
OH	1.978	1.972	1.987	1.971	1.986	1.982	1.965	1.985	1.974	1.995	1.968	1.978	1.977	1.981
F	0.022	0.028	0.013	0.028	0.012	0.018	0.035	0.015	0.025	0.005	0.031	0.022	0.023	0.019
Cl	0.001	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
X_{Mg}	0.557	0.548	0.554	0.551	0.538	0.548	0.549	0.533	0.545	0.539	0.540	0.541	0.531	0.536

	76172C F3 Bt14	76172C F4 Bt1	76172C F4 Bt2	76172C F4 Bt3	76172C F4 Bt4	76172C F4 Bt5	76175A F1ms Bt1	76175A F1ms Bt2	76175A F1ms Bt3	76175A F1ms Bt4	76175A F1ms Bt5	76175A F1ms Bt15	76175A F1ms Bt14	76175A F1ms Bt13
Analysis														
SiO_2	36.84	36.93	36.00	36.86	37.00	36.85	35.04	34.82	34.78	34.96	35.11	34.86	35.01	34.78
TiO_2	1.89	2.32	2.02	2.18	2.10	2.21	3.77	3.74	4.15	4.32	4.47	4.52	4.68	4.55
Al_2O_3	17.90	17.93	17.95	17.90	17.95	17.73	17.36	17.36	17.37	17.48	17.56	17.59	17.74	17.74
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	11.74	11.61	11.89	11.57	11.68	11.91	6.58	6.40	6.36	6.26	6.15	6.16	6.14	6.15
CaO	0.00	0.02	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
MnO	0.11	0.12	0.22	0.19	0.14	0.18	0.13	0.14	0.14	0.17	0.12	0.09	0.08	0.07
FeO	17.37	16.75	17.88	17.16	17.18	17.52	24.53	24.59	24.12	24.03	24.55	23.82	23.79	24.17
BaO	0.20	0.23	0.21	0.20	0.22	0.21	0.08	0.10	0.05	0.15	0.13	0.10	0.13	0.09
Na_2O	0.15	0.20	0.14	0.21	0.18	0.16	0.08	0.07	0.06	0.07	0.12	0.08	0.06	0.10
K_2O	9.26	9.40	7.71	9.16	9.37	9.15	9.50	9.70	9.62	9.57	9.68	9.71	9.69	9.54
H_2O	3.95	3.98	3.91	3.97	3.95	3.98	3.78	3.77	3.79	3.83	3.86	3.80	3.85	3.86
F	0.09	0.04	0.08	0.04	0.10	0.06	0.23	0.22	0.18	0.14	0.13	0.19	0.13	0.09
Cl	0.00	0.00	0.00	0.02	0.02	0.00	0.05	0.04	0.05	0.03	0.03	0.04	0.06	0.05
Total	99.49	99.54	98.06	99.45	99.91	99.95	101.14	100.93	100.69	101.00	101.90	100.95	101.36	101.17
Total cor.	99.45	99.52	98.03	99.43	99.86	99.92	101.03	100.83	100.60	100.93	101.84	100.87	101.29	101.13
Cations														
Si	2.768	2.768	2.734	2.767	2.768	2.758	2.694	2.689	2.685	2.687	2.680	2.679	2.678	2.667
Ti	0.107	0.131	0.115	0.123	0.118	0.124	0.218	0.217	0.241	0.250	0.257	0.262	0.269	0.262
Al	1.585	1.583	1.607	1.583	1.583	1.564	1.573	1.580	1.580	1.584	1.579	1.593	1.599	1.604
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.315	1.297	1.346	1.295	1.303	1.328	0.754	0.736	0.732	0.717	0.700	0.706	0.700	0.703
Ca	0.000	0.002	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Mn	0.007	0.008	0.014	0.012	0.009	0.011	0.009	0.009	0.009	0.011	0.008	0.006	0.005	0.004
Fe^{2+}	1.092	1.050	1.136	1.077	1.075	1.097	1.577	1.588	1.557	1.545	1.567	1.531	1.522	1.551
Ba	0.006	0.007	0.006	0.006	0.006	0.006	0.002	0.003	0.002	0.005	0.004	0.003	0.004	0.003
Na	0.022	0.029	0.021	0.030	0.027	0.023	0.012	0.010	0.009	0.010	0.017	0.011	0.009	0.015
K	0.887	0.899	0.747	0.877	0.895	0.873	0.932	0.955	0.947	0.938	0.943	0.952	0.945	0.934
Total	7.788	7.774	7.731	7.772	7.784	7.784	7.773	7.787	7.762	7.746	7.754	7.744	7.731	7.743
Volatiles														
OH	1.978	1.990	1.980	1.988	1.973	1.985	1.938	1.940	1.950	1.962	1.966	1.950	1.962	1.973
F	0.022	0.010	0.020	0.010	0.024	0.014	0.055	0.054	0.043	0.034	0.031	0.045	0.031	0.021
Cl	0.000	0.000	0.000	0.002	0.003	0.000	0.007	0.006	0.007	0.004	0.004	0.005	0.007	0.006
X_{Mg}	0.546	0.553	0.542	0.546	0.548	0.548	0.324	0.317	0.320	0.317	0.309	0.316	0.315	0.312

	76175A F1ms Bt12	76175A F1ms Bt11	76175A F2ms Bt1	76175A F2ms Bt2	76175A F2ms Bt3	76175A F2ms Bt4	76175A F2ms Bt5	76175A F2ms Bt6	76175A F2ms Bt7	811079A F1 Bt	811079A F1 Bt	811079A F1 Bt	811079A F1 Bt	811079A F1 Bt
Analysis														
SiO_2	34.72	35.04	35.08	34.80	34.71	34.64	34.82	34.16	34.72	36.20	35.64	35.84	35.86	35.73
TiO_2	4.50	4.33	3.56	3.47	3.67	4.18	4.31	4.31	4.21	3.50	3.98	3.65	3.61	3.35
Al_2O_3	17.88	17.92	18.40	18.36	18.19	17.90	17.85	17.83	17.91	16.80	16.17	16.20	16.13	16.48
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	6.16	6.29	6.89	6.85	6.80	6.67	6.55	6.55	6.60	7.54	7.61	8.26	8.12	8.21
CaO	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00
MnO	0.09	0.11	0.07	0.12	0.10	0.12	0.07	0.11	0.12	0.14	0.17	0.19	0.18	0.21
FeO	23.61	23.56	23.34	22.84	23.54	23.48	23.40	24.07	23.91	22.92	23.24	23.70	24.29	22.99
BaO	0.14	0.13	0.12	0.07	0.07	0.01	0.10	0.05	0.10	0.32	0.30	0.39	0.30	0.38
Na_2O	0.08	0.09	0.10	0.09	0.09	0.09	0.10	0.09	0.12	0.08	0.05	0.02	0.06	0.05
K_2O	9.61	9.69	9.65	9.64	9.62	9.51	9.70	9.46	9.56	9.44	9.35	9.39	9.30	9.34
H_2O	3.82	3.81	3.84	3.80	3.81	3.79	3.83	3.78	3.84	3.92	3.88	3.93	3.93	3.90
F	0.14	0.19	0.18	0.19	0.18	0.21	0.14	0.18	0.12	0.00	0.02	0.01	0.00	0.01
Cl	0.05	0.06	0.03	0.03	0.03	0.03	0.06	0.05	0.06	0.02	0.01	0.00	0.01	0.02
Total	100.79	101.20	101.28	100.27	100.82	100.62	100.92	100.63	101.27	100.88	100.43	101.58	101.80	100.69
Total cor.	100.72	101.11	101.19	100.18	100.74	100.53	100.85	100.55	101.21	100.88	100.42	101.57	101.80	100.67
Cations														
Si	2.669	2.681	2.676	2.678	2.665	2.664	2.671	2.638	2.659	2.763	2.743	2.733	2.733	2.740
Ti	0.260	0.249	0.204	0.201	0.212	0.242	0.249	0.250	0.243	0.201	0.230	0.209	0.207	0.193
Al	1.620	1.616	1.654	1.665	1.646	1.622	1.614	1.623	1.617	1.511	1.467	1.456	1.449	1.490
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.706	0.718	0.784	0.786	0.778	0.764	0.749	0.754	0.754	0.858	0.873	0.938	0.922	0.939
Ca	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000
Mn	0.006	0.007	0.004	0.008	0.007	0.008	0.005	0.007	0.008	0.009	0.011	0.012	0.012	0.014
Fe^{2+}	1.518	1.508	1.489	1.470	1.511	1.510	1.501	1.555	1.531	1.463	1.496	1.511	1.548	1.474
Ba	0.004	0.004	0.004	0.002	0.002	0.000	0.003	0.002	0.003	0.010	0.009	0.012	0.009	0.011
Na	0.011	0.013	0.014	0.013	0.013	0.014	0.014	0.013	0.017	0.012	0.007	0.003	0.008	0.008
K	0.943	0.946	0.939	0.946	0.942	0.933	0.949	0.932	0.934	0.919	0.918	0.913	0.904	0.914
Total	7.737	7.741	7.769	7.769	7.777	7.757	7.755	7.773	7.766	7.747	7.756	7.788	7.792	7.783
Volatiles														
OH	1.960	1.947	1.953	1.950	1.953	1.945	1.960	1.949	1.964	1.997	1.993	1.997	1.998	1.994
F	0.034	0.045	0.043	0.046	0.043	0.051	0.033	0.045	0.029	0.000	0.005	0.003	0.000	0.003
Cl	0.006	0.008	0.004	0.004	0.004	0.004	0.007	0.007	0.007	0.003	0.001	0.000	0.002	0.003
X_{Mg}	0.317	0.322	0.345	0.348	0.340	0.336	0.333	0.327	0.330	0.370	0.369	0.383	0.373	0.389

	811079A F1 Bt	811079A F1 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811079A F2 Bt	811102F F2 Bt	811102F F2 Bt
Analysis														
SiO_2	35.61	35.96	36.35	35.35	35.81	35.89	34.77	36.13	36.72	36.19	36.65	36.50	36.24	36.09
TiO_2	3.31	3.51	3.50	3.63	3.71	2.81	2.68	2.96	3.34	3.50	3.45	3.44	3.96	3.98
Al_2O_3	16.39	16.10	16.24	15.83	15.46	16.12	18.04	17.11	16.39	16.38	16.27	16.26	18.25	18.31
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	8.24	8.15	7.84	7.35	7.80	7.99	7.13	7.49	7.90	7.83	7.75	7.85	9.61	9.65
CaO	0.00	0.01	0.13	0.05	0.06	0.02	0.09	0.05	0.02	0.00	0.00	0.00	0.00	0.00
MnO	0.17	0.18	0.17	0.19	0.18	0.23	0.17	0.20	0.21	0.20	0.18	0.19	0.04	0.09
FeO	23.37	23.97	23.30	24.16	23.96	23.87	24.56	24.15	23.37	23.68	23.48	23.53	19.62	19.57
BaO	0.30	0.29	0.31	0.26	0.27	0.25	0.51	0.34	0.28	0.25	0.30	0.40	0.13	0.02
Na_2O	0.05	0.03	0.12	0.02	0.09	0.05	0.10	0.11	0.11	0.05	0.06	0.07	0.09	0.10
K_2O	9.45	9.49	9.15	8.81	9.06	9.23	8.85	9.23	9.41	9.27	9.42	9.37	9.59	9.64
H_2O	3.90	3.92	3.90	3.85	3.88	3.87	3.88	3.93	3.95	3.93	3.94	3.93	3.91	3.91
F	0.00	0.01	0.07	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.22	0.22
Cl	0.01	0.02	0.01	0.01	0.00	0.00	0.04	0.03	0.02	0.01	0.01	0.02	0.04	0.04
Total	100.81	101.64	101.08	99.51	100.27	100.38	100.81	101.72	101.72	101.29	101.51	101.56	101.70	101.64
Total cor.	100.80	101.63	101.06	99.50	100.27	100.36	100.80	101.71	101.72	101.29	101.50	101.55	101.60	101.54
Cations														
Si	2.733	2.743	2.773	2.752	2.766	2.768	2.678	2.747	2.783	2.759	2.785	2.775	2.699	2.689
Ti	0.191	0.201	0.201	0.213	0.216	0.163	0.155	0.169	0.190	0.201	0.197	0.197	0.222	0.223
Al	1.482	1.447	1.460	1.453	1.408	1.465	1.638	1.533	1.463	1.472	1.457	1.458	1.601	1.608
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.943	0.927	0.891	0.853	0.899	0.919	0.818	0.849	0.892	0.889	0.878	0.890	1.067	1.072
Ca	0.000	0.001	0.011	0.004	0.005	0.002	0.008	0.004	0.002	0.000	0.000	0.000	0.000	0.000
Mn	0.011	0.011	0.011	0.013	0.012	0.015	0.011	0.013	0.014	0.013	0.012	0.012	0.002	0.006
Fe^{2+}	1.500	1.529	1.486	1.573	1.548	1.539	1.582	1.536	1.481	1.510	1.492	1.496	1.222	1.220
Ba	0.009	0.009	0.009	0.008	0.008	0.007	0.015	0.010	0.008	0.008	0.009	0.012	0.004	0.001
Na	0.008	0.005	0.017	0.003	0.013	0.007	0.015	0.017	0.015	0.007	0.009	0.010	0.013	0.014
K	0.925	0.923	0.890	0.875	0.893	0.908	0.869	0.895	0.910	0.902	0.913	0.909	0.911	0.916
Total	7.802	7.796	7.750	7.747	7.767	7.794	7.790	7.773	7.758	7.760	7.751	7.759	7.741	7.749
Volatiles														
OH	1.998	1.995	1.983	1.998	1.999	1.988	1.995	1.996	1.998	1.998	1.998	1.995	1.944	1.942
F	0.000	0.002	0.016	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.003	0.051	0.052
Cl	0.002	0.002	0.001	0.002	0.001	0.000	0.005	0.004	0.002	0.002	0.002	0.002	0.005	0.005
X_{Mg}	0.386	0.377	0.375	0.352	0.367	0.374	0.341	0.356	0.376	0.371	0.370	0.373	0.466	0.468

	811102F F2 Bt	811102F F2 Bt	811102F F2 Bt	811102F F2 Bt	811102F F2 Bt	811102F F2 Bt	811102F F2 Bt	811102F F4 Bt	811102F F4 Bt	811102F F4 Bt	811102F F4 Bt	811102F F4 Bt	811102F F4 Bt	D7625A F1 Bt1
Analysis														
SiO_2	36.15	36.14	36.19	36.33	36.17	36.02	35.83	36.09	35.89	36.43	36.27	35.83	35.98	36.43
TiO_2	4.29	4.22	4.06	4.09	4.09	3.78	4.09	4.16	4.11	3.86	4.32	4.37	4.27	1.50
Al_2O_3	18.44	18.30	18.43	18.83	18.08	18.13	18.84	18.31	18.84	18.82	18.91	18.50	18.21	17.67
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	9.44	9.54	9.67	9.44	9.65	9.68	9.36	9.65	9.48	9.73	9.22	9.48	9.38	13.05
CaO	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
MnO	0.06	0.04	0.06	0.08	0.07	0.05	0.04	0.06	0.06	0.06	0.04	0.04	0.06	0.06
FeO	19.49	19.08	19.05	18.56	19.36	19.82	18.53	19.28	19.08	18.46	18.86	19.08	19.38	16.23
BaO	0.11	0.18	0.05	0.18	0.20	0.19	0.18	0.01	0.08	0.12	0.30	0.14	0.16	0.25
Na_2O	0.08	0.06	0.11	0.07	0.07	0.08	0.08	0.11	0.13	0.10	0.10	0.06	0.11	0.07
K_2O	9.67	9.75	9.80	9.79	9.70	9.61	9.64	9.50	9.67	9.75	9.93	9.72	9.62	8.12
H_2O	3.92	3.91	3.91	3.91	3.90	3.88	3.88	3.89	3.94	3.91	3.93	3.91	3.89	3.81
F	0.23	0.22	0.23	0.26	0.23	0.25	0.23	0.27	0.16	0.25	0.23	0.20	0.24	0.28
Cl	0.04	0.02	0.04	0.02	0.03	0.04	0.05	0.03	0.03	0.04	0.04	0.03	0.03	0.02
Total	101.91	101.45	101.60	101.54	101.55	101.52	100.76	101.37	101.47	101.54	102.15	101.36	101.31	97.50
Total cor.	101.81	101.35	101.49	101.43	101.45	101.41	100.66	101.26	101.40	101.43	102.04	101.27	101.20	97.38
Cations														
Si	2.686	2.694	2.693	2.698	2.698	2.693	2.683	2.691	2.672	2.702	2.685	2.675	2.690	2.768
Ti	0.240	0.236	0.227	0.228	0.230	0.213	0.230	0.233	0.230	0.215	0.240	0.245	0.240	0.086
Al	1.614	1.608	1.616	1.648	1.590	1.598	1.662	1.609	1.653	1.645	1.650	1.627	1.604	1.582
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.045	1.061	1.073	1.045	1.073	1.079	1.044	1.073	1.052	1.076	1.018	1.055	1.046	1.477
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Mn	0.004	0.002	0.004	0.005	0.004	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.004
Fe^{2+}	1.211	1.190	1.185	1.153	1.208	1.239	1.160	1.202	1.188	1.145	1.168	1.191	1.212	1.031
Ba	0.003	0.005	0.001	0.005	0.006	0.005	0.005	0.000	0.002	0.004	0.009	0.004	0.005	0.007
Na	0.011	0.009	0.015	0.009	0.010	0.012	0.012	0.016	0.019	0.015	0.014	0.009	0.016	0.010
K	0.917	0.928	0.930	0.928	0.923	0.916	0.921	0.904	0.919	0.923	0.938	0.925	0.917	0.787
Total	7.731	7.734	7.745	7.719	7.744	7.759	7.722	7.732	7.740	7.729	7.725	7.734	7.734	7.754
Volatiles														
OH	1.942	1.945	1.941	1.937	1.943	1.936	1.940	1.933	1.959	1.937	1.942	1.948	1.939	1.930
F	0.053	0.052	0.054	0.060	0.053	0.059	0.054	0.063	0.038	0.058	0.053	0.048	0.058	0.068
Cl	0.005	0.003	0.005	0.002	0.004	0.005	0.006	0.003	0.003	0.005	0.005	0.004	0.003	0.002
X_{Mg}	0.463	0.471	0.475	0.476	0.470	0.465	0.474	0.472	0.470	0.485	0.466	0.470	0.463	0.589

	D7625A F1 Bt2	D7625A F1 Bt3	D7625A F1 Bt4	D7625A F1 Bt5	D7625A F1 Bt6	D7625A F1 Bt7	D7625A F1 Bt8	D7625A F1 Bt9	D7625A F1 Bt10	D7625A F2 Bt1	D7625A F2 Bt2	D7625A F2 Bt3	D7625A F2 Bt4	D7625A F2 Bt5
Analysis														
SiO_2	36.79	36.90	36.55	37.02	37.04	36.27	36.28	36.00	36.59	36.35	36.65	36.37	36.75	36.21
TiO_2	1.57	1.54	1.48	1.57	1.65	1.47	1.49	1.54	1.56	1.81	1.81	1.79	1.90	1.83
Al_2O_3	17.73	17.81	18.04	18.07	17.71	18.12	17.83	17.97	17.91	17.71	17.98	18.09	17.92	17.84
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.40	12.19	12.30	12.40	12.44	12.18	12.17	12.03	12.23	12.03	11.84	11.84	11.84	11.65
CaO	0.00	0.01	0.01	0.02	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02
MnO	0.05	0.10	0.10	0.05	0.06	0.08	0.12	0.00	0.08	0.06	0.10	0.02	0.05	0.04
FeO	16.99	17.16	16.44	16.49	16.56	16.61	16.51	16.45	16.81	16.60	16.70	16.44	16.66	16.40
BaO	0.25	0.15	0.14	0.19	0.18	0.19	0.03	0.14	0.13	0.17	0.19	0.14	0.20	0.28
Na_2O	0.10	0.12	0.15	0.11	0.10	0.09	0.16	0.07	0.14	0.09	0.12	0.14	0.14	0.13
K_2O	8.44	8.41	8.48	8.51	8.75	8.59	8.70	8.59	8.72	8.53	8.62	8.66	8.59	8.59
H_2O	3.86	3.85	3.83	3.88	3.87	3.85	3.82	3.83	3.87	3.83	3.85	3.83	3.84	3.82
F	0.23	0.25	0.25	0.23	0.23	0.19	0.22	0.16	0.20	0.21	0.23	0.23	0.26	0.20
Cl	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Total	98.41	98.49	97.78	98.53	98.59	97.66	97.32	96.80	98.22	97.39	98.08	97.55	98.15	97.01
Total cor.	98.31	98.38	97.68	98.44	98.49	97.58	97.23	96.73	98.14	97.30	97.99	97.45	98.04	96.93
Cations														
Si	2.779	2.785	2.773	2.784	2.789	2.760	2.770	2.761	2.771	2.773	2.777	2.768	2.781	2.775
Ti	0.089	0.087	0.085	0.089	0.094	0.084	0.086	0.089	0.089	0.104	0.103	0.103	0.108	0.106
Al	1.579	1.584	1.613	1.601	1.572	1.625	1.604	1.625	1.598	1.593	1.605	1.623	1.598	1.611
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.397	1.372	1.391	1.390	1.396	1.382	1.385	1.376	1.380	1.369	1.337	1.343	1.336	1.330
Ca	0.000	0.001	0.001	0.002	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001
Mn	0.003	0.007	0.006	0.003	0.004	0.005	0.008	0.000	0.005	0.004	0.006	0.001	0.003	0.003
Fe^{2+}	1.073	1.083	1.043	1.037	1.043	1.057	1.054	1.055	1.065	1.059	1.058	1.046	1.054	1.051
Ba	0.007	0.004	0.004	0.006	0.005	0.006	0.001	0.004	0.004	0.005	0.006	0.004	0.006	0.008
Na	0.014	0.018	0.022	0.016	0.014	0.014	0.023	0.010	0.021	0.013	0.017	0.021	0.020	0.020
K	0.814	0.810	0.821	0.816	0.841	0.834	0.847	0.841	0.842	0.830	0.833	0.840	0.829	0.840
Total	7.756	7.750	7.758	7.743	7.758	7.767	7.777	7.763	7.774	7.748	7.742	7.749	7.736	7.744
Volatiles														
OH	1.946	1.941	1.939	1.945	1.944	1.955	1.946	1.960	1.953	1.950	1.944	1.944	1.938	1.951
F	0.054	0.059	0.060	0.055	0.055	0.045	0.054	0.040	0.047	0.050	0.056	0.056	0.062	0.047
Cl	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002
X_{Mg}	0.565	0.559	0.572	0.573	0.572	0.567	0.568	0.566	0.565	0.564	0.558	0.562	0.559	0.559

	Q33B F2 Bt 1 1	Q33B F2 Bt 1 2	Q33B F2 Bt 1 3	Q33B F2 Bt 1 5	Q33B F8 Bt 3 1	Q33B F8 Bt 3 2	Q33B F8 Bt 3 3	Q33B F8 Bt 3 4	Q33B F8 Bt 3 5	Q33B F8 Bt 3 6	Q33B F8 Bt 3 8	Q33B F8 Bt 3 9	Q33B F8 Bt 3 10	Q33B F6 Bt 1 1
Analysis														
SiO_2	35.68	36.74	36.28	36.02	35.45	36.75	35.24	36.39	36.34	36.21	36.54	36.67	36.39	36.28
TiO_2	2.30	2.33	2.58	2.47	2.71	2.39	2.39	2.25	2.38	2.46	2.31	2.42	2.58	2.51
Al_2O_3	20.02	20.75	20.16	20.17	20.79	20.48	20.34	20.45	20.41	20.50	20.50	20.72	20.19	20.32
Cr_2O_3	0.10	0.09	0.08	0.08	0.09	0.10	0.06	0.07	0.05	0.07	0.09	0.10	0.07	0.05
MgO	11.25	11.59	11.20	11.13	10.99	11.65	11.75	11.55	11.71	11.61	11.56	11.63	11.37	11.70
CaO	0.04	0.05	0.07	0.10	0.10	0.05	0.08	0.04	0.04	0.06	0.06	0.06	0.09	0.10
MnO	0.10	0.09	0.12	0.14	0.11	0.09	0.11	0.16	0.10	0.09	0.08	0.11	0.12	0.13
FeO	18.27	18.21	17.94	17.74	18.79	18.06	18.90	18.32	18.21	17.51	17.85	17.84	18.37	17.64
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.10	0.07	0.15	0.06	0.10	0.05	0.10	0.07	0.15	0.14	0.04	0.08	0.06	0.08
K_2O	9.69	9.60	9.66	9.52	8.44	9.69	8.28	9.68	9.71	9.72	9.67	9.67	9.53	9.65
H_2O	3.72	3.85	3.78	3.76	3.80	3.83	3.77	3.81	3.81	3.79	3.81	3.83	3.81	3.79
F	0.71	0.66	0.66	0.64	0.57	0.67	0.61	0.66	0.68	0.68	0.67	0.67	0.65	0.68
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Total	101.99	104.03	102.70	101.85	101.95	103.82	101.63	103.46	103.57	102.85	103.19	103.79	103.24	102.92
Total cor.	101.70	103.76	102.42	101.58	101.71	103.54	101.37	103.19	103.29	102.57	102.91	103.52	102.97	102.63
Cations														
Si	2.638	2.648	2.654	2.654	2.606	2.655	2.602	2.645	2.638	2.640	2.655	2.647	2.649	2.644
Ti	0.128	0.126	0.142	0.137	0.150	0.130	0.133	0.123	0.130	0.135	0.127	0.131	0.141	0.138
Al	1.745	1.763	1.738	1.751	1.801	1.744	1.770	1.751	1.746	1.762	1.755	1.762	1.732	1.745
Cr	0.006	0.005	0.005	0.005	0.005	0.005	0.003	0.004	0.003	0.004	0.005	0.006	0.004	0.003
Mg	1.239	1.245	1.221	1.223	1.205	1.255	1.293	1.251	1.267	1.261	1.252	1.251	1.234	1.271
Ca	0.003	0.004	0.006	0.008	0.008	0.004	0.006	0.003	0.003	0.004	0.005	0.005	0.007	0.007
Mn	0.006	0.006	0.008	0.009	0.007	0.005	0.007	0.010	0.006	0.006	0.005	0.006	0.008	0.008
Fe^{2+}	1.129	1.098	1.098	1.093	1.156	1.091	1.167	1.114	1.105	1.068	1.084	1.077	1.119	1.075
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.014	0.010	0.022	0.009	0.014	0.008	0.015	0.010	0.021	0.020	0.005	0.011	0.009	0.011
K	0.914	0.883	0.902	0.895	0.791	0.893	0.780	0.898	0.899	0.904	0.897	0.891	0.885	0.897
Total	7.823	7.788	7.795	7.783	7.743	7.791	7.776	7.809	7.818	7.804	7.790	7.788	7.789	7.798
Volatiles														
OH	1.835	1.851	1.846	1.850	1.866	1.847	1.858	1.847	1.843	1.841	1.845	1.847	1.850	1.841
F	0.165	0.149	0.154	0.150	0.133	0.153	0.142	0.153	0.157	0.157	0.153	0.153	0.150	0.158
Cl	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001
X_{Mg}	0.523	0.531	0.527	0.528	0.510	0.535	0.526	0.529	0.534	0.542	0.536	0.537	0.525	0.542

	Q33B F6 Bt 1 2	Q33B F6 Bt 1 3	Q33B F6 Bt 1 4	Q33B F6 Bt 1 5	Q33B F6 Bt 2 1	Q33B F6 Bt 2 2	Q33B F6 Bt 2 3	Q33B F6 Bt 2 4	Q33B F6 Bt 2 5	Q33B F10 Bt 4 1	Q33B F10 Bt 4 2	Q33B F10 Bt 4 3	Q33B F10 Bt 4 5	Q33B F10 Bt 5 1
Analysis														
SiO_2	36.56	36.42	36.81	35.94	35.49	35.78	36.28	36.27	36.55	36.06	36.17	36.43	34.88	36.43
TiO_2	2.17	2.03	2.08	2.23	2.70	2.61	2.40	2.53	2.32	2.37	2.26	2.44	2.02	2.47
Al_2O_3	20.79	20.38	20.45	19.97	19.73	20.06	20.30	20.10	20.32	20.39	20.33	20.69	20.53	20.99
Cr_2O_3	0.05	0.06	0.07	0.08	0.13	0.11	0.07	0.11	0.07	0.08	0.08	0.11	0.07	0.10
MgO	11.84	11.98	11.74	11.60	11.39	11.59	11.74	11.63	11.14	11.79	11.66	11.66	12.28	11.34
CaO	0.00	0.05	0.03	0.03	0.02	0.01	0.01	0.04	0.02	0.03	0.03	0.01	0.03	0.05
MnO	0.09	0.13	0.12	0.11	0.16	0.16	0.14	0.07	0.16	0.10	0.14	0.09	0.16	0.10
FeO	17.83	17.86	17.77	18.29	17.68	17.95	18.12	18.33	17.86	18.40	18.34	17.85	19.19	17.07
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.12	0.11	0.05	0.06	0.10	0.06	0.01	0.06	0.08	0.10	0.00	0.10	0.05	0.16
K_2O	9.78	9.49	9.74	9.70	9.63	9.81	9.79	9.81	9.60	9.80	9.80	9.87	8.56	9.67
H_2O	3.82	3.80	3.79	3.76	3.71	3.76	3.80	3.79	3.78	3.79	3.79	3.81	3.77	3.80
F	0.69	0.68	0.73	0.67	0.69	0.69	0.67	0.69	0.67	0.69	0.68	0.70	0.62	0.69
Cl	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00
Total	103.74	102.98	103.38	102.42	101.44	102.59	103.35	103.43	102.57	103.57	103.29	103.76	102.16	102.87
Total cor.	103.46	102.70	103.08	102.15	101.15	102.30	103.07	103.15	102.29	103.29	103.01	103.48	101.90	102.58
Cations														
Si	2.642	2.651	2.668	2.643	2.634	2.627	2.640	2.640	2.672	2.623	2.637	2.636	2.572	2.646
Ti	0.118	0.111	0.114	0.123	0.151	0.144	0.132	0.139	0.128	0.129	0.124	0.133	0.112	0.135
Al	1.771	1.748	1.747	1.731	1.725	1.736	1.741	1.724	1.750	1.748	1.746	1.765	1.784	1.797
Cr	0.003	0.004	0.004	0.005	0.008	0.007	0.004	0.006	0.004	0.004	0.005	0.006	0.004	0.005
Mg	1.276	1.300	1.269	1.271	1.260	1.268	1.273	1.262	1.214	1.278	1.267	1.257	1.350	1.228
Ca	0.000	0.004	0.002	0.003	0.002	0.001	0.001	0.003	0.002	0.002	0.002	0.001	0.002	0.004
Mn	0.005	0.008	0.007	0.007	0.010	0.010	0.008	0.004	0.010	0.006	0.008	0.005	0.010	0.006
Fe^{2+}	1.078	1.087	1.077	1.125	1.097	1.102	1.103	1.116	1.092	1.119	1.118	1.080	1.183	1.037
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.016	0.016	0.008	0.008	0.015	0.008	0.002	0.009	0.011	0.014	0.000	0.015	0.007	0.022
K	0.902	0.882	0.901	0.910	0.911	0.919	0.909	0.911	0.896	0.909	0.911	0.911	0.805	0.896
Total	7.811	7.811	7.797	7.825	7.812	7.821	7.812	7.815	7.777	7.833	7.819	7.809	7.829	7.777
Volatiles														
OH	1.844	1.843	1.834	1.845	1.838	1.839	1.845	1.840	1.844	1.841	1.843	1.839	1.854	1.842
F	0.157	0.156	0.166	0.155	0.162	0.159	0.155	0.160	0.156	0.159	0.156	0.160	0.145	0.158
Cl	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000
X_{Mg}	0.542	0.545	0.541	0.531	0.535	0.535	0.536	0.531	0.526	0.533	0.531	0.538	0.533	0.542

	Q33B F10 Bt 5 2	Q33B F10 Bt 5 3	Q33B F10 Bt 5 4	Q33B F10 Bt 5 5	Q33B F11 Bt 6 1	Q33B F11 Bt 6 2	Q33B F11 Bt 6 3	Q33B F11 Bt 6 4	Q61E F2 Bt 1 1	Q61E F2 Bt 1 2	Q61E F2 Bt 1 4	Q61E F2 Bt 1 5	Q61E F2 Bt 2 2	Q61E F2 Bt 2 3
Analysis														
SiO_2	36.54	36.08	36.22	36.31	36.13	35.79	36.15	35.99	34.89	34.60	36.02	36.16	35.51	35.80
TiO_2	2.54	2.53	2.88	2.28	2.32	2.10	2.28	1.97	1.42	1.48	1.48	1.49	1.48	1.55
Al_2O_3	20.91	20.63	20.84	20.79	20.69	20.54	20.84	20.76	19.72	20.06	20.41	20.53	20.30	20.35
Cr_2O_3	0.09	0.12	0.05	0.10	0.06	0.05	0.09	0.06	0.03	0.04	0.03	0.02	0.01	0.02
MgO	11.22	11.34	11.00	11.16	11.34	11.48	11.57	11.27	11.37	11.01	11.18	11.05	10.83	11.24
CaO	0.01	0.03	0.00	0.04	0.02	0.00	0.00	0.00	0.14	1.58	0.07	0.08	0.03	0.00
MnO	0.08	0.08	0.13	0.09	0.10	0.17	0.11	0.15	0.06	0.03	0.03	0.04	0.05	0.02
FeO	16.86	17.41	17.99	17.39	18.82	18.08	18.17	18.24	20.31	18.99	19.56	19.37	19.59	19.72
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.14	0.11	0.15	0.09	0.06	0.09	0.05	0.07	0.23	0.18	0.20	0.19	0.16	0.16
K_2O	9.64	9.58	9.57	9.61	9.74	9.88	9.90	9.82	7.18	7.45	8.10	7.95	7.99	7.86
H_2O	3.80	3.77	3.80	3.79	3.81	3.76	3.82	3.76	3.75	3.74	3.82	3.84	3.78	3.81
F	0.69	0.69	0.70	0.65	0.67	0.68	0.66	0.70	0.46	0.49	0.50	0.47	0.48	0.50
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.00	0.01
Total	102.50	102.38	103.35	102.29	103.77	102.63	103.64	102.77	99.57	99.68	101.40	101.21	100.20	101.04
Total cor.	102.22	102.09	103.06	102.03	103.49	102.35	103.37	102.49	99.37	99.48	101.19	101.01	100.00	100.83
Cations														
Si	2.659	2.639	2.630	2.655	2.625	2.626	2.623	2.636	2.633	2.609	2.662	2.670	2.657	2.654
Ti	0.139	0.139	0.157	0.125	0.127	0.116	0.124	0.108	0.081	0.084	0.082	0.083	0.083	0.087
Al	1.793	1.779	1.783	1.791	1.771	1.777	1.783	1.792	1.754	1.783	1.777	1.787	1.790	1.778
Cr	0.005	0.007	0.003	0.006	0.003	0.003	0.005	0.004	0.002	0.003	0.002	0.001	0.001	0.001
Mg	1.217	1.237	1.191	1.216	1.228	1.256	1.252	1.230	1.279	1.238	1.232	1.217	1.209	1.242
Ca	0.001	0.003	0.000	0.003	0.002	0.000	0.000	0.000	0.012	0.128	0.006	0.006	0.003	0.000
Mn	0.005	0.005	0.008	0.006	0.006	0.010	0.007	0.009	0.004	0.002	0.002	0.002	0.003	0.001
Fe^{2+}	1.026	1.065	1.092	1.063	1.143	1.110	1.103	1.117	1.282	1.197	1.209	1.197	1.226	1.222
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.020	0.016	0.021	0.012	0.009	0.013	0.007	0.010	0.033	0.027	0.029	0.028	0.023	0.023
K	0.895	0.894	0.887	0.897	0.903	0.925	0.917	0.917	0.691	0.717	0.764	0.749	0.763	0.743
Total	7.761	7.784	7.774	7.775	7.817	7.836	7.821	7.822	7.771	7.786	7.763	7.741	7.757	7.753
Volatiles														
OH	1.842	1.840	1.839	1.851	1.846	1.841	1.848	1.839	1.887	1.881	1.882	1.890	1.886	1.882
F	0.158	0.159	0.161	0.149	0.154	0.158	0.152	0.161	0.110	0.116	0.118	0.109	0.114	0.117
Cl	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.001	0.001	0.001	0.001
X_{Mg}	0.543	0.537	0.522	0.534	0.518	0.531	0.532	0.524	0.499	0.508	0.505	0.504	0.496	0.504

	Q61E F2 Bt 2 4	Q61E F2 Bt 3 1	Q61E F2 Bt 3 2	Q61E F2 Bt 3 3	Q61E F2 Bt 3 4	Q61E F2 Bt 3 5	Q61E F9 Bt 4 1	Q61E F9 Bt 4 2	Q61E F9 Bt 4 3	Q61E F10 Bt 5 1	Q61E F10 Bt 5 2	Q61E F10 Bt 5 3	Q61E F10 Bt 5 4	Q61E F10 Bt 5 5
Analysis														
SiO_2	35.81	35.72	35.51	35.50	35.85	36.59	35.87	35.87	35.56	35.78	36.09	36.06	35.90	36.01
TiO_2	1.66	1.72	1.80	1.70	1.65	1.58	1.57	1.61	1.74	1.60	1.47	1.72	1.67	1.65
Al_2O_3	19.80	20.34	20.29	20.44	19.99	20.03	19.70	19.89	19.52	20.24	20.02	20.10	20.10	20.33
Cr_2O_3	0.02	0.00	0.00	0.04	0.04	0.02	0.02	0.03	0.01	0.06	0.04	0.02	0.03	0.01
MgO	11.01	11.11	11.15	10.99	11.10	11.14	11.40	11.22	10.96	10.87	11.10	11.26	11.11	11.07
CaO	0.03	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.05	0.04	0.04	0.03	0.04	0.01
MnO	0.07	0.06	0.06	0.04	0.04	0.04	0.09	0.00	0.03	0.02	0.03	0.05	0.03	0.02
FeO	19.38	19.66	19.33	19.63	19.42	19.08	19.53	19.30	19.33	20.11	19.78	19.78	19.99	19.80
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.17	0.20	0.18	0.20	0.21	0.21	0.19	0.10	0.25	0.24	0.19	0.26	0.26	0.26
K_2O	7.88	8.08	8.14	8.06	8.09	8.02	8.07	8.13	7.72	7.96	7.90	8.04	8.09	7.95
H_2O	3.76	3.82	3.81	3.80	3.79	3.81	3.76	3.77	3.67	3.80	3.79	3.82	3.80	3.81
F	0.51	0.47	0.46	0.49	0.50	0.51	0.55	0.53	0.54	0.50	0.52	0.50	0.52	0.51
Cl	0.02	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.20	0.02	0.02	0.02	0.01	0.02
Total	100.10	101.19	100.72	100.90	100.72	101.05	100.77	100.46	99.59	101.23	101.01	101.64	101.57	101.46
Total cor.	99.89	101.00	100.53	100.70	100.51	100.83	100.54	100.24	99.32	101.02	100.79	101.43	101.35	101.24
Cations														
Si	2.679	2.648	2.643	2.640	2.669	2.703	2.671	2.675	2.679	2.656	2.678	2.661	2.656	2.661
Ti	0.093	0.096	0.101	0.095	0.092	0.088	0.088	0.090	0.099	0.090	0.082	0.095	0.093	0.092
Al	1.746	1.777	1.780	1.792	1.753	1.744	1.730	1.748	1.733	1.771	1.751	1.748	1.753	1.770
Cr	0.001	0.000	0.000	0.002	0.002	0.001	0.001	0.002	0.001	0.003	0.003	0.001	0.002	0.001
Mg	1.228	1.227	1.237	1.218	1.232	1.227	1.266	1.247	1.231	1.203	1.228	1.239	1.226	1.219
Ca	0.002	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.003	0.003	0.002	0.003	0.001
Mn	0.004	0.004	0.003	0.003	0.003	0.006	0.000	0.002	0.001	0.002	0.003	0.002	0.002	0.001
Fe^{2+}	1.212	1.219	1.203	1.221	1.209	1.179	1.217	1.204	1.218	1.248	1.227	1.221	1.237	1.224
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.024	0.029	0.026	0.029	0.030	0.031	0.027	0.014	0.036	0.034	0.028	0.037	0.038	0.038
K	0.752	0.764	0.773	0.764	0.768	0.756	0.767	0.773	0.742	0.754	0.748	0.757	0.763	0.750
Total	7.742	7.764	7.765	7.765	7.760	7.731	7.772	7.754	7.744	7.762	7.751	7.765	7.774	7.756
Volatiles														
OH	1.876	1.887	1.891	1.884	1.881	1.880	1.868	1.873	1.846	1.881	1.874	1.882	1.877	1.879
F	0.122	0.111	0.108	0.115	0.117	0.120	0.130	0.125	0.128	0.117	0.123	0.116	0.122	0.118
Cl	0.002	0.002	0.001	0.001	0.002	0.000	0.002	0.002	0.026	0.002	0.003	0.002	0.001	0.002
X_{Mg}	0.503	0.502	0.507	0.499	0.505	0.510	0.510	0.509	0.503	0.491	0.500	0.504	0.498	0.499

	Q61E F10 Bt 5 6	Q61E F12 Bt 6 1	Q61E F12 Bt 6 2	Q61E F12 Bt 6 3	Q61E F12 Bt 6 4	Q61E F12 Bt 6 5	Q61E F6 Bt 1 2	Q61E F6 Bt 1 3	Q61E F6 Bt 1 4	Q61E F6 Bt 1 5	Q61E F6 Bt 2 1	Q61E F6 Bt 2 2	Q61E F6 Bt 2 3	Q61E F6 Bt 2 4
Analysis														
SiO_2	36.00	35.33	35.44	35.41	35.33	35.52	35.15	35.17	35.02	35.46	35.33	34.79	35.74	35.47
TiO_2	1.53	1.44	1.36	1.31	1.33	1.46	1.61	1.60	1.47	1.74	1.42	1.48	1.48	1.43
Al_2O_3	20.27	20.25	20.02	20.30	20.12	20.09	19.62	19.93	19.48	19.82	19.99	19.85	20.02	19.64
Cr_2O_3	0.07	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.03	0.04	0.04
MgO	11.19	10.58	10.89	10.89	10.75	10.79	10.70	10.69	10.89	10.52	10.97	10.57	10.91	10.73
CaO	0.02	0.01	0.01	0.04	0.01	0.01	0.02	0.00	0.03	0.00	0.04	0.02	0.03	0.03
MnO	0.05	0.05	0.00	0.00	0.03	0.07	0.03	0.00	0.05	0.05	0.04	0.03	0.04	0.02
FeO	19.86	19.74	19.57	19.78	19.79	20.06	19.41	20.00	19.95	19.72	19.61	19.28	19.54	19.53
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.20	0.18	0.18	0.23	0.14	0.12	0.14	0.12	0.13	0.10	0.14	0.17	0.24	0.21
K_2O	7.99	8.05	8.08	7.71	7.98	7.98	7.97	7.96	7.67	7.95	7.82	7.83	7.83	7.80
H_2O	3.80	3.73	3.73	3.75	3.73	3.75	3.70	3.72	3.70	3.73	3.74	3.65	3.75	3.71
F	0.52	0.53	0.53	0.51	0.53	0.53	0.53	0.53	0.50	0.52	0.50	0.55	0.53	0.53
Cl	0.03	0.02	0.01	0.02	0.02	0.01	0.00	0.01	0.01	0.02	0.03	0.05	0.01	0.02
Total	101.53	99.94	99.87	99.95	99.79	100.41	98.91	99.76	98.96	99.67	99.69	98.31	100.17	99.15
Total cor.	101.31	99.72	99.65	99.74	99.56	100.19	98.69	99.54	98.75	99.45	99.48	98.07	99.94	98.93
Cations														
Si	2.660	2.656	2.665	2.656	2.660	2.659	2.669	2.652	2.661	2.671	2.659	2.657	2.673	2.683
Ti	0.085	0.082	0.077	0.074	0.075	0.082	0.092	0.091	0.084	0.099	0.080	0.085	0.083	0.081
Al	1.766	1.794	1.774	1.794	1.785	1.773	1.756	1.772	1.745	1.760	1.773	1.786	1.765	1.751
Cr	0.004	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002
Mg	1.233	1.185	1.221	1.217	1.207	1.205	1.210	1.201	1.233	1.181	1.230	1.204	1.217	1.210
Ca	0.002	0.001	0.001	0.003	0.001	0.001	0.002	0.000	0.002	0.000	0.003	0.002	0.002	0.002
Mn	0.003	0.003	0.000	0.000	0.002	0.005	0.002	0.000	0.003	0.003	0.003	0.002	0.002	0.001
Fe^{2+}	1.227	1.241	1.230	1.241	1.246	1.256	1.232	1.262	1.268	1.243	1.234	1.231	1.222	1.235
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.028	0.026	0.026	0.034	0.021	0.017	0.021	0.017	0.020	0.015	0.021	0.026	0.035	0.031
K	0.754	0.772	0.775	0.738	0.766	0.762	0.772	0.766	0.744	0.764	0.751	0.763	0.748	0.753
Total	7.761	7.763	7.770	7.758	7.765	7.761	7.758	7.762	7.763	7.739	7.758	7.758	7.751	7.751
Volatiles														
OH	1.875	1.871	1.873	1.878	1.872	1.872	1.872	1.873	1.878	1.872	1.877	1.861	1.872	1.872
F	0.121	0.126	0.125	0.120	0.126	0.126	0.128	0.125	0.121	0.125	0.120	0.132	0.127	0.126
Cl	0.004	0.003	0.002	0.002	0.002	0.002	0.000	0.002	0.001	0.003	0.003	0.006	0.002	0.002
X_{Mg}	0.501	0.489	0.498	0.495	0.492	0.490	0.496	0.488	0.493	0.487	0.499	0.494	0.499	0.495

	Q61E F6 Bt 2 5	Q64D F2 Bt 1 1	Q64D F2 Bt 1 2	Q64D F2 Bt 1 3	Q64D F3 Bt 2 1	Q64D F3 Bt 2 2	Q64D F3 Bt 2 3	Q64D F3 Bt 2 4	Q64D F3 Bt 2 5	Q64D F3 Bt 3 1	Q64D F3 Bt 3 2	Q64D F3 Bt 3 3	Q64D F3 Bt 3 4	Q64D F3 Bt 3 5
Analysis														
SiO_2	35.42	34.21	34.48	34.39	34.36	34.43	34.03	34.06	34.80	34.17	34.12	34.49	34.22	34.41
TiO_2	1.60	4.32	4.17	3.88	3.63	3.53	3.75	3.92	3.24	4.11	4.26	4.25	4.10	3.95
Al_2O_3	19.67	19.37	19.47	19.45	19.38	19.35	19.12	19.20	19.17	18.84	19.15	18.86	19.27	19.16
Cr_2O_3	0.03	0.04	0.02	0.03	0.07	0.03	0.03	0.05	0.06	0.06	0.03	0.06	0.05	0.03
MgO	10.87	7.76	7.70	7.90	8.15	7.99	8.03	8.02	8.79	8.13	7.99	7.64	7.64	7.80
CaO	0.06	0.00	0.01	0.00	0.02	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.02
MnO	0.03	0.13	0.12	0.12	0.15	0.13	0.14	0.09	0.08	0.11	0.22	0.13	0.15	0.13
FeO	19.45	20.48	20.56	20.36	20.25	20.44	20.61	20.98	20.65	20.86	21.03	21.30	21.13	20.76
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.14	0.05	0.09	0.02	0.07	0.07	0.07	0.08	0.04	0.05	0.02	0.05	0.07	0.05
K_2O	7.85	9.47	9.58	9.40	9.39	9.50	9.46	9.31	9.48	9.49	9.54	9.51	9.59	9.50
H_2O	3.70	3.64	3.64	3.64	3.62	3.62	3.61	3.63	3.63	3.60	3.64	3.64	3.64	3.63
F	0.54	0.60	0.63	0.59	0.61	0.62	0.58	0.58	0.66	0.64	0.62	0.60	0.60	0.61
Cl	0.04	0.03	0.03	0.03	0.04	0.02	0.02	0.03	0.03	0.04	0.02	0.02	0.03	0.03
Total	99.39	100.11	100.49	99.79	99.74	99.74	99.48	99.98	100.63	100.10	100.63	100.59	100.49	100.07
Total cor.	99.16	99.85	100.23	99.54	99.48	99.49	99.23	99.74	100.35	99.83	100.37	100.33	100.23	99.81
Cations														
Si	2.673	2.611	2.622	2.628	2.628	2.636	2.618	2.608	2.641	2.616	2.601	2.630	2.612	2.631
Ti	0.091	0.248	0.238	0.223	0.209	0.203	0.217	0.226	0.185	0.237	0.244	0.244	0.235	0.227
Al	1.750	1.742	1.745	1.751	1.747	1.746	1.734	1.733	1.714	1.700	1.720	1.695	1.733	1.726
Cr	0.002	0.003	0.001	0.002	0.004	0.002	0.002	0.003	0.004	0.004	0.002	0.004	0.003	0.002
Mg	1.223	0.883	0.873	0.900	0.929	0.912	0.921	0.916	0.995	0.928	0.907	0.869	0.870	0.888
Ca	0.005	0.000	0.001	0.000	0.002	0.001	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.002
Mn	0.002	0.008	0.008	0.008	0.010	0.008	0.009	0.006	0.005	0.007	0.014	0.008	0.010	0.008
Fe^{2+}	1.228	1.307	1.307	1.301	1.295	1.309	1.326	1.344	1.310	1.335	1.341	1.358	1.349	1.327
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.020	0.008	0.014	0.003	0.010	0.010	0.011	0.012	0.006	0.007	0.004	0.008	0.010	0.008
K	0.756	0.922	0.929	0.916	0.916	0.928	0.929	0.910	0.917	0.927	0.928	0.926	0.934	0.927
Total	7.748	7.733	7.738	7.732	7.750	7.756	7.767	7.759	7.777	7.762	7.760	7.743	7.757	7.746
Volatiles														
OH	1.865	1.852	1.846	1.853	1.847	1.849	1.855	1.856	1.838	1.841	1.849	1.852	1.852	1.850
F	0.130	0.144	0.151	0.144	0.148	0.149	0.142	0.140	0.158	0.154	0.149	0.145	0.144	0.147
Cl	0.005	0.004	0.004	0.003	0.005	0.003	0.003	0.004	0.004	0.005	0.002	0.003	0.004	0.003
X_{Mg}	0.499	0.403	0.401	0.409	0.418	0.411	0.410	0.405	0.431	0.410	0.404	0.390	0.392	0.401

	Q64D F4 Bt 5 1	Q64D F4 Bt 5 2	Q64D F4 Bt 5 3	Q64D F5 Bt 5a 1	Q64D F5 Bt 5a 2	Q64D F5 Bt 5a 3	Q64D F5 Bt 6 1	Q64D F5 Bt 6 2	Q64D F5 Bt 6 3	Q64D F6 Bt 7 2	Q64D F6 Bt 7 3	Q 64 E F5 Bt 1 1	Q 64 E F5 Bt 1 2	Q 64 E F5 Bt 1 3
Analysis														
SiO_2	33.92	34.09	33.82	34.15	34.14	34.21	33.83	33.76	33.95	33.47	33.84	35.73	34.58	36.52
TiO_2	3.21	3.97	4.14	4.24	4.45	4.20	4.00	4.20	4.26	3.49	3.89	2.23	2.05	2.04
Al_2O_3	18.95	18.82	19.03	19.02	19.38	19.13	19.36	19.24	19.02	19.17	19.38	17.81	18.13	18.01
Cr_2O_3	0.02	0.03	0.06	0.02	0.02	0.02	0.03	0.05	0.03	0.02	0.04	0.00	0.00	0.00
MgO	8.61	8.11	7.61	7.79	7.82	7.61	7.81	7.66	7.89	8.10	7.90	12.94	13.29	12.94
CaO	0.04	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.03	0.23	0.11	0.10
MnO	0.12	0.12	0.14	0.18	0.12	0.14	0.14	0.15	0.15	0.13	0.14	0.01	0.05	0.02
FeO	21.08	21.30	20.94	20.76	20.93	21.10	20.42	20.90	20.70	20.98	21.12	20.26	21.73	19.87
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.05	0.07	0.06	0.06	0.13	0.11	0.10	0.12	0.02	0.08	0.03	0.19	0.16	0.21
K_2O	9.33	9.37	9.58	9.46	9.42	9.56	9.45	9.31	9.43	9.03	9.39	8.00	6.77	8.90
H_2O	3.57	3.61	3.59	3.63	3.66	3.63	3.58	3.59	3.59	3.56	3.61	3.70	3.68	3.71
F	0.65	0.62	0.62	0.59	0.58	0.59	0.64	0.62	0.64	0.61	0.63	0.69	0.67	0.78
Cl	0.04	0.03	0.04	0.03	0.03	0.04	0.03	0.06	0.03	0.05	0.02	0.02	0.01	0.01
Total	99.60	100.14	99.66	99.93	100.68	100.36	99.39	99.65	99.72	98.69	100.01	101.81	101.24	103.11
Total cor.	99.32	99.88	99.39	99.68	100.44	100.11	99.12	99.38	99.45	98.43	99.74	101.52	100.96	102.79
Cations														
Si	2.613	2.613	2.606	2.617	2.596	2.615	2.604	2.597	2.608	2.599	2.595	2.654	2.589	2.680
Ti	0.186	0.229	0.240	0.244	0.255	0.242	0.232	0.243	0.246	0.204	0.224	0.125	0.116	0.112
Al	1.720	1.700	1.728	1.718	1.737	1.723	1.756	1.745	1.722	1.754	1.752	1.560	1.600	1.558
Cr	0.001	0.002	0.003	0.001	0.001	0.001	0.002	0.003	0.002	0.001	0.002	0.000	0.000	0.000
Mg	0.989	0.927	0.874	0.890	0.887	0.867	0.896	0.878	0.903	0.937	0.903	1.432	1.484	1.416
Ca	0.003	0.001	0.003	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.003	0.018	0.009	0.008
Mn	0.008	0.008	0.009	0.011	0.008	0.009	0.009	0.010	0.010	0.009	0.009	0.000	0.003	0.001
Fe^{2+}	1.358	1.366	1.350	1.330	1.331	1.349	1.315	1.345	1.329	1.362	1.355	1.259	1.361	1.220
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.007	0.010	0.008	0.010	0.019	0.017	0.015	0.018	0.003	0.012	0.004	0.027	0.023	0.030
K	0.917	0.916	0.942	0.924	0.914	0.932	0.928	0.914	0.924	0.895	0.918	0.758	0.646	0.833
Total	7.803	7.770	7.764	7.746	7.747	7.756	7.757	7.751	7.748	7.773	7.765	7.833	7.830	7.859
Volatiles														
OH	1.835	1.846	1.843	1.854	1.856	1.853	1.841	1.843	1.842	1.844	1.845	1.835	1.838	1.817
F	0.159	0.150	0.151	0.142	0.140	0.142	0.155	0.150	0.155	0.149	0.152	0.163	0.160	0.181
Cl	0.006	0.003	0.006	0.004	0.004	0.005	0.004	0.007	0.003	0.007	0.003	0.003	0.002	0.002
X_{Mg}	0.421	0.404	0.393	0.401	0.400	0.391	0.405	0.395	0.405	0.408	0.400	0.532	0.522	0.537

	Q 64 E F8 Bt 1 1	Q 64 E F8 Bt 1 2	Q 64 E F8 Bt 1 3	Q67F F3 Bt 1 1	Q67F F3 Bt 1 2	Q67F F3 Bt 1 3	Q67F F3 Bt 1 4	Q67F F6 Bt 3 1	Q67F F6 Bt 3 2	Q67F F6 Bt 3 3	Q67F F6 Bt 3 4	Q67F F6 Bt 3 5	Q67F F6 Bt 3a 1	Q67F F6 Bt 3a 2
Analysis														
SiO_2	33.51	33.24	35.75	35.99	36.06	35.51	36.17	33.93	34.75	36.10	33.47	33.44	34.85	35.80
TiO_2	1.93	1.88	2.14	1.41	1.56	1.51	1.64	1.57	1.42	1.55	1.32	1.39	1.65	1.65
Al_2O_3	18.57	18.50	17.93	20.23	20.44	20.13	20.08	19.68	19.80	20.39	20.15	20.19	19.91	20.05
Cr_2O_3	0.04	0.00	0.01	0.02	0.02	0.01	0.03	0.04	0.03	0.03	0.01	0.01	0.05	0.03
MgO	13.40	13.35	12.90	11.50	11.67	11.48	11.53	12.45	11.94	11.53	12.83	13.16	10.98	11.36
CaO	0.05	0.05	0.07	0.02	0.00	0.01	0.11	0.12	0.13	0.05	0.13	0.10	0.08	0.02
MnO	0.00	0.02	0.03	0.04	0.00	0.03	0.01	0.04	0.04	0.01	0.02	0.03	0.01	0.01
FeO	22.71	22.85	21.02	18.01	18.06	17.73	18.03	19.19	19.20	18.50	19.13	19.23	19.25	18.07
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.10	0.08	0.14	0.15	0.12	0.09	0.08	0.01	0.09	0.14	0.05	0.06	0.12	0.17
K_2O	5.91	5.84	8.03	8.84	8.76	8.91	8.34	6.98	7.48	8.62	6.60	6.36	7.89	8.51
H_2O	3.71	3.69	3.73	3.70	3.71	3.67	3.71	3.62	3.63	3.74	3.62	3.64	3.63	3.65
F	0.55	0.55	0.68	0.70	0.73	0.68	0.69	0.67	0.71	0.67	0.65	0.64	0.68	0.75
Cl	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
Total	100.48	100.05	102.42	100.63	101.14	99.75	100.43	98.30	99.23	101.33	97.98	98.26	99.12	100.09
Total cor.	100.25	99.83	102.14	100.34	100.84	99.46	100.15	98.02	98.94	101.06	97.71	97.99	98.84	99.78
Cations														
Si	2.530	2.524	2.647	2.676	2.665	2.664	2.686	2.587	2.626	2.666	2.555	2.544	2.641	2.675
Ti	0.109	0.108	0.119	0.079	0.087	0.085	0.091	0.090	0.081	0.086	0.076	0.079	0.094	0.093
Al	1.652	1.655	1.565	1.773	1.781	1.780	1.757	1.768	1.764	1.774	1.813	1.810	1.778	1.765
Cr	0.002	0.000	0.000	0.001	0.001	0.000	0.002	0.002	0.002	0.002	0.001	0.001	0.003	0.002
Mg	1.509	1.511	1.423	1.275	1.286	1.284	1.277	1.415	1.345	1.269	1.460	1.492	1.241	1.265
Ca	0.004	0.004	0.005	0.002	0.000	0.000	0.009	0.009	0.010	0.004	0.010	0.008	0.007	0.002
Mn	0.000	0.001	0.002	0.002	0.000	0.002	0.001	0.002	0.003	0.001	0.002	0.002	0.001	0.001
Fe^{2+}	1.434	1.450	1.302	1.120	1.116	1.112	1.119	1.223	1.214	1.142	1.221	1.223	1.220	1.129
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.014	0.011	0.020	0.022	0.017	0.013	0.012	0.002	0.013	0.020	0.008	0.010	0.018	0.025
K	0.569	0.566	0.759	0.839	0.826	0.852	0.790	0.679	0.721	0.812	0.642	0.617	0.762	0.811
Total	7.825	7.830	7.841	7.788	7.779	7.793	7.744	7.778	7.778	7.776	7.788	7.785	7.765	7.767
Volatiles														
OH	1.866	1.867	1.841	1.834	1.828	1.838	1.837	1.839	1.830	1.844	1.843	1.844	1.836	1.821
F	0.132	0.132	0.158	0.164	0.171	0.162	0.163	0.160	0.169	0.156	0.156	0.154	0.163	0.178
Cl	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000
X_{Mg}	0.513	0.510	0.522	0.532	0.535	0.536	0.533	0.536	0.526	0.526	0.544	0.550	0.504	0.528

	Q67F F6 Bt 3a 3	Q67F F6 Bt 3a 4	Q67F F6 Bt 3a 5	Q67F F10 Bt 4 1	Q67F F10 Bt 4 2	Q67F F10 Bt 4 3	Q67F F10 Bt 4 4	Q67F F10 Bt 4 5
Analysis								
SiO_2	35.22	35.87	32.68	36.36	35.88	36.06	35.68	36.36
TiO_2	1.52	1.62	1.41	1.47	1.50	1.60	1.53	1.90
Al_2O_3	19.87	20.13	20.57	20.10	20.08	19.80	20.16	20.07
Cr_2O_3	0.04	0.04	0.00	0.01	0.02	0.03	0.04	0.02
MgO	11.89	11.25	12.64	12.03	11.68	11.80	12.36	11.60
CaO	0.06	0.04	0.07	0.05	0.06	0.03	0.04	0.03
MnO	0.02	0.01	0.00	0.04	0.05	0.05	0.04	0.04
FeO	18.61	18.28	19.40	17.76	17.99	17.62	18.53	17.71
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.08	0.08	0.03	0.11	0.13	0.15	0.11	0.11
K_2O	8.14	8.57	6.16	8.76	8.60	8.85	8.26	8.78
H_2O	3.66	3.68	3.59	3.72	3.68	3.68	3.78	3.73
F	0.71	0.71	0.64	0.72	0.73	0.72	0.59	0.69
Cl	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01
Total	99.84	100.29	97.20	101.12	100.41	100.40	101.11	101.05
Total cor.	99.54	100.00	96.94	100.82	100.11	100.11	100.87	100.76
Cations								
Si	2.644	2.676	2.515	2.683	2.672	2.685	2.639	2.685
Ti	0.086	0.091	0.081	0.081	0.084	0.089	0.085	0.105
Al	1.757	1.769	1.865	1.749	1.763	1.737	1.757	1.746
Cr	0.003	0.002	0.000	0.001	0.001	0.002	0.003	0.001
Mg	1.331	1.251	1.450	1.324	1.296	1.309	1.363	1.277
Ca	0.005	0.003	0.006	0.004	0.004	0.002	0.004	0.003
Mn	0.001	0.001	0.000	0.002	0.003	0.003	0.002	0.002
Fe^{2+}	1.168	1.141	1.248	1.096	1.120	1.097	1.146	1.094
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.012	0.012	0.004	0.015	0.019	0.022	0.016	0.016
K	0.780	0.816	0.605	0.825	0.817	0.841	0.779	0.827
Total	7.787	7.761	7.775	7.781	7.780	7.788	7.794	7.757
Volatiles								
OH	1.832	1.833	1.844	1.832	1.826	1.829	1.863	1.837
F	0.168	0.167	0.155	0.167	0.173	0.169	0.137	0.162
Cl	0.000	0.000	0.001	0.000	0.001	0.002	0.000	0.001
X_{Mg}	0.533	0.523	0.537	0.547	0.536	0.544	0.543	0.539

Chlorite

Electron microprobe analyses of chlorite. Cations based on a 28 oxygen basis.

	75261C F3 Chl1	75261C F3 Chl2	75261C F3 Chl3	75261C F3 Chl4	75312B F2 Chl2	75312B F2 Chl3	75312B F2 Chl5	75312B F2 Chl6	75312B F2 Chl7	75312B F2 Chl8	75312B F2 Chl9	75312B F2 Chl21	75312B F2 Chl22	75312B F2 Chl23
Analysis														
SiO_2	25.45	25.01	25.03	24.95	27.01	26.90	26.23	27.03	27.22	26.22	27.87	26.19	27.76	25.82
TiO_2	0.09	0.07	0.08	0.07	0.17	0.12	0.03	0.07	0.08	0.04	0.09	0.03	0.12	0.05
Al_2O_3	23.79	23.76	23.87	23.68	17.75	18.30	18.29	18.87	19.01	18.15	18.66	18.09	16.70	19.04
Fe_2O_3	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00
MgO	16.64	16.77	16.62	16.97	11.44	11.91	11.19	11.39	11.16	11.33	10.89	12.01	11.12	12.34
CaO	0.01	0.00	0.01	0.00	0.12	0.05	0.07	0.04	0.05	0.02	0.07	0.12	1.56	0.14
MnO	0.00	0.00	0.08	0.05	0.71	0.66	0.80	0.67	0.64	0.70	0.64	0.60	0.54	0.34
FeO	23.07	23.34	23.10	22.95	31.17	31.26	32.47	30.37	30.17	31.68	30.29	31.27	29.82	30.36
Na_2O	0.00	0.01	0.04	0.00	0.00	0.02	0.02	0.02	0.03	0.00	0.01	0.01	0.03	0.03
K_2O	0.18	0.03	0.00	0.01	0.35	0.31	0.05	0.52	0.71	0.08	0.73	0.03	1.21	0.05
Total	89.23	88.99	88.88	88.88	88.72	89.55	89.15	88.98	89.06	88.22	89.25	88.72	88.85	88.16
Cations														
Si	5.190	5.124	5.130	5.114	5.830	5.754	5.686	5.784	5.814	5.709	5.934	5.661	6.005	5.584
Ti	0.014	0.011	0.013	0.010	0.027	0.020	0.005	0.011	0.013	0.006	0.015	0.006	0.019	0.008
Al	5.717	5.737	5.767	5.720	4.516	4.614	4.673	4.759	4.786	4.659	4.684	4.607	4.258	4.852
Mg	5.057	5.121	5.079	5.183	3.680	3.798	3.617	3.633	3.553	3.678	3.457	3.870	3.585	3.979
Ca	0.002	0.000	0.001	0.000	0.027	0.012	0.016	0.009	0.012	0.005	0.017	0.029	0.363	0.031
Mn	0.000	0.000	0.014	0.008	0.131	0.119	0.146	0.121	0.115	0.129	0.115	0.110	0.098	0.063
Fe^{2+}	3.935	3.998	3.959	3.933	5.628	5.592	5.886	5.434	5.389	5.770	5.394	5.654	5.396	5.491
Fe^{3+}	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.000	0.000
Na	0.000	0.003	0.015	0.000	0.000	0.009	0.009	0.007	0.010	0.002	0.004	0.005	0.013	0.013
K	0.047	0.007	0.001	0.002	0.097	0.085	0.015	0.143	0.193	0.022	0.197	0.009	0.333	0.013
Total	19.962	20.002	19.982	20.003	19.936	20.006	20.052	19.903	19.890	19.983	19.817	20.012	20.078	20.034
X_{Mg}	0.562	0.562	0.562	0.569	0.395	0.404	0.381	0.401	0.397	0.389	0.391	0.406	0.399	0.420

	75312B F2 Chl26	75312B F3 Chl1	75312B F3 Chl4	75312B F3 Chl5	75312B F3 Chl24	75312B F2 Chl2	75312B F2 Chl3	75312B F2 Chl5	75312B F2 Chl6	75312B F2 Chl7	75312B F2 Chl8	75312B F2 Chl9	75312B F2 Chl21	75312B F2 Chl22
Analysis														
SiO_2	26.32	25.82	26.00	26.36	25.97	27.01	26.90	26.23	27.03	27.22	26.22	27.87	26.19	27.76
TiO_2	0.01	0.06	0.05	0.05	0.00	0.17	0.12	0.03	0.07	0.08	0.04	0.09	0.03	0.12
Al_2O_3	18.65	17.81	18.58	18.46	17.88	17.75	18.30	18.29	18.87	19.01	18.15	18.66	18.09	16.70
Fe_2O_3	0.28	0.77	0.23	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00
MgO	12.41	11.84	11.67	11.90	11.50	11.44	11.91	11.19	11.39	11.16	11.33	10.89	12.01	11.12
CaO	0.23	0.47	0.28	0.29	0.23	0.12	0.05	0.07	0.04	0.05	0.02	0.07	0.12	1.56
MnO	0.62	0.57	0.62	0.55	0.74	0.71	0.66	0.80	0.67	0.64	0.70	0.64	0.60	0.54
FeO	31.03	30.58	31.44	31.47	31.59	31.17	31.26	32.47	30.37	30.17	31.68	30.29	31.27	29.82
Na_2O	0.00	0.00	0.01	0.00	0.02	0.00	0.02	0.02	0.02	0.03	0.00	0.01	0.01	0.03
K_2O	0.07	0.00	0.07	0.06	0.02	0.35	0.31	0.05	0.52	0.71	0.08	0.73	0.03	1.21
Total	89.63	87.94	88.97	89.13	88.60	88.72	89.55	89.15	88.98	89.06	88.22	89.25	88.72	88.85
Cations														
Si	5.627	5.636	5.610	5.664	5.653	5.830	5.754	5.686	5.784	5.814	5.709	5.934	5.661	6.005
Ti	0.002	0.011	0.008	0.008	0.000	0.027	0.020	0.005	0.011	0.013	0.006	0.015	0.006	0.019
Al	4.699	4.581	4.726	4.676	4.586	4.516	4.614	4.673	4.759	4.786	4.659	4.684	4.607	4.258
Mg	3.955	3.853	3.756	3.811	3.733	3.680	3.798	3.617	3.633	3.553	3.678	3.457	3.870	3.585
Ca	0.053	0.110	0.066	0.066	0.054	0.027	0.012	0.016	0.009	0.012	0.005	0.017	0.029	0.363
Mn	0.113	0.106	0.114	0.100	0.136	0.131	0.119	0.146	0.121	0.115	0.129	0.115	0.110	0.098
Fe^{2+}	5.548	5.582	5.674	5.656	5.752	5.628	5.592	5.886	5.434	5.389	5.770	5.394	5.654	5.396
Fe^{3+}	0.045	0.126	0.038	0.000	0.108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.000
Na	0.001	0.000	0.006	0.002	0.008	0.000	0.009	0.009	0.007	0.010	0.002	0.004	0.005	0.013
K	0.019	0.001	0.020	0.015	0.004	0.097	0.085	0.015	0.143	0.193	0.022	0.197	0.009	0.333
Total	20.062	20.006	20.018	19.999	20.035	19.936	20.006	20.052	19.903	19.890	19.983	19.817	20.012	20.078
X_{Mg}	0.416	0.408	0.398	0.403	0.394	0.395	0.404	0.381	0.401	0.397	0.389	0.391	0.406	0.399

	75312B F2 Chl23	75312B F2 Chl26	75312B F3 Chl1	75312B F3 Chl4	75312B F3 Chl5	75312B F3 Chl24	76022B F3 Chl	76022B F2 Chl	76022B F2 Chl	76022B F2 Chl	76022B F3 Chl	76022B F3 Chl	76022B F3 Chl	76022B F1 Chl Blase
Analysis														
SiO_2	25.82	26.32	25.82	26.00	26.36	25.97	29.74	28.16	28.34	28.66	28.05	27.87	28.25	28.01
TiO_2	0.05	0.01	0.06	0.05	0.05	0.00	0.05	0.03	0.00	0.03	0.00	0.05	0.00	0.04
Al_2O_3	19.04	18.65	17.81	18.58	18.46	17.88	18.32	19.52	19.36	19.61	21.33	21.01	21.61	19.75
Fe_2O_3	0.00	0.28	0.77	0.23	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.34	12.41	11.84	11.67	11.90	11.50	20.28	20.37	20.32	20.24	19.38	19.29	19.40	20.47
CaO	0.14	0.23	0.47	0.28	0.29	0.23	0.57	0.07	0.11	0.08	0.09	0.06	0.13	0.06
MnO	0.34	0.62	0.57	0.62	0.55	0.74	0.24	0.33	0.25	0.25	0.30	0.32	0.23	0.30
FeO	30.36	31.03	30.58	31.44	31.47	31.59	17.78	18.43	18.09	18.22	18.71	19.04	18.63	18.67
Na_2O	0.03	0.00	0.00	0.01	0.00	0.02	0.03	0.00	0.02	0.01	0.02	0.01	0.02	0.03
K_2O	0.05	0.07	0.00	0.07	0.06	0.02	0.15	0.05	0.14	0.16	0.03	0.01	0.01	0.04
Total	88.16	89.63	87.94	88.97	89.13	88.60	87.16	86.95	86.62	87.25	87.90	87.64	88.28	87.36
Cations														
Si	5.584	5.627	5.636	5.610	5.664	5.653	6.036	5.754	5.803	5.819	5.662	5.655	5.668	5.705
Ti	0.008	0.002	0.011	0.008	0.008	0.000	0.007	0.004	0.000	0.004	0.000	0.007	0.001	0.006
Al	4.852	4.699	4.581	4.726	4.676	4.586	4.381	4.701	4.671	4.693	5.073	5.026	5.109	4.740
Mg	3.979	3.955	3.853	3.756	3.811	3.733	6.136	6.206	6.201	6.127	5.830	5.835	5.803	6.214
Ca	0.031	0.053	0.110	0.066	0.066	0.054	0.125	0.015	0.023	0.017	0.020	0.012	0.029	0.013
Mn	0.063	0.113	0.106	0.114	0.100	0.136	0.040	0.056	0.044	0.043	0.050	0.055	0.039	0.051
Fe^{2+}	5.491	5.548	5.582	5.674	5.656	5.752	3.017	3.150	3.097	3.093	3.158	3.231	3.125	3.180
Fe^{3+}	0.000	0.045	0.126	0.038	0.000	0.108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.013	0.001	0.000	0.006	0.002	0.008	0.013	0.000	0.009	0.005	0.009	0.005	0.007	0.011
K	0.013	0.019	0.001	0.020	0.015	0.004	0.040	0.014	0.036	0.042	0.007	0.002	0.003	0.011
Total	20.034	20.062	20.006	20.018	19.999	20.035	19.794	19.900	19.885	19.853	19.810	19.828	19.783	19.930
X_{Mg}	0.420	0.416	0.408	0.398	0.403	0.394	0.670	0.663	0.667	0.664	0.649	0.644	0.650	0.661

	76022B F1 ChlBlase	76022B F1 ChlBlase	76022B F1 ChlBlase	76022B F1 ChlBlase	76022B F1 Chl-matrix	76022B F1 Chl-matrix	76053A F3 Chl1	76053A F3 Chl2	76053A F3 Chl21	76053A F3 Chl22	76053A F3 Chl23	76053A F2 Chl1	76053A F2 Chl2	76053A F2 Chl3
Analysis														
SiO_2	27.87	27.58	27.53	27.97	28.29	28.12	25.78	26.04	25.81	26.24	25.90	26.15	25.98	25.83
TiO_2	0.02	0.03	0.01	0.01	0.02	0.02	0.02	0.01	0.05	2.34	0.05	0.04	0.02	0.02
Al_2O_3	20.08	20.26	20.25	19.99	19.49	19.62	19.47	19.07	19.69	18.33	19.85	19.68	19.64	19.72
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	20.84	20.36	20.57	20.50	20.45	20.35	13.59	13.46	13.37	12.59	13.50	13.62	13.52	13.40
CaO	0.02	0.03	0.04	0.05	0.16	0.15	0.03	0.04	0.05	1.86	0.04	0.08	0.05	0.07
MnO	0.27	0.27	0.30	0.26	0.28	0.30	0.47	0.40	0.47	0.37	0.40	0.39	0.43	0.44
FeO	18.59	19.04	18.79	19.17	18.65	18.73	27.57	27.45	27.39	26.59	27.67	27.36	27.33	27.09
Na_2O	0.00	0.00	0.01	0.04	0.03	0.02	0.00	0.00	0.02	0.00	0.02	0.03	0.02	0.02
K_2O	0.00	0.02	0.03	0.04	0.16	0.10	0.02	0.01	0.00	0.03	0.00	0.02	0.02	0.02
Total	87.69	87.59	87.53	88.02	87.53	87.39	86.95	86.56	86.85	88.36	87.42	87.37	87.06	86.60
Cations														
Si	5.649	5.613	5.602	5.666	5.753	5.728	5.562	5.641	5.568	5.577	5.552	5.599	5.588	5.579
Ti	0.004	0.004	0.002	0.001	0.004	0.003	0.003	0.002	0.009	0.374	0.008	0.006	0.002	0.003
Al	4.798	4.860	4.857	4.773	4.672	4.711	4.953	4.869	5.005	4.592	5.016	4.966	4.978	5.019
Mg	6.296	6.176	6.242	6.191	6.199	6.181	4.370	4.347	4.298	3.988	4.313	4.346	4.335	4.314
Ca	0.003	0.006	0.009	0.010	0.034	0.032	0.007	0.010	0.011	0.423	0.008	0.019	0.012	0.016
Mn	0.045	0.047	0.052	0.044	0.048	0.052	0.086	0.074	0.086	0.067	0.072	0.071	0.078	0.080
Fe^{2+}	3.151	3.241	3.197	3.247	3.172	3.190	4.974	4.973	4.941	4.727	4.959	4.899	4.915	4.894
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.001	0.002	0.006	0.015	0.012	0.009	0.002	0.000	0.008	0.000	0.008	0.012	0.009	0.006
K	0.000	0.005	0.007	0.011	0.041	0.025	0.004	0.003	0.000	0.009	0.000	0.005	0.005	0.006
Total	19.949	19.957	19.974	19.959	19.934	19.931	19.962	19.925	19.926	19.758	19.936	19.921	19.928	19.918
X_{Mg}	0.666	0.656	0.661	0.656	0.662	0.660	0.468	0.466	0.465	0.458	0.465	0.470	0.469	0.469

	76053A F2 Chl4	76053A F1 Chl1	76053A F1 Chl2	76053A F1 Chl3	76053A F1 Chl4	76053A F1 Chl2	76053A F1 Chl1	76053A F1 Chl2	76057A F1 Chlamp1	76057A F1 Chlamp2	76057A F1 Chlamp3	76057A F1 Chlep1	76057A F1 Chlep2	76057A F1 Chlep3
Analysis														
SiO_2	25.66	25.59	26.05	25.44	25.94	25.92	25.60	25.78	26.02	26.20	26.43	26.41	26.17	25.61
TiO_2	0.05	0.00	0.05	0.03	0.03	0.03	0.07	0.07	0.02	0.05	0.10	0.05	0.03	0.03
Al_2O_3	19.44	19.57	19.88	19.36	19.84	19.63	19.84	20.01	18.62	18.47	18.23	18.10	19.13	18.86
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	13.37	13.42	13.55	13.07	13.46	13.28	13.48	13.55	14.60	15.12	14.63	14.53	14.86	14.89
CaO	0.09	0.02	0.02	0.03	0.02	0.03	0.01	0.04	0.11	0.09	0.32	0.44	0.11	0.09
MnO	0.39	0.45	0.42	0.35	0.40	0.45	0.44	0.35	0.42	0.41	0.45	0.44	0.42	0.38
FeO	27.30	27.66	27.19	26.83	27.51	27.39	27.38	27.58	25.33	25.18	25.04	24.60	25.11	25.28
Na_2O	0.01	0.00	0.01	0.02	0.00	0.00	0.05	0.05	0.00	0.01	0.07	0.09	0.02	0.03
K_2O	0.02	0.01	0.00	0.01	0.00	0.01	0.02	0.02	0.03	0.01	0.05	0.02	0.02	0.02
Total	86.33	86.78	87.16	85.15	87.22	86.76	86.90	87.44	85.16	85.53	85.32	84.67	85.86	85.17
Cations														
Si	5.571	5.539	5.584	5.590	5.568	5.595	5.523	5.523	5.672	5.679	5.746	5.775	5.644	5.585
Ti	0.008	0.000	0.008	0.005	0.005	0.005	0.012	0.010	0.004	0.008	0.016	0.007	0.006	0.004
Al	4.974	4.993	5.021	5.013	5.019	4.994	5.042	5.053	4.784	4.718	4.671	4.664	4.860	4.847
Mg	4.328	4.331	4.329	4.282	4.307	4.273	4.335	4.328	4.744	4.885	4.741	4.736	4.776	4.842
Ca	0.021	0.005	0.004	0.008	0.005	0.007	0.001	0.008	0.026	0.021	0.074	0.104	0.025	0.021
Mn	0.072	0.083	0.076	0.065	0.073	0.082	0.079	0.064	0.077	0.075	0.082	0.082	0.077	0.071
Fe^{2+}	4.957	5.007	4.875	4.931	4.939	4.944	4.940	4.941	4.619	4.565	4.551	4.498	4.528	4.610
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.003	0.001	0.003	0.009	0.000	0.000	0.019	0.019	0.000	0.004	0.031	0.037	0.006	0.011
K	0.006	0.002	0.000	0.003	0.001	0.004	0.006	0.004	0.007	0.003	0.013	0.004	0.005	0.005
Total	19.940	19.967	19.900	19.905	19.918	19.905	19.958	19.952	19.936	19.958	19.926	19.908	19.927	19.996
X_{Mg}	0.466	0.464	0.470	0.465	0.466	0.464	0.467	0.467	0.507	0.517	0.510	0.513	0.513	0.512

	76057A F1 Chlep4	76057A F2 Chl2	76057A F2 Chl3	76057A F2 Chl4	76057A F3tg Chl1	76057A F3tg Chl2	76057A F3tg Chl3	76057A F3tg Chl4	76057A F3tg Chl5	76057A F3tg Chl6	76057A F3tg Chl7	76057A F3tg Chl8	76057A F3tg Chl9	76057A F3tg Chl10
Analysis														
SiO_2	25.49	25.96	26.31	28.63	26.45	26.18	25.37	26.19	26.47	25.89	25.29	26.58	26.17	26.64
TiO_2	0.03	0.04	0.06	0.06	0.04	0.04	0.05	0.05	0.04	0.01	0.05	0.00	0.07	0.01
Al_2O_3	18.87	19.14	18.50	17.31	19.32	18.98	18.17	19.22	18.61	19.09	18.25	18.81	19.15	19.08
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	15.09	15.01	14.64	14.82	14.70	14.90	14.04	14.70	14.54	14.64	14.67	14.56	15.01	14.65
CaO	0.06	0.05	0.10	0.84	0.08	0.06	0.05	0.04	0.10	0.07	0.04	0.06	0.04	0.06
MnO	0.44	0.39	0.34	0.41	0.36	0.37	0.35	0.37	0.44	0.38	0.43	0.43	0.40	0.41
FeO	25.29	25.34	25.49	24.60	24.84	25.22	24.46	24.28	25.01	24.80	24.83	25.28	25.38	25.32
Na_2O	0.00	0.02	0.02	0.15	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.00
K_2O	0.01	0.01	0.02	0.02	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.04	0.01	0.03
Total	85.28	85.96	85.48	86.83	85.83	85.78	82.54	84.88	85.23	84.91	83.59	85.77	86.23	86.20
Cations														
Si	5.555	5.600	5.711	6.073	5.688	5.653	5.697	5.684	5.746	5.641	5.618	5.737	5.624	5.715
Ti	0.005	0.006	0.009	0.009	0.006	0.006	0.008	0.008	0.007	0.002	0.008	0.000	0.012	0.001
Al	4.846	4.865	4.734	4.326	4.896	4.830	4.809	4.915	4.762	4.902	4.780	4.785	4.849	4.825
Mg	4.902	4.828	4.738	4.685	4.713	4.797	4.701	4.756	4.705	4.753	4.858	4.686	4.808	4.685
Ca	0.013	0.012	0.023	0.191	0.017	0.013	0.011	0.009	0.023	0.016	0.010	0.013	0.009	0.013
Mn	0.080	0.072	0.063	0.074	0.065	0.068	0.067	0.067	0.080	0.070	0.080	0.078	0.073	0.075
Fe^{2+}	4.609	4.572	4.627	4.364	4.467	4.554	4.593	4.406	4.540	4.519	4.613	4.564	4.562	4.543
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.000	0.009	0.009	0.060	0.000	0.000	0.003	0.005	0.000	0.000	0.003	0.004	0.008	0.002
K	0.003	0.002	0.006	0.005	0.015	0.010	0.012	0.007	0.007	0.006	0.009	0.012	0.002	0.009
Total	20.019	19.967	19.921	19.789	19.867	19.931	19.903	19.857	19.870	19.913	19.990	19.880	19.945	19.876
X_{Mg}	0.515	0.514	0.506	0.518	0.513	0.513	0.506	0.519	0.509	0.513	0.513	0.507	0.513	0.508

	76057A F3tg Chl11	76057A F3tg Chl12	76057A F3tg Chl13	76057A F3tg Chl14	76057A F3tg Chl15	76057A F3tg Chl16	76057A F3tg Chl17	753011A F3 Chl1	753011A F3 Chl2	753011A F3 Chl3	753011A F3 Chl4	753011A F3 Chl5	753011A F3 Chl6	753011A F3 Chl7
Analysis														
SiO_2	26.01	25.96	26.25	25.77	25.80	26.37	27.62	24.51	25.53	25.57	25.44	25.07	25.45	25.10
TiO_2	0.01	0.02	0.01	0.02	0.00	0.04	0.03	0.04	0.02	0.08	0.04	0.08	0.05	0.03
Al_2O_3	18.84	19.27	18.93	18.30	18.65	18.99	18.46	20.24	19.36	20.69	20.55	20.32	20.35	20.19
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	14.78	14.72	14.75	14.33	15.37	14.92	14.49	11.83	12.67	12.18	11.81	12.02	12.17	12.08
CaO	0.10	0.07	0.13	0.18	0.00	0.06	0.15	0.02	0.00	0.00	0.02	0.03	0.03	0.01
MnO	0.41	0.44	0.36	0.39	0.42	0.44	0.39	0.09	0.09	0.11	0.08	0.04	0.11	0.11
FeO	24.96	24.87	24.54	25.15	24.90	25.31	24.11	30.40	29.62	31.38	29.51	30.08	28.75	30.42
Na_2O	0.02	0.00	0.06	0.00	0.03	0.02	0.02	0.02	0.00	0.01	0.01	0.03	0.00	0.03
K_2O	0.02	0.02	0.03	0.03	0.00	0.02	0.12	0.00	0.01	0.00	0.00	0.02	0.01	0.01
Total	85.15	85.36	85.06	84.18	85.17	86.17	85.39	87.16	87.30	90.02	87.46	87.68	86.93	87.96
Cations														
Si	5.657	5.626	5.696	5.688	5.613	5.668	5.936	5.361	5.540	5.410	5.494	5.428	5.513	5.427
Ti	0.001	0.003	0.002	0.003	0.000	0.006	0.005	0.007	0.003	0.013	0.007	0.012	0.009	0.005
Al	4.829	4.921	4.840	4.759	4.782	4.811	4.677	5.217	4.952	5.159	5.231	5.184	5.196	5.145
Mg	4.793	4.756	4.771	4.714	4.984	4.781	4.643	3.857	4.098	3.842	3.803	3.880	3.930	3.895
Ca	0.023	0.016	0.030	0.043	0.000	0.015	0.033	0.005	0.001	0.000	0.004	0.006	0.007	0.001
Mn	0.075	0.080	0.066	0.073	0.078	0.080	0.071	0.017	0.017	0.019	0.015	0.008	0.019	0.020
Fe^{2+}	4.541	4.506	4.453	4.643	4.532	4.549	4.333	5.560	5.375	5.552	5.330	5.445	5.207	5.501
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.009	0.000	0.024	0.001	0.011	0.009	0.009	0.009	0.000	0.005	0.003	0.011	0.001	0.013
K	0.006	0.006	0.009	0.008	0.000	0.006	0.034	0.001	0.004	0.001	0.001	0.005	0.002	0.002
Total	19.937	19.914	19.898	19.937	20.001	19.928	19.743	20.032	19.990	20.001	19.888	19.980	19.885	20.008
X_{Mg}	0.514	0.514	0.517	0.504	0.524	0.512	0.517	0.410	0.433	0.409	0.416	0.416	0.430	0.415

	753011A F3 Chl8	753011A F3 Chl9	753011A F3 Chl10	753011A F4 Chl1	753011A F4 Chl2	753011A F4 Chl3	753011A F4 Chl4	753011A F4 Chl5	753011A F4 Chl6	753011A F4 Chl7	753011A F4 Chl8	753011A F4 Chl21	753011A F4 Chl22	753011A F4 Chl23
Analysis														
SiO_2	24.97	24.89	25.51	26.90	26.66	27.07	26.88	26.87	26.10	27.32	28.11	28.78	28.50	27.77
TiO_2	0.03	0.05	0.02	0.04	0.07	0.06	0.04	0.04	0.06	0.06	0.06	0.04	0.03	0.01
Al_2O_3	20.55	20.48	20.38	18.67	19.62	17.94	19.44	19.19	19.95	18.46	17.68	17.24	17.76	18.54
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	12.04	12.21	12.57	15.49	13.88	14.51	13.88	15.17	13.53	15.69	16.74	17.52	17.34	15.68
CaO	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00	0.03	0.01	0.01	0.00	0.02	0.02
MnO	0.07	0.09	0.11	0.19	0.11	0.15	0.15	0.20	0.10	0.15	0.12	0.16	0.09	0.11
FeO	30.28	30.30	29.31	28.22	27.85	25.90	27.54	27.12	29.05	25.62	25.93	24.55	24.00	25.38
Na_2O	0.03	0.01	0.02	0.00	0.02	0.04	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.02
K_2O	0.02	0.01	0.00	0.06	0.13	0.22	0.07	0.03	0.04	0.11	0.07	0.03	0.02	0.01
Total	87.99	88.05	87.94	89.57	88.33	85.89	88.03	88.63	88.88	87.41	88.71	88.32	87.77	87.55
Cations														
Si	5.392	5.374	5.476	5.632	5.643	5.851	5.697	5.648	5.530	5.779	5.858	5.976	5.934	5.843
Ti	0.005	0.008	0.003	0.006	0.011	0.009	0.006	0.006	0.009	0.009	0.010	0.006	0.005	0.001
Al	5.229	5.211	5.155	4.607	4.896	4.571	4.857	4.755	4.981	4.601	4.344	4.218	4.357	4.596
Mg	3.877	3.929	4.022	4.834	4.380	4.675	4.386	4.752	4.274	4.946	5.200	5.423	5.383	4.919
Ca	0.000	0.006	0.006	0.000	0.000	0.005	0.004	0.000	0.007	0.002	0.001	0.000	0.005	0.005
Mn	0.014	0.017	0.019	0.034	0.020	0.028	0.027	0.035	0.018	0.026	0.022	0.028	0.016	0.020
Fe^{2+}	5.469	5.470	5.260	4.941	4.930	4.683	4.881	4.766	5.148	4.531	4.519	4.264	4.179	4.466
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.012	0.002	0.006	0.001	0.009	0.015	0.009	0.007	0.007	0.004	0.000	0.001	0.000	0.010
K	0.004	0.002	0.000	0.015	0.034	0.060	0.018	0.008	0.010	0.029	0.017	0.008	0.005	0.002
Total	20.002	20.017	19.948	20.068	19.922	19.897	19.886	19.976	19.983	19.928	19.971	19.925	19.885	19.863
X_{Mg}	0.415	0.418	0.433	0.495	0.470	0.500	0.473	0.499	0.454	0.522	0.535	0.560	0.563	0.524

	753011A F4 Chl24	753011A F4 Chl25	753011A F4 Chl26	753011A F6 Chl1	753011A F6 Chl2	753011A F6 Chl3	753011A F6 Chl4	753011A F6 Chl5	753011A F6 Chl6	753011A F6 Chl7	753011A F6 Chl8	753011A F6 Chl9	753011A F6 Chl10	753011A F6 Chl11
Analysis														
SiO_2	27.12	27.00	28.10	26.78	26.62	26.05	26.74	25.55	25.32	25.22	25.35	27.22	26.63	26.81
TiO_2	0.06	0.06	0.03	0.02	0.01	0.03	0.03	0.04	0.05	0.07	0.07	0.04	0.06	0.05
Al_2O_3	19.26	18.53	17.92	18.60	18.77	20.10	18.82	20.21	20.35	20.15	20.32	18.60	18.96	19.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	14.49	15.46	17.34	14.67	14.01	12.85	14.80	12.70	12.09	12.53	12.42	15.39	13.98	13.78
CaO	0.02	0.00	0.01	0.01	0.03	0.02	0.02	0.02	0.03	0.03	0.04	0.00	0.01	0.00
MnO	0.15	0.10	0.12	0.14	0.17	0.11	0.12	0.13	0.08	0.10	0.10	0.15	0.11	0.08
FeO	26.96	27.33	24.90	26.73	29.18	30.95	27.90	29.01	31.40	31.32	30.18	26.53	28.42	29.00
Na_2O	0.02	0.01	0.03	0.02	0.02	0.03	0.01	0.01	0.04	0.05	0.03	0.01	0.01	0.02
K_2O	0.16	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.03	0.01	0.01	0.02	0.01
Total	88.23	88.49	88.44	86.98	88.81	90.14	88.44	87.67	89.35	89.50	88.52	87.95	88.20	88.76
Cations														
Si	5.718	5.691	5.840	5.731	5.651	5.491	5.659	5.495	5.409	5.383	5.433	5.746	5.667	5.680
Ti	0.009	0.009	0.004	0.003	0.001	0.005	0.004	0.006	0.008	0.011	0.011	0.007	0.009	0.008
Al	4.788	4.603	4.390	4.691	4.695	4.992	4.694	5.124	5.123	5.068	5.133	4.628	4.755	4.744
Mg	4.554	4.857	5.372	4.680	4.433	4.037	4.670	4.073	3.849	3.985	3.970	4.842	4.434	4.353
Ca	0.003	0.000	0.002	0.002	0.007	0.004	0.004	0.004	0.007	0.008	0.009	0.000	0.002	0.001
Mn	0.027	0.018	0.021	0.025	0.030	0.020	0.022	0.023	0.014	0.018	0.019	0.027	0.020	0.015
Fe^{2+}	4.754	4.817	4.327	4.784	5.180	5.456	4.938	5.217	5.610	5.590	5.410	4.683	5.058	5.139
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.008	0.006	0.011	0.007	0.009	0.010	0.003	0.003	0.018	0.022	0.014	0.003	0.005	0.009
K	0.044	0.000	0.000	0.003	0.002	0.001	0.000	0.000	0.000	0.007	0.002	0.003	0.004	0.003
Total	19.905	20.001	19.967	19.926	20.009	20.017	19.994	19.945	20.037	20.093	20.001	19.937	19.955	19.951
X_{Mg}	0.489	0.502	0.554	0.495	0.461	0.425	0.486	0.438	0.407	0.416	0.423	0.508	0.467	0.459

	753011A F6 Chl12	753011A F7 Chl1	753011A F7 Chl2	753011A F7 Chl3	753011A F7 Chl4	760210A F2 Chl1	760210A F2 Chl2	760210A F2 Chl3	760210A F2 Chl4	760210A F2 Chl5	760210A F2 Chl21	760210A F2 Chl22	760210A F1 Chl1	760210A F1 Chl2
Analysis														
SiO_2	28.45	27.77	28.35	28.21	28.63	26.87	27.30	27.16	27.10	27.36	27.26	26.98	27.01	26.66
TiO_2	0.04	0.04	0.02	0.03	0.03	0.01	0.01	0.03	0.03	0.00	0.04	0.04	0.03	0.02
Al_2O_3	16.89	17.64	17.23	17.13	17.44	18.26	18.94	18.03	18.35	18.48	18.25	18.33	18.76	18.72
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	18.24	17.17	16.98	17.21	17.05	17.08	17.06	17.06	16.68	17.47	17.12	16.67	17.54	17.64
CaO	0.01	0.03	0.02	0.02	0.01	0.03	0.05	0.00	0.07	0.02	0.05	0.05	0.00	0.02
MnO	0.18	0.12	0.18	0.14	0.17	0.55	0.60	0.47	0.63	0.53	0.50	0.53	0.51	0.53
FeO	23.96	24.17	23.37	26.12	24.90	23.70	23.85	23.95	23.57	23.54	23.84	24.08	22.84	23.14
Na_2O	0.02	0.03	0.02	0.02	0.01	0.14	0.13	0.06	0.04	0.04	0.10	0.04	0.04	0.07
K_2O	0.03	0.05	0.05	0.05	0.16	0.02	0.01	0.01	0.03	0.01	0.02	0.02	0.02	0.01
Total	87.82	87.01	86.22	88.94	88.39	86.66	87.94	86.75	86.51	87.45	87.19	86.73	86.74	86.80
Cations														
Si	5.936	5.856	6.001	5.875	5.954	5.701	5.698	5.754	5.752	5.733	5.744	5.724	5.687	5.629
Ti	0.006	0.006	0.004	0.004	0.004	0.002	0.002	0.004	0.005	0.000	0.006	0.007	0.005	0.002
Al	4.154	4.383	4.299	4.205	4.275	4.566	4.658	4.502	4.589	4.563	4.532	4.584	4.656	4.659
Mg	5.675	5.397	5.356	5.344	5.288	5.401	5.307	5.387	5.278	5.458	5.378	5.274	5.506	5.553
Ca	0.003	0.007	0.005	0.005	0.002	0.008	0.011	0.000	0.016	0.004	0.012	0.011	0.001	0.004
Mn	0.032	0.021	0.032	0.024	0.029	0.098	0.106	0.083	0.113	0.095	0.090	0.096	0.090	0.094
Fe^{2+}	4.182	4.263	4.137	4.550	4.331	4.204	4.162	4.244	4.184	4.124	4.201	4.272	4.021	4.086
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.008	0.014	0.008	0.009	0.004	0.057	0.052	0.025	0.014	0.017	0.040	0.016	0.015	0.027
K	0.009	0.013	0.013	0.014	0.041	0.006	0.003	0.002	0.009	0.002	0.005	0.004	0.005	0.002
Total	20.006	19.961	19.856	20.031	19.928	20.049	20.001	20.004	19.961	19.996	20.008	19.988	19.990	20.056
X_{Mg}	0.576	0.559	0.564	0.540	0.550	0.562	0.560	0.559	0.558	0.570	0.561	0.552	0.578	0.576

	760210A F1 Chl3	760210A F1 Chl4	760210A F1 Chl5	760210A F1 Chl6	760210A F1 Chl7	760210A F1 Chl8	760210A F3tg Chl1	760210A F3tg Chl2	760210A F3tg Chl3	760210A F3tg Chl4	760210A F3tg Chl5	760210A F4tg Chl1	760210A F4tg Chl2	760210A F4tg Chl3
Analysis														
SiO_2	27.16	26.96	26.75	26.47	26.55	26.25	26.62	26.65	27.05	26.82	27.41	26.91	27.01	27.01
TiO_2	0.00	0.06	0.03	0.01	0.05	0.00	0.02	0.01	0.02	0.02	0.06	0.00	0.03	0.02
Al_2O_3	18.71	18.59	18.75	18.88	19.05	18.91	18.95	18.52	19.27	19.14	18.91	18.88	18.59	18.41
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	17.33	17.79	17.64	17.33	17.33	17.26	17.20	17.36	17.45	17.54	17.25	17.56	17.32	17.07
CaO	0.03	0.00	0.02	0.02	0.00	0.04	0.06	0.05	0.02	0.01	0.03	0.04	0.04	0.05
MnO	0.56	0.55	0.53	0.51	0.50	0.51	0.50	0.49	0.52	0.53	0.53	0.54	0.57	0.58
FeO	23.27	22.92	23.01	23.08	23.56	23.34	22.94	22.64	23.14	23.15	22.70	22.91	23.36	23.70
Na_2O	0.01	0.05	0.00	0.04	0.02	0.03	0.06	0.02	0.00	0.00	0.02	0.02	0.00	0.00
K_2O	0.00	0.01	0.02	0.01	0.01	0.02	0.04	0.02	0.02	0.02	0.02	0.00	0.00	0.01
Total	87.07	86.93	86.75	86.34	87.05	86.35	86.38	85.75	87.50	87.22	86.93	86.86	86.91	86.85
Cations														
Si	5.710	5.672	5.643	5.616	5.597	5.581	5.638	5.680	5.648	5.624	5.747	5.664	5.695	5.712
Ti	0.000	0.010	0.004	0.001	0.007	0.000	0.003	0.002	0.003	0.003	0.009	0.000	0.005	0.003
Al	4.634	4.610	4.662	4.722	4.733	4.738	4.729	4.653	4.742	4.731	4.673	4.683	4.619	4.588
Mg	5.430	5.581	5.548	5.480	5.445	5.469	5.430	5.516	5.432	5.485	5.391	5.508	5.443	5.381
Ca	0.006	0.000	0.004	0.003	0.000	0.008	0.013	0.011	0.004	0.002	0.007	0.009	0.008	0.011
Mn	0.100	0.097	0.094	0.092	0.089	0.091	0.090	0.088	0.092	0.095	0.094	0.096	0.101	0.104
Fe^{2+}	4.091	4.033	4.060	4.094	4.154	4.150	4.062	4.036	4.040	4.061	3.980	4.032	4.119	4.192
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.005	0.021	0.000	0.016	0.006	0.010	0.023	0.009	0.002	0.000	0.008	0.007	0.000	0.000
K	0.000	0.001	0.004	0.002	0.002	0.005	0.012	0.006	0.005	0.005	0.006	0.000	0.001	0.004
Total	19.978	20.025	20.023	20.031	20.035	20.059	20.012	20.000	19.983	20.010	19.915	19.999	19.991	19.995
X_{Mg}	0.576	0.581	0.577	0.572	0.567	0.569	0.572	0.577	0.574	0.575	0.575	0.577	0.569	0.562

	760210A F4tg Chl4	760210A F4tg Chl5	811042C F2 Chl	811042C F2 Chl	811042C F2 Chl	811042C F2 Chl	811042C F2 Chl	811065A F2 Chl	D7625A F2 Chl1	D7625A F2 Chl2	D7625A F2 Chl3	D7625A F2 Chl4	D7625A F2 Chl5	D7625A F2 Chl6
Analysis														
SiO_2	26.95	26.77	26.32	26.25	26.37	26.60	26.46	28.56	25.47	25.01	25.10	25.11	25.55	25.42
TiO_2	0.02	0.02	0.02	0.06	0.02	0.03	0.04	0.01	0.06	0.12	0.05	0.09	0.11	0.10
Al_2O_3	19.10	19.15	18.67	18.77	19.00	19.10	19.16	19.10	22.20	22.55	22.25	22.27	22.17	22.32
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	17.41	17.35	15.14	14.88	15.40	15.32	15.03	17.57	17.39	16.88	17.13	17.07	17.21	17.03
CaO	0.00	0.04	0.06	0.08	0.09	0.05	0.02	0.20	0.01	0.01	0.00	0.00	0.00	0.00
MnO	0.49	0.60	0.41	0.35	0.32	0.43	0.36	0.17	0.17	0.12	0.14	0.17	0.13	0.14
FeO	23.07	23.06	26.17	26.06	26.22	26.56	26.71	20.26	20.95	21.28	21.50	21.14	21.00	20.90
Na_2O	0.02	0.01	0.03	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.00
K_2O	0.01	0.00	0.01	0.02	0.02	0.02	0.00	0.49	0.01	0.00	0.02	0.01	0.00	0.00
Total	87.07	86.99	86.82	86.46	87.44	88.10	87.79	86.38	86.27	85.97	86.19	85.87	86.18	85.92
Cations														
Si	5.656	5.629	5.645	5.648	5.609	5.621	5.616	5.934	5.327	5.260	5.274	5.285	5.346	5.334
Ti	0.003	0.003	0.003	0.009	0.002	0.005	0.006	0.001	0.009	0.019	0.008	0.014	0.018	0.016
Al	4.725	4.748	4.718	4.760	4.762	4.757	4.791	4.678	5.470	5.589	5.510	5.525	5.469	5.519
Mg	5.449	5.441	4.840	4.773	4.883	4.825	4.755	5.441	5.422	5.293	5.367	5.358	5.370	5.328
Ca	0.000	0.008	0.014	0.018	0.019	0.012	0.004	0.045	0.002	0.002	0.000	0.000	0.000	0.001
Mn	0.087	0.106	0.075	0.064	0.057	0.078	0.065	0.031	0.031	0.022	0.025	0.029	0.023	0.026
Fe^{2+}	4.050	4.055	4.693	4.690	4.665	4.694	4.740	3.521	3.664	3.744	3.777	3.722	3.676	3.667
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.007	0.004	0.010	0.002	0.005	0.000	0.004	0.011	0.000	0.000	0.001	0.005	0.000	0.000
K	0.002	0.001	0.002	0.005	0.005	0.005	0.001	0.129	0.003	0.000	0.004	0.003	0.000	0.000
Total	19.982	19.996	19.999	19.970	20.015	19.998	19.985	19.796	19.931	19.928	19.966	19.942	19.902	19.890
X_{Mg}	0.574	0.573	0.508	0.504	0.511	0.507	0.501	0.607	0.597	0.586	0.587	0.590	0.594	0.592

	D7625A F2 Chl7	D7625A F2 Chl8	D7625A F3 Chl1	D7625A F3 Chl2	D7625A F3 Chl3	D7625A F3 Chl4	D7625A F3 Chl5	D7625A F3 Chl6	D7625A F3 Chl7	D7625A F3 Chl8	D7625A F3 Chl9	D7625A F3 Chl10	D7625A F3 Chl11	D7625A F3 Chl12
Analysis														
SiO_2	25.40	25.57	25.58	25.76	26.00	25.61	25.77	25.54	26.02	25.67	25.98	25.62	25.51	25.73
TiO_2	0.09	0.07	0.09	0.10	0.09	0.08	0.08	0.07	0.06	0.01	0.06	0.06	0.06	0.12
Al_2O_3	22.28	22.38	22.37	22.10	22.11	22.38	21.98	22.38	22.31	22.11	22.32	22.59	22.75	22.46
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	17.15	17.48	18.11	18.16	18.35	17.97	18.08	17.96	18.02	18.08	18.13	18.09	18.07	18.20
CaO	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01
MnO	0.14	0.13	0.20	0.23	0.23	0.18	0.21	0.19	0.25	0.24	0.19	0.17	0.16	0.20
FeO	20.90	21.26	19.96	20.01	19.88	19.79	20.12	20.07	19.99	20.03	19.84	19.68	20.12	19.59
Na_2O	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.03	0.00	0.01	0.00	0.03	0.01	0.00
K_2O	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.01
Total	85.99	86.91	86.33	86.39	86.68	86.00	86.26	86.24	86.68	86.15	86.52	86.25	86.70	86.33
Cations														
Si	5.327	5.311	5.316	5.351	5.374	5.336	5.366	5.317	5.381	5.351	5.378	5.319	5.281	5.335
Ti	0.015	0.011	0.014	0.016	0.014	0.012	0.013	0.011	0.010	0.001	0.009	0.009	0.010	0.019
Al	5.507	5.479	5.479	5.410	5.385	5.495	5.392	5.492	5.439	5.430	5.444	5.527	5.549	5.488
Mg	5.362	5.413	5.612	5.624	5.655	5.580	5.611	5.573	5.557	5.616	5.595	5.598	5.575	5.625
Ca	0.000	0.003	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.003	0.004	0.003
Mn	0.025	0.022	0.035	0.041	0.040	0.031	0.037	0.033	0.044	0.043	0.033	0.030	0.028	0.035
Fe^{2+}	3.666	3.693	3.469	3.477	3.437	3.448	3.503	3.495	3.458	3.492	3.434	3.417	3.483	3.397
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.005	0.003	0.008	0.004	0.003	0.000	0.000	0.012	0.000	0.002	0.002	0.010	0.004	0.000
K	0.003	0.000	0.000	0.006	0.000	0.001	0.004	0.000	0.003	0.003	0.000	0.000	0.001	0.001
Total	19.910	19.940	19.935	19.932	19.923	19.905	19.928	19.932	19.892	19.938	19.894	19.916	19.938	19.903
X_{Mg}	0.594	0.594	0.618	0.618	0.622	0.618	0.616	0.615	0.616	0.617	0.620	0.621	0.615	0.623

	D7625A F3 Chl13	D7625A F3 Chl14	D7625A F3 Chl15	D7626A F5 Chl1	D7626A F5 Chl2	D7626A F5 Chl3	D7626A F5 Chl4	D7626A F5 Chl5	D7626A F4 Chl1	D7626A F4 Chl2	D7626A F4 Chl3	D7626A F4 Chl1	D7626A F4 Chl2	D7626A F4 Chl3
Analysis														
SiO_2	25.72	25.76	25.85	24.03	24.86	25.04	24.62	24.89	25.44	25.52	25.08	24.65	25.54	24.58
TiO_2	0.06	0.08	0.10	0.05	0.08	0.05	0.10	0.07	0.06	0.06	0.00	0.06	0.05	0.07
Al_2O_3	22.25	22.40	21.97	23.13	22.07	23.02	22.90	23.28	22.10	22.47	23.25	22.92	23.56	22.97
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	18.16	18.29	18.29	15.09	15.88	14.79	14.85	14.99	15.02	14.35	14.01	14.77	13.91	15.07
CaO	0.02	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.02
MnO	0.14	0.23	0.17	0.66	0.54	0.66	0.64	0.67	0.58	0.63	0.61	0.56	0.55	0.58
FeO	19.69	19.80	20.01	21.87	22.43	22.50	22.34	22.31	22.64	23.09	22.72	22.91	22.01	22.35
Na_2O	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.00	0.00	0.03	0.06	0.00	0.00	0.00
K_2O	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.08	0.00	0.03	0.01
Total	86.05	86.57	86.40	84.86	85.89	86.10	85.48	86.21	85.86	86.19	85.83	85.87	85.64	85.64
Cations														
Si	5.351	5.333	5.367	5.161	5.282	5.300	5.252	5.255	5.402	5.407	5.328	5.246	5.401	5.232
Ti	0.010	0.012	0.015	0.007	0.013	0.007	0.017	0.011	0.010	0.009	0.000	0.009	0.007	0.011
Al	5.456	5.464	5.377	5.854	5.527	5.742	5.757	5.792	5.530	5.611	5.821	5.750	5.870	5.762
Mg	5.632	5.645	5.661	4.831	5.030	4.667	4.724	4.717	4.753	4.533	4.437	4.685	4.383	4.782
Ca	0.005	0.001	0.002	0.000	0.003	0.005	0.001	0.003	0.003	0.005	0.005	0.001	0.000	0.004
Mn	0.025	0.041	0.030	0.120	0.096	0.119	0.116	0.120	0.104	0.113	0.109	0.102	0.099	0.105
Fe^{2+}	3.426	3.428	3.474	3.928	3.986	3.982	3.985	3.939	4.020	4.091	4.037	4.078	3.893	3.979
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.000	0.000	0.000	0.011	0.000	0.005	0.005	0.000	0.000	0.014	0.026	0.001	0.000	0.000
K	0.003	0.001	0.000	0.000	0.003	0.000	0.001	0.000	0.000	0.009	0.022	0.000	0.007	0.002
Total	19.913	19.925	19.930	19.912	19.943	19.827	19.858	19.837	19.823	19.790	19.788	19.872	19.660	19.878
X_{Mg}	0.622	0.622	0.620	0.552	0.558	0.540	0.542	0.545	0.542	0.526	0.524	0.535	0.530	0.546

	D7626A F4 Chl4	D7626A F4 Chl5	D7626A F4 Chl6	D7626A F4 Chl7	D7626A F4 Chl8	D7626A F4 Chl9	Q61E F10 Chl 1 4	Q61E F10 Chl 2 1
Analysis								
SiO_2	24.53	25.04	25.04	24.76	25.02	24.87	25.53	25.35
TiO_2	0.07	0.04	0.03	0.05	0.03	0.08	0.15	0.14
Al_2O_3	23.05	23.10	22.69	22.60	23.03	22.35	24.90	24.61
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
MgO	14.54	13.92	14.10	14.47	14.19	14.86	16.49	16.15
CaO	0.01	0.05	0.02	0.02	0.00	0.01	0.09	0.04
MnO	0.61	0.58	0.52	0.62	0.56	0.64	0.08	0.08
FeO	23.19	22.45	23.21	22.64	23.07	22.69	24.77	25.24
Na_2O	0.02	0.03	0.02	0.05	0.02	0.02	0.09	0.11
K_2O	0.00	0.04	0.00	0.00	0.02	0.00	0.07	0.10
Total	86.01	85.23	85.63	85.19	85.95	85.50	92.21	92.04
Cations								
Si	5.223	5.348	5.347	5.305	5.317	5.314	5.071	5.065
Ti	0.011	0.007	0.004	0.009	0.005	0.013	0.022	0.022
Al	5.783	5.815	5.709	5.706	5.769	5.626	5.829	5.797
Mg	4.613	4.434	4.488	4.621	4.494	4.731	4.885	4.812
Ca	0.002	0.011	0.004	0.003	0.001	0.002	0.019	0.008
Mn	0.111	0.105	0.094	0.112	0.102	0.115	0.014	0.014
Fe^{2+}	4.128	4.010	4.143	4.057	4.099	4.054	4.116	4.217
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.031
Na	0.006	0.011	0.007	0.019	0.009	0.007	0.036	0.043
K	0.000	0.010	0.001	0.001	0.005	0.000	0.018	0.025
Total	19.878	19.752	19.798	19.844	19.802	19.864	20.016	20.034
X_{Mg}	0.528	0.525	0.520	0.532	0.523	0.539	0.543	0.533

Chloritoid

Electron microprobe analyses of chloritoid. Cations based on a 12 oxygen basis.

	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1
Analysis														
SiO_2	24.94	24.92	25.08	24.67	24.72	24.78	24.95	24.69	24.57	24.73	24.69	24.52	24.76	24.85
TiO_2	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.00	0.02	0.03	0.01	0.00	0.02
Al_2O_3	40.26	40.14	39.73	39.93	39.97	39.84	40.10	40.19	39.68	39.95	40.07	39.90	39.96	39.85
Cr_2O_3	0.04	0.00	0.00	0.03	0.02	0.02	0.02	0.00	0.02	0.02	0.03	0.01	0.00	0.00
MgO	1.86	1.91	1.83	1.86	1.91	1.84	1.83	1.93	1.93	1.92	1.91	1.89	1.84	1.91
CaO	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.02	0.02
MnO	0.24	0.20	0.24	0.29	0.20	0.23	0.19	0.20	0.22	0.26	0.26	0.22	0.20	0.23
FeO	22.87	23.03	22.27	23.40	22.55	22.31	23.18	23.18	22.66	22.22	22.87	23.24	22.11	22.33
Na_2O	0.00	0.00	0.02	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.02	0.00
K_2O	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
Total	90.23	90.20	89.18	90.21	89.39	89.01	90.32	90.21	89.07	89.14	89.88	89.82	88.90	89.22
Cations														
Si	2.090	2.090	2.120	2.076	2.089	2.100	2.092	2.074	2.086	2.092	2.079	2.071	2.098	2.101
Ti	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.000	0.001
Al	3.976	3.968	3.957	3.960	3.980	3.979	3.962	3.978	3.971	3.984	3.976	3.972	3.991	3.971
Cr	0.003	0.000	0.000	0.002	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.001	0.000	0.000
Mg	0.232	0.239	0.231	0.233	0.240	0.233	0.229	0.242	0.244	0.243	0.240	0.238	0.232	0.241
Ca	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.001	0.002
Mn	0.017	0.014	0.017	0.020	0.014	0.017	0.013	0.014	0.016	0.019	0.019	0.016	0.015	0.017
Fe^{2+}	1.603	1.616	1.574	1.647	1.593	1.581	1.625	1.628	1.609	1.572	1.610	1.642	1.567	1.579
Na	0.000	0.000	0.003	0.002	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.003	0.000
K	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000
Total	7.922	7.926	7.903	7.943	7.920	7.910	7.929	7.937	7.928	7.914	7.930	7.944	7.907	7.912
X_{Mg}	0.127	0.129	0.128	0.124	0.131	0.128	0.124	0.129	0.132	0.134	0.130	0.127	0.129	0.132

	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1	Q68B F2 Cld1
Analysis				
SiO_2	24.79	24.62	24.88	25.05
TiO_2	0.00	0.02	0.00	0.02
Al_2O_3	40.04	40.17	40.06	39.92
Cr_2O_3	0.00	0.00	0.01	0.02
MgO	1.88	1.91	1.94	1.93
CaO	0.00	0.00	0.00	0.01
MnO	0.27	0.23	0.22	0.24
FeO	22.78	23.33	22.80	22.23
Na_2O	0.00	0.01	0.01	0.01
K_2O	0.00	0.00	0.00	0.01
Total	89.76	90.28	89.93	89.43
Cations				
Si	2.088	2.068	2.091	2.111
Ti	0.000	0.001	0.000	0.001
Al	3.975	3.978	3.969	3.964
Cr	0.000	0.000	0.001	0.001
Mg	0.236	0.239	0.243	0.242
Ca	0.000	0.000	0.000	0.001
Mn	0.020	0.017	0.016	0.017
Fe^{2+}	1.605	1.639	1.603	1.567
Na	0.000	0.001	0.001	0.001
K	0.000	0.000	0.000	0.001
Total	7.924	7.943	7.925	7.907
X_{Mg}	0.128	0.127	0.132	0.134

Epidote

Electron microprobe analyses of epidote. Cations based on a 25 oxygen basis.

	76017B F4 Ep1	76017B F4 Ep2	76017B F4 Ep3	76017B F4 Ep4	76017B F4 Ep5	76017B F4 Ep6	76017B F4 Ep7	76017B F4 Ep8	76022B F3 Ep	76022B F3 Ep	76022B F3 Ep	76022B F3 Ep	76022B F3 Ep	76022B F3 Ep
Analysis														
SiO_2	38.46	39.36	38.62	38.40	38.75	38.61	38.36	37.22	38.06	37.92	38.28	38.32	38.26	38.30
TiO_2	0.15	0.14	0.15	0.05	0.10	0.15	0.05	0.05	0.08	0.06	0.04	0.04	0.07	0.09
Al_2O_3	25.58	26.10	25.75	23.52	25.32	25.85	23.51	23.66	22.54	23.86	23.16	23.05	23.02	22.55
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	10.89	9.17	9.81	13.01	10.56	9.64	13.21	14.47	14.56	13.21	13.68	14.13	14.14	14.70
MgO	0.97	0.12	0.05	0.00	0.01	0.00	0.00	1.30	0.00	0.00	0.01	0.00	0.00	0.11
CaO	21.55	23.14	23.02	23.52	24.03	23.30	23.15	21.41	23.73	23.69	23.55	23.69	23.45	22.94
MnO	0.22	0.23	0.17	0.06	0.03	0.14	0.04	0.14	0.08	0.09	0.07	0.11	0.07	0.15
Na_2O	0.01	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.01	0.03	0.00	0.04	0.00	0.00
K_2O	0.02	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Total	96.74	97.38	96.59	97.26	97.74	96.76	97.02	96.80	97.60	97.53	97.43	97.97	97.60	97.37
Cations														
Si	6.032	6.127	6.075	6.061	6.050	6.065	6.064	5.902	6.021	5.981	6.045	6.028	6.036	6.058
Ti	0.017	0.017	0.017	0.006	0.011	0.017	0.006	0.006	0.009	0.007	0.004	0.004	0.008	0.011
Al	4.729	4.788	4.773	4.374	4.659	4.786	4.381	4.422	4.203	4.435	4.311	4.274	4.280	4.204
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.285	1.074	1.161	1.546	1.240	1.140	1.572	1.727	1.733	1.568	1.626	1.673	1.679	1.750
Mg	0.228	0.027	0.012	0.000	0.003	0.000	0.000	0.307	0.000	0.000	0.003	0.000	0.000	0.026
Ca	3.621	3.859	3.879	3.977	4.020	3.923	3.921	3.636	4.023	4.004	3.984	3.994	3.964	3.886
Mn	0.029	0.031	0.022	0.008	0.004	0.019	0.005	0.018	0.010	0.012	0.009	0.015	0.009	0.019
Na	0.002	0.000	0.000	0.001	0.000	0.010	0.009	0.000	0.003	0.008	0.000	0.011	0.000	0.001
K	0.004	0.005	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Total	15.946	15.927	15.940	15.975	15.989	15.960	15.958	16.018	16.003	16.015	15.984	15.999	15.977	15.955

	76022B F2 Ep	76022B F2 Ep	76022B F2 Ep	76022B F2 Ep	76022B F1 Ep-Blase	76022B F1 Ep-Blase	76022B F1 Ep-Blase	76022B F1 Ep-Blase	76045G F2 Ep1	76045G F2 Ep2	76045G F2 Ep3	76045G F2 Ep4	76045G F2 Ep5	76053A F3 Ep1
Analysis														
SiO_2	38.56	38.59	38.68	38.37	38.69	38.03	37.96	37.88	37.15	37.08	37.00	36.74	37.48	38.25
TiO_2	0.11	0.08	0.10	0.05	0.08	0.04	0.03	0.08	0.10	0.07	0.06	0.06	0.07	0.05
Al_2O_3	24.91	25.02	24.92	25.07	26.73	22.83	23.31	23.26	22.25	21.06	21.03	20.22	21.79	25.06
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	10.92	11.52	11.10	10.69	9.15	14.44	13.62	13.60	14.43	15.38	15.61	16.44	14.49	10.84
MgO	0.04	0.00	0.00	0.00	0.01	0.01	0.06	0.00	0.00	0.01	0.00	0.09	0.01	0.00
CaO	23.59	23.94	23.81	23.59	23.82	23.10	23.52	23.31	22.79	22.65	22.97	21.99	22.95	23.24
MnO	0.10	0.08	0.10	0.06	0.12	0.05	0.04	0.19	0.16	0.32	0.06	0.21	0.10	0.17
Na_2O	0.02	0.00	0.02	0.02	0.01	0.00	0.02	0.02	0.01	0.03	0.02	0.01	0.01	0.02
K_2O	0.03	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.02	0.02	0.00	0.02	0.00	0.00
Total	97.19	98.08	97.61	96.80	97.70	97.06	97.19	96.98	95.45	95.07	95.18	94.18	95.45	96.55
Cations														
Si	6.058	6.020	6.055	6.050	6.018	6.033	6.011	6.013	6.006	6.041	6.023	6.052	6.059	6.045
Ti	0.013	0.009	0.012	0.006	0.009	0.004	0.003	0.009	0.012	0.009	0.008	0.008	0.009	0.006
Al	4.613	4.600	4.598	4.658	4.901	4.269	4.349	4.351	4.239	4.044	4.035	3.926	4.152	4.668
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.291	1.353	1.307	1.269	1.071	1.724	1.623	1.625	1.756	1.886	1.912	2.037	1.763	1.290
Mg	0.010	0.000	0.000	0.000	0.002	0.003	0.014	0.000	0.000	0.003	0.000	0.021	0.002	0.000
Ca	3.972	4.002	3.993	3.986	3.971	3.926	3.991	3.964	3.947	3.953	4.006	3.882	3.975	3.935
Mn	0.013	0.011	0.013	0.007	0.015	0.006	0.005	0.025	0.022	0.043	0.009	0.029	0.013	0.023
Na	0.006	0.000	0.006	0.007	0.003	0.000	0.007	0.007	0.003	0.008	0.007	0.003	0.004	0.007
K	0.005	0.000	0.000	0.002	0.001	0.003	0.000	0.001	0.004	0.004	0.000	0.004	0.001	0.000
Total	15.982	15.995	15.984	15.986	15.990	15.968	16.003	15.994	15.988	15.991	15.999	15.962	15.977	15.974

	76053A F3 Ep2	76053A F2 Ep1	76053A F2 Ep2	76053A F2 Ep3	76053A F2 Ep4	76053A F2 Ep5	**76053A F2 Ep6**	**76053A F1 Ep1**	**76053A F1 Ep2**	**76057A F1 Ep1**	**76057A F1 Ep2**	**76057A F1 Ep3**	**76057A F1 Ep4**	**76057A F1 Ep5**
Analysis														
SiO_2	37.96	37.81	37.54	37.53	37.80	37.62	37.82	38.69	38.22	37.02	36.30	36.38	36.46	36.76
TiO_2	0.08	0.18	0.05	0.07	0.05	0.07	0.04	0.15	0.14	0.04	0.07	0.08	0.06	0.07
Al_2O_3	24.71	22.93	23.15	22.98	23.30	23.08	23.09	26.12	25.94	22.81	21.20	21.16	21.38	21.67
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	11.16	14.27	12.97	12.75	12.86	13.21	13.18	9.52	9.36	13.61	14.67	14.98	14.79	14.50
MgO	0.00	4.19	0.06	0.04	0.02	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01
CaO	23.26	16.78	22.96	23.20	23.12	23.17	22.97	23.47	23.43	22.95	22.77	22.46	22.43	22.76
MnO	0.21	0.20	0.17	0.12	0.12	0.10	0.08	0.19	0.17	0.29	0.19	0.26	0.33	0.16
Na_2O	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.04
K_2O	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Total	96.25	95.25	95.61	95.41	95.97	95.97	95.89	97.20	96.33	95.37	93.74	93.82	93.97	94.53
Cations														
Si	6.029	6.023	6.032	6.045	6.047	6.028	6.056	6.051	6.035	5.986	5.997	6.005	6.004	6.011
Ti	0.009	0.022	0.006	0.008	0.006	0.008	0.005	0.018	0.017	0.005	0.009	0.009	0.007	0.008
Al	4.625	4.304	4.385	4.362	4.393	4.358	4.359	4.815	4.826	4.346	4.129	4.116	4.149	4.176
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.334	1.711	1.569	1.545	1.547	1.593	1.588	1.120	1.112	1.655	1.824	1.860	1.833	1.784
Mg	0.001	0.994	0.014	0.010	0.004	0.006	0.002	0.000	0.002	0.000	0.000	0.000	0.002	0.003
Ca	3.958	2.864	3.953	4.004	3.962	3.979	3.942	3.932	3.963	3.976	4.031	3.971	3.957	3.987
Mn	0.028	0.027	0.023	0.016	0.016	0.014	0.010	0.026	0.023	0.040	0.026	0.036	0.046	0.022
Na	0.000	0.000	0.004	0.000	0.000	0.005	0.005	0.000	0.000	0.002	0.002	0.001	0.000	0.014
K	0.001	0.003	0.000	0.002	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.001	0.001
Total	15.984	15.949	15.987	15.994	15.976	15.991	15.968	15.965	15.979	16.010	16.018	15.998	15.999	16.008

	76057A F2 Ep	**76057A F3tg Ep1**	**76057A F3tg Ep2**	**76057A F3tg Ep3**	**76057A F3tg Ep4**	**76057A F3tg Ep5**	**76057A F3tg Ep6**	**760210A F2 Ep1con-tAmp1**	**760210A F2 Ep1con-tAmp2**	**760210A F2 Ep1con-tAmp3**	**760210A F2 Ep1con-tAmp4**	**760210A F2 Ep1con-tAmp5**	**760210A F2 Ep1con-tAmp6**	**760210A F2 Ep1i-sol1**
Analysis														
SiO_2	36.32	37.40	36.16	36.57	36.60	36.51	36.86	37.29	36.71	36.53	36.53	36.23	36.72	36.69
TiO_2	0.25	0.05	0.05	0.01	0.03	0.05	0.04	0.13	0.06	0.05	0.06	0.04	0.05	0.12
Al_2O_3	21.60	22.81	21.12	21.30	22.06	20.70	21.34	21.12	20.53	20.52	20.04	20.07	20.35	19.99
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	14.13	13.50	14.88	15.02	13.72	14.66	14.85	16.24	16.50	16.11	16.62	16.38	16.51	16.85
MgO	0.01	0.00	0.00	0.00	0.00	0.48	0.00	0.05	0.31	0.05	0.29	0.09	0.11	0.01
CaO	22.64	22.88	22.26	22.93	22.84	21.81	22.73	22.49	22.17	22.35	22.16	21.99	22.23	22.68
MnO	0.26	0.24	0.39	0.23	0.26	0.33	0.26	0.15	0.19	0.26	0.12	0.17	0.18	0.24
Na_2O	0.01	0.02	0.00	0.03	0.00	0.09	0.03	0.02	0.02	0.00	0.03	0.00	0.04	0.03
K_2O	0.02	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
Total	93.82	95.53	93.38	94.59	94.13	93.16	94.63	95.87	94.91	94.28	94.28	93.38	94.60	94.98
Cations														
Si	5.987	6.026	5.998	5.992	6.002	6.057	6.029	6.024	6.005	6.015	6.022	6.025	6.027	6.017
Ti	0.031	0.006	0.006	0.001	0.004	0.006	0.005	0.015	0.007	0.006	0.008	0.004	0.007	0.014
Al	4.196	4.331	4.129	4.114	4.265	4.048	4.112	4.020	3.959	3.982	3.893	3.934	3.936	3.863
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.753	1.636	1.858	1.852	1.693	1.830	1.827	1.974	2.031	1.995	2.062	2.050	2.039	2.080
Mg	0.003	0.000	0.000	0.000	0.001	0.117	0.000	0.013	0.075	0.013	0.072	0.023	0.028	0.001
Ca	3.999	3.950	3.957	4.027	4.014	3.878	3.983	3.892	3.886	3.943	3.914	3.918	3.909	3.985
Mn	0.036	0.033	0.055	0.032	0.036	0.046	0.036	0.020	0.026	0.036	0.016	0.024	0.025	0.033
Na	0.004	0.007	0.000	0.011	0.000	0.028	0.010	0.006	0.005	0.001	0.010	0.001	0.011	0.008
K	0.004	0.000	0.001	0.000	0.000	0.001	0.001	0.004	0.001	0.000	0.000	0.000	0.000	0.000
Total	16.012	15.988	16.003	16.029	16.015	16.012	16.003	15.969	15.996	15.991	15.997	15.979	15.984	16.002

	760210A F2 Ep1i-sol2	**760210A F2 Ep1i-sol3**	**760210A F2 Ep1i-sol4**	**760210A F2 Ep1i-sol5**	**760210A F2 Ep1i-sol6**	**760210A F2 Ep1i-sol7**	**760210A F1 Ep1**	**760210A F1 Ep2**	**760210A F1 Ep3**	**760210A F1 Ep4**	**760210A F1 Ep5**	**760210A F1 Ep6**	**760210A F1 Ep7**	**760210A F1 Ep1**
Analysis														
SiO_2	37.06	36.83	36.68	37.13	37.16	37.14	37.26	36.70	36.64	36.41	36.66	36.84	36.78	37.32
TiO_2	0.07	0.01	0.08	0.06	0.05	0.06	0.05	0.18	0.20	0.05	0.07	0.10	0.09	0.06
Al_2O_3	20.59	20.61	20.18	20.90	20.99	21.14	20.75	21.09	20.94	20.39	20.76	21.03	21.03	21.61
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	16.52	16.06	16.69	15.71	15.94	15.95	16.55	15.55	15.77	16.06	16.86	15.51	15.84	15.51
MgO	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	22.68	22.82	22.69	22.78	22.78	22.78	22.73	23.03	23.01	22.62	22.58	23.13	22.75	22.83
MnO	0.42	0.32	0.31	0.41	0.52	0.44	0.50	0.30	0.24	0.61	0.50	0.26	0.35	0.43
Na_2O	0.03	0.05	0.03	0.00	0.01	0.04	0.01	0.03	0.04	0.02	0.00	0.05	0.01	0.00
K_2O	0.01	0.02	0.00	0.00	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.02
Total	95.76	95.12	95.08	95.42	95.87	95.97	96.23	95.34	95.25	94.61	95.82	95.38	95.27	96.22
Cations														
Si	6.018	6.017	6.009	6.036	6.019	6.007	6.020	5.978	5.976	5.994	5.960	5.997	5.992	6.008
Ti	0.008	0.001	0.010	0.008	0.006	0.007	0.006	0.023	0.024	0.007	0.008	0.012	0.011	0.007
Al	3.940	3.969	3.896	4.004	4.006	4.030	3.951	4.049	4.024	3.956	3.977	4.035	4.039	4.101
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	2.019	1.974	2.057	1.922	1.942	1.941	2.012	1.906	1.935	1.989	2.062	1.900	1.942	1.880
Mg	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Ca	3.946	3.995	3.983	3.967	3.953	3.948	3.935	4.019	4.021	3.991	3.934	4.035	3.972	3.939
Mn	0.057	0.044	0.043	0.057	0.071	0.060	0.068	0.042	0.032	0.085	0.069	0.035	0.049	0.058
Na	0.008	0.017	0.010	0.000	0.004	0.012	0.004	0.009	0.011	0.006	0.000	0.015	0.003	0.000
K	0.002	0.004	0.001	0.000	0.002	0.004	0.000	0.001	0.002	0.003	0.001	0.001	0.001	0.004
Total	15.999	16.021	16.010	15.994	16.004	16.008	15.995	16.027	16.027	16.031	16.013	16.032	16.008	15.997

	760210A F1 Ep2	**760210A F1 Ep3**	**760210A F1 Ep4**	**760210A F1 Ep5**	**760210A F5tg Ep1**	**760210A F5tg Ep2**	**760210A F5tg Ep3**	**760210A F5tg Ep4**	**760210A F5tg Ep5**	**760210A F5tg Ep6**	**760210A F5tg Ep7**	**760210A F5tg Ep8**	**811042C F4 Ep**	**811042C F4 Ep**
Analysis														
SiO_2	36.95	37.00	37.16	37.34	37.38	37.03	36.81	37.19	36.63	36.97	36.89	36.91	38.21	37.90
TiO_2	0.09	0.05	0.07	0.08	0.08	0.10	0.04	0.00	0.00	0.03	0.03	0.06	0.03	0.07
Al_2O_3	21.07	20.88	21.05	21.37	19.77	19.23	19.47	20.72	20.71	21.36	20.12	19.88	22.04	22.47
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	15.64	15.89	15.89	15.57	17.20	17.66	17.12	16.06	15.73	15.56	16.87	17.16	14.93	14.82
MgO	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
CaO	22.88	22.79	22.80	22.61	22.30	22.59	22.46	22.84	22.35	22.40	22.68	22.78	23.18	23.04
MnO	0.40	0.36	0.23	0.23	0.15	0.09	0.13	0.16	0.21	0.38	0.09	0.19	0.21	0.37
Na_2O	0.02	0.00	0.02	0.06	0.03	0.02	0.03	0.02	0.00	0.02	0.02	0.00	0.00	0.00
K_2O	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.01
Total	95.47	95.38	95.62	95.76	95.30	95.13	94.49	95.41	94.06	95.18	95.08	95.36	97.13	97.21
Cations														
Si	6.006	6.020	6.024	6.036	6.097	6.072	6.068	6.045	6.035	6.015	6.034	6.032	6.072	6.021
Ti	0.011	0.006	0.008	0.009	0.009	0.012	0.005	0.000	0.000	0.004	0.004	0.007	0.004	0.008
Al	4.036	4.004	4.021	4.071	3.799	3.717	3.784	3.970	4.020	4.096	3.878	3.828	4.128	4.206
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.913	1.945	1.939	1.894	2.111	2.179	2.124	1.965	1.950	1.905	2.076	2.110	1.786	1.771
Mg	0.001	0.000	0.000	0.001	0.000	0.003	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.003
Ca	3.985	3.974	3.961	3.916	3.896	3.969	3.967	3.979	3.945	3.905	3.975	3.988	3.947	3.922
Mn	0.055	0.050	0.032	0.031	0.021	0.013	0.019	0.022	0.029	0.052	0.013	0.026	0.029	0.050
Na	0.005	0.000	0.005	0.017	0.008	0.006	0.010	0.007	0.000	0.006	0.007	0.000	0.000	0.000
K	0.000	0.000	0.000	0.010	0.001	0.001	0.000	0.002	0.001	0.001	0.001	0.000	0.004	0.003
Total	16.011	15.999	15.990	15.986	15.943	15.971	15.978	15.991	15.981	15.984	15.989	15.991	15.970	15.984

	811042C F4 Ep	811042C F4 Ep	811042C F4 Ep	811042C F3 Ep	811042C F3 Ep	811042C F3 Ep	811042C F3 Ep	811042C F2 Ep	811042C F2 Ep	811042C F2 Ep	811042C F2 Ep	Q09B F2 Czoisit 2 2	Q09B F2 Czoisit 2 3	Q09B F6 Czoisit 3 1
Analysis														
SiO_2	37.76	37.77	41.43	38.07	38.10	38.18	37.97	38.10	38.14	38.22	38.09	39.88	38.70	38.93
TiO_2	0.03	0.04	0.09	0.10	0.07	0.06	0.07	0.05	0.08	0.05	0.01	0.11	0.08	0.07
Al_2O_3	22.56	22.13	21.84	22.05	22.24	22.15	22.14	21.97	21.70	21.67	21.84	32.43	33.44	32.91
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	15.01	14.94	13.12	14.95	14.76	14.54	14.83	15.20	15.29	15.59	15.74	2.73	2.69	2.89
MgO	0.00	0.02	1.31	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.08
CaO	23.17	23.11	17.42	23.26	23.39	23.23	23.17	23.16	23.43	23.36	23.31	22.91	24.53	24.29
MnO	0.18	0.19	0.16	0.21	0.20	0.10	0.12	0.11	0.13	0.19	0.16	0.04	0.04	0.06
Na_2O	0.02	0.00	0.05	0.01	0.01	0.03	0.03	0.03	0.02	0.00	0.04	0.57	0.01	0.04
K_2O	0.01	0.00	2.49	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Total	97.23	96.72	96.61	97.16	97.32	96.83	96.85	97.10	97.27	97.55	97.61	98.61	99.34	99.08
Cations														
Si	5.998	6.031	6.522	6.053	6.045	6.079	6.051	6.059	6.063	6.061	6.038	6.021	5.827	5.876
Ti	0.003	0.005	0.010	0.012	0.009	0.007	0.009	0.006	0.009	0.006	0.002	0.012	0.009	0.008
Al	4.223	4.166	4.052	4.131	4.160	4.156	4.157	4.118	4.066	4.051	4.079	5.770	5.935	5.854
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	1.794	1.796	1.554	1.789	1.762	1.742	1.779	1.819	1.830	1.861	1.877	0.310	0.304	0.328
Mg	0.000	0.006	0.307	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.007	0.017
Ca	3.944	3.954	2.939	3.961	3.976	3.963	3.955	3.946	3.991	3.970	3.958	3.706	3.957	3.928
Mn	0.024	0.026	0.021	0.029	0.027	0.013	0.016	0.015	0.018	0.026	0.021	0.006	0.005	0.008
Na	0.006	0.000	0.015	0.002	0.003	0.009	0.011	0.009	0.006	0.001	0.011	0.167	0.002	0.012
K	0.002	0.000	0.500	0.000	0.003	0.000	0.000	0.001	0.002	0.001	0.002	0.000	0.000	0.000
Total	15.995	15.983	15.921	15.977	15.988	15.970	15.978	15.972	15.985	15.978	15.988	16.008	16.046	16.031

	Q09B F6 Czoisit 3 2	Q09B F6 Czoisit 3 3	Q09B F6 Czoisit 3 4	Q09B F6 Czoisit 3 5	Q09B F9 Czoisit 4 1	Q09B F9 Czoisit 4 2	Q09B F9 Czoisit 4 3	Q09B F9 Czoisit 4 4
Analysis								
SiO_2	38.96	38.66	38.89	38.58	63.48	40.26	45.03	50.11
TiO_2	0.08	0.03	0.22	0.18	0.01	0.21	0.04	0.25
Al_2O_3	33.17	32.54	30.34	30.41	23.25	28.70	29.58	5.88
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	3.04	2.66	6.47	6.49	0.37	5.53	2.05	12.64
MgO	0.05	0.05	0.14	0.14	0.00	0.15	0.01	12.84
CaO	24.80	24.69	23.81	23.96	3.77	21.52	19.08	13.63
MnO	0.03	0.01	0.06	0.03	0.00	0.08	0.00	0.17
Na_2O	0.03	0.00	0.00	0.03	9.51	1.33	2.97	1.18
K_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.95	98.48	99.39	99.28	100.46	97.34	98.67	95.45
Cations								
Si	5.840	5.878	5.899	5.864	8.731	6.196	6.698	7.816
Ti	0.009	0.004	0.025	0.020	0.001	0.025	0.004	0.029
Al	5.859	5.831	5.423	5.449	3.769	5.204	5.185	1.080
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	0.343	0.304	0.739	0.742	0.039	0.640	0.230	1.484
Mg	0.011	0.011	0.032	0.032	0.000	0.034	0.003	2.985
Ca	3.982	4.022	3.869	3.903	0.555	3.548	3.040	2.277
Mn	0.004	0.001	0.008	0.003	0.000	0.010	0.000	0.023
Na	0.007	0.000	0.000	0.010	2.536	0.398	0.856	0.357
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	16.054	16.051	15.995	16.024	15.632	16.056	16.018	16.051

Feldspar

Electron microprobe analyses of feldspar. Cations based on an 8 oxygen basis.

	75214D F3 Pl2	75214D F3 Pl3	75214D F3 Pl4	75214D F3 Pl5	75214D F3 Pl6	75223A F2 Pl1	75223A F2 Pl2	75223A F2 Pl3	75223A F2 Pl4	75223A F2 Pl5	75223A F2 Pl6	75223A F2 Pl9	75223A F2 Pl10	75223A F2 Pl11
Analysis														
SiO_2	62.75	63.10	63.16	63.55	62.91	64.07	69.51	69.46	68.76	69.12	68.16	68.04	66.58	68.24
Al_2O_3	24.28	23.94	23.78	23.48	23.91	22.96	19.64	19.72	19.53	19.62	19.50	20.86	21.35	20.50
CaO	5.86	5.51	4.95	5.07	5.55	4.32	0.36	0.25	0.34	0.48	0.46	1.34	2.23	0.64
FeO	0.07	0.02	0.00	0.01	0.08	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.03	0.12
BaO	0.00	0.02	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.03	0.00
Na_2O	8.80	9.17	9.18	9.34	9.19	9.79	12.14	12.36	11.98	12.18	11.93	11.77	11.10	11.72
K_2O	0.09	0.08	0.45	0.13	0.12	0.07	0.05	0.07	0.07	0.07	0.08	0.22	0.07	0.47
Total	101.85	101.83	101.51	101.59	101.77	101.20	101.72	101.88	100.68	101.49	100.12	102.24	101.37	101.70
Cations														
Si	2.738	2.753	2.764	2.775	2.749	2.80	2.99	2.99	2.99	2.98	2.98	2.93	2.89	2.95
Al	1.249	1.231	1.226	1.208	1.231	1.18	1.00	1.00	1.00	1.00	1.01	1.06	1.09	1.04
Ca	0.274	0.257	0.232	0.237	0.260	0.202	0.017	0.012	0.016	0.022	0.022	0.062	0.104	0.030
Fe	0.003	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.744	0.775	0.778	0.791	0.779	0.830	1.012	1.031	1.010	1.019	1.011	0.982	0.935	0.982
K	0.005	0.005	0.025	0.007	0.007	0.004	0.003	0.004	0.004	0.004	0.005	0.012	0.004	0.026
Total	5.012	5.022	5.025	5.020	5.028	5.023	5.019	5.031	5.018	5.028	5.024	5.041	5.030	5.034
Endmember														
K feldspar	0.5	0.4	2.4	0.7	0.6	0.4	0.3	0.4	0.4	0.4	0.4	1.1	0.4	2.5
Albite	72.8	74.7	75.2	76.4	74.5	80.1	98.1	98.5	98.1	97.5	97.5	93.0	89.7	94.6
Anorthite	26.8	24.8	22.4	22.9	24.8	19.5	1.6	1.1	1.5	2.1	2.1	5.9	9.9	2.9
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75223A F2 Pl12	75223A F2 Pl13	75223A F2 Pl15	75223A F2 Pl16	75247F Pl1 Line10	75247F Pl1 Line11	75247F Pl1 Line12	75247F Pl1 Line13	75247F Pl1 Line14	75247F Pl1 Line15	75247F Pl1 Line16	75247F Pl1 Line17	75247F Pl1 Line18	75247F Pl1 Line19
Analysis														
SiO_2	64.59	78.23	69.60	69.70	60.01	59.80	59.87	59.89	60.02	60.03	59.95	59.92	59.88	60.11
Al_2O_3	22.07	14.73	19.56	19.56	25.63	25.36	25.58	25.34	25.47	25.50	25.58	25.37	25.71	25.57
CaO	1.65	2.83	0.26	0.29	6.87	6.84	6.79	6.88	6.83	6.80	6.76	6.83	6.91	6.85
FeO	0.52	0.11	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.03	0.00
BaO	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.03	0.00	0.01	0.00	0.02	0.00	0.00
Na_2O	10.03	5.79	12.40	12.50	7.50	7.43	7.51	7.58	7.66	7.36	7.54	7.52	7.40	7.48
K_2O	1.36	0.19	0.04	0.07	0.22	0.23	0.23	0.24	0.22	0.21	0.21	0.22	0.19	0.18
Total	100.23	101.88	101.88	102.11	100.27	99.66	99.99	99.96	100.20	99.93	100.06	99.88	100.12	100.19
Cations														
Si	2.85	3.27	2.99	2.99	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.66	2.67
Al	1.15	0.73	0.99	0.99	1.34	1.33	1.34	1.33	1.33	1.34	1.34	1.33	1.35	1.34
Ca	0.078	0.127	0.012	0.013	0.327	0.327	0.324	0.329	0.325	0.324	0.322	0.326	0.329	0.326
Fe	0.019	0.004	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.859	0.469	1.033	1.040	0.646	0.643	0.648	0.655	0.660	0.635	0.650	0.650	0.638	0.644
K	0.077	0.010	0.002	0.004	0.012	0.013	0.013	0.014	0.013	0.012	0.012	0.013	0.011	0.010
Total	5.038	4.606	5.031	5.037	4.993	4.990	4.994	4.999	5.001	4.983	4.994	4.993	4.988	4.988
Endmember														
K feldspar	7.5	1.6	0.2	0.4	1.2	1.3	1.3	1.4	1.3	1.2	1.2	1.3	1.1	1.0
Albite	84.7	77.4	98.6	98.4	65.6	65.4	65.8	65.7	66.1	65.4	66.1	65.7	65.2	65.7
Anorthite	7.7	20.9	1.1	1.2	33.2	33.3	32.9	32.9	32.6	33.4	32.7	33.0	33.7	33.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75247F Pl1 Line20	75247F Pl2 Line1	75247F Pl2 Line2	75247F Pl2 Line3	75247F Pl2 Line4	75247F Pl2 Line5	75247F Pl2 Line7	75247F Pl2 Line8	75247F Pl2 Line9	75247F Pl2 Line10	75247F Pl2 Line11	75247F Pl2 Line12	75247F Pl2 Line13	75247F Pl2 Line14
Analysis														
SiO_2	59.71	60.30	59.56	58.77	59.83	59.01	59.82	59.57	60.05	59.40	59.86	59.73	60.05	60.03
Al_2O_3	25.66	25.09	25.79	26.01	25.77	25.82	25.80	25.44	25.52	25.48	25.47	25.58	25.54	25.59
CaO	6.71	6.65	6.76	6.32	6.52	6.68	6.90	6.88	6.81	6.76	6.86	6.89	6.89	6.89
FeO	0.03	0.03	0.04	0.46	0.06	0.03	0.08	0.00	0.04	0.00	0.00	0.00	0.04	0.03
BaO	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.02	0.00	0.03	0.00	0.01
Na_2O	7.27	7.51	7.40	6.46	7.44	7.28	7.65	7.48	7.47	7.55	7.55	7.60	7.50	7.49
K_2O	0.14	0.13	0.20	0.29	0.25	0.23	0.22	0.20	0.22	0.21	0.21	0.21	0.20	0.21
Total	99.53	99.71	99.77	98.31	99.89	99.05	100.48	99.57	100.12	99.42	99.95	100.04	100.22	100.26
Cations														
Si	2.67	2.69	2.66	2.65	2.66	2.65	2.65	2.66	2.67	2.66	2.67	2.66	2.67	2.67
Al	1.35	1.32	1.36	1.38	1.35	1.37	1.35	1.34	1.34	1.35	1.34	1.34	1.34	1.34
Ca	0.321	0.318	0.323	0.306	0.311	0.322	0.328	0.330	0.324	0.325	0.327	0.329	0.328	0.328
Fe	0.001	0.001	0.002	0.017	0.002	0.001	0.003	0.000	0.002	0.000	0.000	0.000	0.001	0.001
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Na	0.629	0.649	0.640	0.566	0.642	0.634	0.658	0.649	0.644	0.656	0.652	0.656	0.646	0.645
K	0.008	0.007	0.011	0.017	0.014	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.011	0.012
Total	4.977	4.981	4.990	4.945	4.987	4.989	5.006	4.995	4.990	5.000	4.996	5.002	4.992	4.992
Endmember														
K feldspar	0.9	0.7	1.2	1.9	1.5	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2
Albite	65.7	66.6	65.7	63.7	66.4	65.5	65.9	65.5	65.7	66.1	65.8	65.8	65.6	65.5
Anorthite	33.5	32.6	33.1	34.4	32.1	33.2	32.9	33.3	33.1	32.7	33.0	33.0	33.3	33.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

	75247F Pl2 Line15	75247F Pl2 Line16	75247F Pl2 Line17	75247F Pl2 Line18	75247F Pl2 Line19	75247F Pl2 Line20	75247F Pl2 Line21	75247F Pl2 Line22	75247F Pl2 Line23	75247F Pl2 Line24	75247F Pl2 Line25	75247F Kfs Line1	75247F Kfs Line2	75247F Kfs Line3
Analysis														
SiO_2	59.87	61.01	59.82	60.03	59.92	59.91	60.19	59.71	60.08	60.25	60.38	64.60	64.76	64.65
Al_2O_3	25.45	25.03	25.49	25.55	25.19	25.59	25.57	25.39	25.48	25.18	25.52	18.72	18.77	18.85
CaO	6.93	6.67	6.81	6.76	6.79	6.70	6.87	6.79	6.75	6.72	6.80	0.13	0.00	0.00
FeO	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.12	0.00	0.09	0.06	0.00	0.00	0.00
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.46	0.54
Na_2O	7.64	7.45	7.68	7.65	7.74	7.66	7.61	7.68	7.72	7.63	7.69	0.89	0.96	0.97
K_2O	0.20	0.10	0.15	0.14	0.17	0.17	0.13	0.16	0.12	0.11	0.12	15.56	15.45	15.56
Total	100.09	100.26	99.95	100.13	99.81	100.09	100.37	99.85	100.15	99.98	100.56	100.48	100.40	100.57
Cations														
Si	2.67	2.70	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.68	2.67	2.98	2.98	2.98
Al	1.34	1.31	1.34	1.34	1.32	1.34	1.34	1.34	1.33	1.32	1.33	1.02	1.02	1.02
Ca	0.331	0.316	0.325	0.322	0.325	0.319	0.326	0.325	0.321	0.320	0.322	0.006	0.000	0.000
Fe	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.004	0.000	0.004	0.002	0.000	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.008	0.010
Na	0.659	0.639	0.664	0.659	0.670	0.661	0.654	0.665	0.665	0.658	0.660	0.079	0.086	0.086
K	0.011	0.006	0.008	0.008	0.010	0.010	0.007	0.009	0.007	0.006	0.007	0.916	0.908	0.914
Total	5.002	4.969	5.001	4.996	5.003	4.999	4.994	5.004	4.999	4.991	4.995	5.009	5.004	5.011
Endmember														
K feldspar	1.1	0.6	0.8	0.8	1.0	1.0	0.7	0.9	0.7	0.6	0.7	90.5	90.6	90.5
Albite	65.9	66.5	66.6	66.6	66.7	66.7	66.2	66.6	66.9	66.8	66.7	7.8	8.6	8.5
Anorthite	33.0	32.9	32.6	32.5	32.3	32.3	33.0	32.5	32.3	32.5	32.6	0.6	0.0	0.0
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.8	1.0

	75247F Kfs Line4	75247F Kfs Line5	75247F Kfs Line6	75247F Kfs Line7	75247F Kfs Line8	75247F Kfs Line9	75247F Kfs Line10	75247F Kfs Line11	75247F Kfs Line12	75247F Kfs Line13	75247F Kfs Line14	75247F Kfs Line15	75248C F1 Pl L2	75248C F1 Pl L3
Analysis														
SiO_2	64.90	64.38	64.39	64.78	64.65	64.75	64.70	64.74	64.49	64.65	64.17	64.93	61.20	60.68
Al_2O_3	18.73	19.07	19.11	19.06	18.95	19.11	19.02	18.96	18.85	19.01	18.89	19.13	24.53	24.34
CaO	0.01	0.00	0.03	0.01	0.03	0.01	0.03	0.01	0.02	0.02	0.01	0.01	6.11	5.98
FeO	0.00	0.00	0.05	0.09	0.00	0.00	0.12	0.00	0.06	0.06	0.00	0.02	0.09	0.00
BaO	0.42	0.56	0.58	0.54	0.58	0.55	0.54	0.59	0.55	0.55	0.56	0.55	0.01	0.00
Na_2O	1.08	1.02	0.97	1.09	1.06	1.09	1.02	1.04	1.01	1.15	1.13	1.16	8.82	8.64
K_2O	15.18	15.43	15.40	15.26	15.34	15.20	15.26	15.26	15.41	15.09	15.04	15.10	0.14	0.11
Total	100.32	100.46	100.53	100.82	100.61	100.72	100.68	100.60	100.38	100.52	99.79	100.89	100.91	99.75
Cations														
Si	2.99	2.97	2.97	2.97	2.97	2.97	2.97	2.98	2.98	2.97	2.97	2.97	2.70	2.71
Al	1.02	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.28	1.28
Ca	0.000	0.000	0.002	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.289	0.286
Fe	0.000	0.000	0.002	0.003	0.000	0.000	0.005	0.000	0.002	0.002	0.000	0.001	0.003	0.000
Ba	0.008	0.010	0.011	0.010	0.010	0.010	0.010	0.011	0.010	0.010	0.010	0.010	0.000	0.000
Na	0.096	0.091	0.087	0.097	0.095	0.097	0.091	0.093	0.090	0.102	0.101	0.103	0.756	0.747
K	0.891	0.908	0.905	0.893	0.900	0.890	0.895	0.895	0.907	0.885	0.889	0.882	0.008	0.006
Total	4.999	5.013	5.010	5.007	5.009	5.004	5.004	5.003	5.011	5.005	5.006	5.002	5.039	5.028
Endmember														
K feldspar	89.5	90.0	90.1	89.3	89.4	89.2	89.8	89.6	90.0	88.7	88.8	88.6	0.8	0.6
Albite	9.7	9.0	8.7	9.7	9.4	9.7	9.1	9.3	9.0	10.2	10.1	10.3	71.7	71.9
Anorthite	0.0	0.0	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	27.5	27.5
Celsiane	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	0.0	0.0

	75248C F1 Pl L4	75248C F1 Pl L5	75248C F1 Pl L6	75248C F1 Pl L7	75248C F1 Pl L8	75248C F1 Pl L9	75248C F1 Pl L10	75248C F1 Pl L11	75248C F1 Pl L12	75248C F1 Pl L13	75248C F1 Pl L14	75248C F1 Pl L15	75248C F1 Pl L16	75248C F1 Pl L17
Analysis														
SiO_2	60.75	60.88	60.48	60.46	60.61	60.16	59.74	60.36	60.19	60.50	60.44	60.10	60.20	60.39
Al_2O_3	26.15	24.62	25.01	25.19	25.11	25.09	25.31	25.44	25.10	25.22	25.39	25.21	25.23	25.12
CaO	5.80	6.31	6.61	6.88	6.90	7.18	7.13	7.11	6.87	7.01	7.06	6.87	7.01	6.95
FeO	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.05	0.01	0.00
BaO	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.01	0.01
Na_2O	8.43	8.27	8.38	8.27	8.15	8.11	7.88	8.08	8.04	8.00	8.09	8.26	8.26	8.15
K_2O	0.13	0.28	0.22	0.24	0.23	0.25	0.22	0.23	0.30	0.22	0.21	0.23	0.22	0.23
Total	101.28	100.36	100.72	101.04	101.00	100.80	100.30	101.27	100.51	100.94	101.18	100.73	100.92	100.85
Cations														
Si	2.67	2.70	2.68	2.67	2.68	2.67	2.66	2.66	2.67	2.67	2.67	2.67	2.67	2.67
Al	1.35	1.29	1.31	1.31	1.31	1.31	1.33	1.32	1.31	1.31	1.32	1.32	1.32	1.31
Ca	0.273	0.300	0.314	0.326	0.326	0.341	0.340	0.336	0.327	0.332	0.334	0.326	0.332	0.330
Fe	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.718	0.711	0.720	0.709	0.698	0.697	0.680	0.691	0.692	0.686	0.692	0.710	0.709	0.700
K	0.008	0.016	0.012	0.013	0.013	0.014	0.012	0.013	0.017	0.012	0.012	0.013	0.012	0.013
Total	5.019	5.017	5.033	5.032	5.024	5.032	5.022	5.027	5.024	5.018	5.025	5.036	5.036	5.027
Endmember														
K feldspar	0.8	1.5	1.2	1.3	1.3	1.3	1.2	1.2	1.7	1.2	1.1	1.3	1.2	1.3
Albite	71.9	69.3	68.8	67.6	67.3	66.3	65.9	66.4	66.8	66.6	66.7	67.6	67.3	67.1
Anorthite	27.3	29.2	30.0	31.1	31.5	32.4	32.9	32.3	31.6	32.2	32.2	31.1	31.6	31.6
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75248C F1 Pl L18	75248C F1 Pl L19	75248C F1 Pl L20	75248C F1 Pl L21	75248C F1 Pl L22	75248C F1 Pl L23	75248C F1 Pl L24	75248C F1 Pl L25	75248C F2 Pl L1	75248C F2 Pl L2	75248C F2 Pl L3	75248C F2 Pl L4	75248C F2 Pl L5	75248C F2 Pl L6
Analysis														
SiO_2	58.88	59.93	58.56	59.81	60.29	59.88	60.45	62.80	61.16	60.08	60.81	61.35	61.61	61.29
Al_2O_3	24.89	25.32	25.11	25.34	25.27	25.14	24.90	23.32	24.38	24.95	24.20	24.44	24.47	24.33
CaO	6.90	7.18	7.02	7.34	7.18	6.93	6.57	5.64	6.04	5.42	4.87	5.48	5.71	6.04
FeO	0.05	0.04	0.05	0.06	0.00	0.05	0.01	0.07	0.24	0.42	0.44	0.01	0.11	0.06
BaO	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00
Na_2O	7.94	8.07	7.96	8.09	8.00	8.21	8.57	8.16	8.73	8.04	8.40	8.59	8.57	8.69
K_2O	0.21	0.21	0.20	0.20	0.19	0.16	0.15	0.12	0.18	0.55	0.83	0.55	0.27	0.19
Total	98.85	100.76	98.90	100.83	100.94	100.38	100.66	100.12	100.75	99.46	99.55	100.42	100.75	100.60
Cations														
Si	2.66	2.66	2.65	2.65	2.67	2.67	2.68	2.78	2.71	2.69	2.72	2.72	2.72	2.71
Al	1.33	1.32	1.34	1.33	1.32	1.32	1.30	1.22	1.27	1.32	1.28	1.28	1.27	1.27
Ca	0.334	0.341	0.340	0.349	0.340	0.331	0.312	0.267	0.287	0.260	0.234	0.260	0.270	0.287
Fe	0.002	0.001	0.002	0.002	0.000	0.002	0.000	0.003	0.009	0.016	0.016	0.000	0.004	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.695	0.694	0.698	0.696	0.686	0.708	0.737	0.700	0.749	0.698	0.729	0.738	0.734	0.746
K	0.012	0.012	0.011	0.011	0.011	0.009	0.008	0.007	0.010	0.031	0.047	0.031	0.015	0.010
Total	5.030	5.032	5.038	5.037	5.022	5.034	5.041	4.969	5.035	5.015	5.027	5.027	5.017	5.029
Endmember														
K feldspar	1.1	1.1	1.1	1.1	1.1	0.9	0.8	0.7	1.0	3.2	4.7	3.0	1.5	1.0
Albite	66.8	66.3	66.5	65.9	66.1	67.6	69.7	71.8	71.6	70.5	72.2	71.7	72.0	71.5
Anorthite	32.1	32.6	32.4	33.0	32.8	31.6	29.5	27.4	27.4	26.3	23.1	25.3	26.5	27.5
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75248C F2 Pl L7	75248C F2 Pl L8	75248C F2 Pl L9	75248C F2 Pl L10	75248C F2 Pl L11	75248C F2 Pl L12	75248C F2 Kfs L1	75248C F2 Kfs L2	75248C F2 Kfs L3	75248C F2 Kfs L4	75248C F2 Kfs L5	75248C F2 Kfs L6	75248C F2 Kfs L7	75248C F2 Kfs L8
Analysis														
SiO_2	60.99	61.19	61.24	61.55	61.46	61.46	63.79	64.85	64.58	64.68	64.65	64.61	64.46	64.87
Al_2O_3	24.02	24.65	24.54	24.54	24.60	24.56	18.80	18.84	18.62	18.76	18.85	18.82	18.74	18.92
CaO	5.76	5.95	6.13	6.09	6.17	5.92	0.50	0.01	0.03	0.02	0.00	0.03	0.02	0.01
FeO	0.13	0.04	0.00	0.02	0.05	0.04	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00
BaO	0.00	0.04	0.00	0.00	0.02	0.00	0.54	0.65	0.52	0.57	0.54	0.48	0.52	0.55
Na_2O	8.52	8.49	8.55	8.66	8.80	8.70	2.93	1.25	1.22	1.29	1.36	1.37	1.39	1.35
K_2O	0.40	0.17	0.18	0.19	0.19	0.16	12.07	14.85	14.96	14.78	14.61	14.67	14.60	14.65
Total	99.81	100.53	100.63	101.05	101.29	100.82	98.99	100.45	99.92	100.10	100.01	99.99	99.74	100.35
Cations														
Si	2.72	2.71	2.71	2.71	2.71	2.71	2.96	2.98	2.99	2.98	2.98	2.98	2.98	2.98
Al	1.26	1.29	1.28	1.27	1.28	1.28	1.03	1.02	1.01	1.02	1.02	1.02	1.02	1.02
Ca	0.275	0.282	0.290	0.287	0.291	0.280	0.025	0.000	0.001	0.001	0.000	0.001	0.001	0.001
Fe	0.005	0.002	0.000	0.001	0.002	0.001	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ba	0.000	0.001	0.000	0.000	0.000	0.000	0.010	0.012	0.009	0.010	0.010	0.009	0.009	0.010
Na	0.737	0.729	0.733	0.740	0.751	0.744	0.263	0.111	0.109	0.116	0.122	0.123	0.124	0.120
K	0.022	0.009	0.010	0.011	0.011	0.009	0.715	0.871	0.883	0.870	0.860	0.863	0.862	0.859
Total	5.026	5.017	5.023	5.026	5.037	5.025	5.015	4.998	5.003	5.000	4.997	5.001	5.000	4.996
Endmember														
K feldspar	2.2	0.9	1.0	1.0	1.0	0.9	70.6	87.6	88.1	87.3	86.7	86.7	86.5	86.8
Albite	71.2	71.4	70.9	71.3	71.3	72.1	26.0	11.2	10.9	11.6	12.3	12.3	12.5	12.1
Anorthite	26.6	27.6	28.1	27.7	27.6	27.1	2.4	0.0	0.1	0.1	0.0	0.1	0.1	0.1
Celsiane	0.0	0.1	0.0	0.0	0.0	0.0	1.0	1.2	0.9	1.0	1.0	0.9	1.0	1.0

	75248C F2 Kfs L9	75248C F2 Kfs L10	75248C F2 Kfs L11	75248C F2 Kfs L12	75248C F2 Kfs L13	75248C F2 Kfs L14	75248C F2 Kfs L15	75251E F1 Kfs1	75251E F1 Kfs2	75251E F1 Kfs7	75251E F1 Pl2	75251E F1 Pl3	75251E F1 Pl4	75251E F1 Pl5
Analysis														
SiO_2	64.68	63.51	64.31	63.96	63.89	64.44	64.03	64.94	65.13	64.34	61.23	61.11	61.24	61.24
Al_2O_3	18.82	18.64	18.74	18.85	18.88	18.80	18.93	18.41	18.52	18.24	24.85	24.66	24.56	24.90
CaO	0.02	0.09	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.00	6.44	6.45	6.32	5.86
FeO	0.00	0.12	0.00	0.02	0.02	0.01	0.03	0.06	0.02	0.03	0.03	0.02	0.00	0.07
BaO	0.56	0.59	0.56	0.56	0.56	0.55	0.54	0.75	0.77	0.81	0.00	0.03	0.03	0.00
Na_2O	1.28	0.99	1.02	1.04	1.06	1.21	1.05	0.88	0.85	0.94	8.48	8.53	8.54	8.55
K_2O	14.82	15.03	15.15	15.11	15.07	14.86	15.14	15.06	15.30	14.85	0.19	0.29	0.26	0.36
Total	100.19	98.97	99.80	99.53	99.47	99.89	99.73	100.09	100.59	99.21	101.22	101.08	100.95	100.98
Cations														
Si	2.98	2.97	2.98	2.97	2.97	2.98	2.97	2.999	2.996	2.999	2.697	2.698	2.705	2.701
Al	1.02	1.03	1.02	1.03	1.03	1.02	1.03	1.002	1.004	1.002	1.290	1.283	1.279	1.295
Ca	0.001	0.004	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.304	0.305	0.299	0.277
Fe	0.000	0.005	0.000	0.001	0.001	0.000	0.001	0.002	0.001	0.001	0.001	0.001	0.000	0.002
Ba	0.010	0.011	0.010	0.010	0.010	0.010	0.010	0.014	0.014	0.015	0.000	0.000	0.001	0.000
Na	0.115	0.090	0.092	0.093	0.096	0.109	0.094	0.079	0.076	0.085	0.724	0.730	0.731	0.731
K	0.871	0.898	0.896	0.896	0.894	0.877	0.896	0.887	0.898	0.883	0.011	0.016	0.014	0.020
Total	5.001	5.007	5.002	5.006	5.006	5.001	5.007	4.983	4.989	4.985	5.026	5.034	5.029	5.027
Endmember														
K feldspar	87.4	89.5	89.7	89.7	89.4	88.0	89.5	90.6	90.9	89.8	1.0	1.6	1.4	2.0
Albite	11.5	8.9	9.2	9.3	9.6	10.9	9.4	8.1	7.7	8.6	69.7	69.4	70.0	71.1
Anorthite	0.1	0.4	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	29.3	29.0	28.6	26.9
Celsiane	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.4	1.4	1.5	0.0	0.0	0.1	0.0

	75251E F1 Pl6	75251E F4 Pl2	75251E F4 Pl3	75251E F4 Pl4	75251E F4 Pl5	75251E F4 Pl6	75251E F4 Pl7	75251E F4 Pl8	75251E F4 Pl9	75251E F4 Pl10	75251E F4 Pl11	75251E F4 Pl12	75251E F4 Pl13	75251E F4 Pl14
Analysis														
SiO_2	61.61	61.04	61.23	60.63	60.36	60.83	60.90	60.82	60.71	60.35	60.51	60.58	60.44	60.67
Al_2O_3	24.55	23.96	24.33	24.52	24.74	25.27	24.93	24.92	25.09	25.02	25.31	24.99	25.16	25.20
CaO	5.59	5.84	6.33	6.79	6.81	6.89	6.79	6.74	6.82	6.98	7.11	7.12	6.88	6.71
FeO	0.00	0.06	0.03	0.04	0.05	0.00	0.04	0.03	0.03	0.00	0.00	0.02	0.00	0.05
BaO	0.00	0.03	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.04
Na_2O	8.45	8.58	8.50	8.35	8.38	8.30	8.28	8.31	8.34	8.06	8.07	8.11	8.15	8.15
K_2O	0.67	0.19	0.23	0.23	0.23	0.23	0.24	0.24	0.25	0.26	0.20	0.25	0.23	0.24
Total	100.87	99.70	100.68	100.56	100.60	101.54	101.19	101.07	101.23	100.67	101.22	101.07	100.87	101.06
Cations														
Si	2.720	2.725	2.711	2.692	2.682	2.675	2.686	2.686	2.678	2.676	2.669	2.678	2.675	2.679
Al	1.277	1.261	1.270	1.283	1.295	1.310	1.296	1.297	1.305	1.308	1.316	1.302	1.312	1.311
Ca	0.264	0.279	0.300	0.323	0.324	0.325	0.321	0.319	0.322	0.332	0.336	0.337	0.326	0.318
Fe	0.000	0.002	0.001	0.001	0.002	0.000	0.002	0.001	0.001	0.000	0.000	0.001	0.000	0.002
Ba	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Na	0.723	0.743	0.730	0.719	0.722	0.708	0.708	0.712	0.713	0.693	0.690	0.695	0.699	0.697
K	0.038	0.011	0.013	0.013	0.013	0.013	0.014	0.013	0.014	0.014	0.011	0.014	0.013	0.014
Total	5.022	5.022	5.025	5.032	5.038	5.031	5.027	5.028	5.033	5.024	5.024	5.026	5.025	5.021
Endmember														
K feldspar	3.7	1.0	1.3	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.1	1.3	1.3	1.3
Albite	70.6	71.9	69.9	68.2	68.1	67.7	67.9	68.2	67.9	66.7	66.5	66.4	67.3	67.8
Anorthite	25.8	27.0	28.8	30.6	30.6	31.0	30.8	30.5	30.7	31.9	32.4	32.2	31.4	30.9
Celsiane	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

	75254A F4 Pl L2	75254A F4 Pl L3	75254A F4 Pl L4	75254A F4 Pl L5	75254A F4 Pl L6	75254A F4 Pl L7	75254A F4 Pl L8	75254A F4 Pl L9	75254A F4 Pl L10	75254A F4 Pl L11	75254A F4 Pl L12	75254A F4 Pl L13	75254A F4 Pl L14	75254A F4 Pl L15
Analysis														
SiO_2	57.00	57.71	57.36	57.14	56.26	56.53	56.32	56.63	56.50	56.46	56.51	56.59	57.18	56.64
Al_2O_3	26.98	26.81	26.86	27.08	27.30	27.26	27.39	27.35	27.42	27.37	27.31	27.53	27.06	27.24
CaO	9.04	8.71	9.08	9.46	9.74	9.91	9.71	9.84	9.76	10.03	9.83	9.78	9.48	9.41
FeO	0.14	0.07	0.05	0.08	0.09	0.00	0.00	0.06	0.03	0.00	0.05	0.01	0.05	0.00
BaO	0.00	0.01	0.00	0.02	0.01	0.02	0.00	0.01	0.02	0.01	0.00	0.02	0.03	0.01
Na_2O	7.20	7.24	7.02	6.72	6.75	6.67	6.65	6.50	6.72	6.68	6.59	6.75	6.67	6.83
K_2O	0.04	0.06	0.05	0.10	0.08	0.06	0.08	0.07	0.07	0.08	0.08	0.07	0.08	0.10
Total	100.40	100.60	100.44	100.60	100.21	100.45	100.15	100.45	100.51	100.63	100.37	100.74	100.56	100.21
Cations														
Si	2.555	2.575	2.566	2.555	2.530	2.535	2.532	2.537	2.532	2.529	2.535	2.530	2.556	2.543
Al	1.425	1.410	1.416	1.427	1.447	1.441	1.451	1.444	1.448	1.445	1.444	1.451	1.426	1.441
Ca	0.434	0.416	0.435	0.453	0.469	0.476	0.468	0.472	0.469	0.482	0.472	0.468	0.454	0.453
Fe	0.005	0.003	0.002	0.003	0.003	0.000	0.000	0.002	0.001	0.000	0.002	0.000	0.002	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Na	0.625	0.627	0.609	0.583	0.588	0.580	0.579	0.564	0.584	0.580	0.573	0.585	0.578	0.594
K	0.002	0.003	0.003	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.006
Total	5.047	5.034	5.032	5.026	5.043	5.036	5.035	5.025	5.038	5.041	5.032	5.039	5.022	5.036
Endmember														
K feldspar	0.2	0.3	0.3	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Albite	58.9	59.9	58.1	55.9	55.4	54.7	55.1	54.2	55.3	54.4	54.6	55.3	55.7	56.5
Anorthite	40.9	39.8	41.6	43.5	44.2	44.9	44.5	45.4	44.3	45.2	45.0	44.3	43.8	43.0
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

	75254A F4 Pl L16	75254A F4 Pl L17	75254A F4 Pl L18	75254A F4 Pl L19	75254A F1 Pl L2	75254A F1 Pl L3	75254A F1 Pl L4	75254A F1 Pl L5	75254A F1 Pl L6	75254A F1 Pl L7	75254A F1 Pl L8	75254A F1 Pl L9	75254A F1 Pl L10	75254A F1 Pl L11
Analysis														
SiO_2	57.21	57.43	57.90	58.34	57.14	57.12	56.91	57.52	57.43	57.98	58.21	57.94	58.54	58.20
Al_2O_3	27.23	26.92	26.82	26.65	26.54	26.67	26.58	26.38	26.22	26.25	25.78	25.77	25.53	25.36
CaO	9.42	9.23	8.99	8.74	8.96	8.98	8.94	8.76	8.57	8.45	8.14	7.91	7.60	7.75
FeO	0.03	0.07	0.02	0.04	0.06	0.06	0.04	0.02	0.02	0.04	0.00	0.01	0.03	0.04
BaO	0.01	0.02	0.03	0.00	0.02	0.03	0.01	0.00	0.00	0.01	0.00	0.03	0.01	0.03
Na_2O	7.05	7.17	7.23	7.30	7.14	7.14	7.06	7.23	7.36	7.44	7.67	7.74	7.78	7.87
K_2O	0.07	0.06	0.04	0.06	0.07	0.07	0.06	0.05	0.07	0.10	0.08	0.08	0.09	0.10
Total	101.02	100.90	101.03	101.13	99.93	100.07	99.61	99.96	99.66	100.26	99.87	99.49	99.59	99.35
Cations														
Si	2.549	2.561	2.575	2.588	2.571	2.567	2.568	2.583	2.587	2.595	2.613	2.611	2.631	2.626
Al	1.430	1.415	1.405	1.394	1.407	1.412	1.413	1.397	1.392	1.385	1.364	1.369	1.353	1.349
Ca	0.450	0.441	0.428	0.415	0.432	0.433	0.432	0.422	0.413	0.405	0.392	0.382	0.366	0.375
Fe	0.001	0.003	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.000	0.000	0.001	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
Na	0.609	0.620	0.623	0.628	0.623	0.622	0.617	0.630	0.643	0.645	0.667	0.677	0.678	0.688
K	0.004	0.004	0.002	0.004	0.004	0.004	0.004	0.003	0.004	0.005	0.004	0.005	0.005	0.006
Total	5.042	5.043	5.035	5.031	5.039	5.040	5.036	5.035	5.041	5.038	5.041	5.045	5.034	5.046
Endmember														
K feldspar	0.4	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.5	0.4	0.5	0.5	0.6
Albite	57.3	58.2	59.1	60.0	58.8	58.7	58.6	59.7	60.6	61.1	62.8	63.6	64.6	64.3
Anorthite	42.3	41.4	40.6	39.7	40.8	40.9	41.0	40.0	39.0	38.4	36.8	35.9	34.9	35.0
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

	75254A F1 Pl L12	75254A F1 Pl L13	75254A F1 Pl L14	75254A F1 Pl L15	75254A F1 Pl L16	75254A F1 Pl L18	75254A F1 Pl L19	75254A F1 Pl L20	75254A F1 Pl L21	75261C F1 Pl1	75261C F1 Pl2	75261C F1 Pl3	75261C F1 Pl4	75261C F1 Pl5
Analysis														
SiO_2	58.54	58.32	57.86	57.35	56.02	56.51	56.81	56.89	59.14	62.97	63.22	62.78	62.80	65.75
Al_2O_3	25.50	25.62	25.70	26.07	25.80	26.23	25.95	25.77	24.41	23.95	24.08	23.87	23.97	22.29
CaO	7.80	7.85	8.04	8.14	8.14	8.44	8.28	7.83	7.44	5.41	5.24	5.42	5.32	5.10
FeO	0.05	0.06	0.23	0.55	0.93	0.63	0.70	0.83	0.77	0.03	0.00	0.00	0.06	0.05
BaO	0.00	0.01	0.00	0.02	0.00	0.02	0.02	0.01	0.01	0.01	0.02	0.00	0.01	0.02
Na_2O	7.80	7.85	7.78	7.48	7.01	7.13	7.02	7.20	7.16	9.42	9.19	9.10	9.13	8.55
K_2O	0.08	0.08	0.08	0.11	0.09	0.07	0.13	0.16	0.18	0.04	0.05	0.04	0.04	0.04
Total	99.76	99.78	99.69	99.72	97.99	99.02	98.91	98.70	99.10	101.82	101.80	101.21	101.32	101.80
Cations														
Si	2.628	2.620	2.607	2.588	2.576	2.570	2.584	2.593	2.671	2.749	2.755	2.753	2.751	2.847
Al	1.349	1.357	1.365	1.386	1.398	1.406	1.391	1.384	1.300	1.232	1.237	1.234	1.238	1.138
Ca	0.375	0.378	0.388	0.393	0.401	0.411	0.404	0.383	0.360	0.253	0.245	0.255	0.249	0.236
Fe	0.002	0.002	0.009	0.021	0.036	0.024	0.027	0.032	0.029	0.001	0.000	0.000	0.002	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.679	0.683	0.680	0.654	0.625	0.629	0.619	0.637	0.627	0.798	0.777	0.774	0.776	0.718
K	0.005	0.005	0.004	0.006	0.005	0.004	0.007	0.009	0.010	0.002	0.003	0.002	0.002	0.002
Total	5.039	5.045	5.053	5.049	5.040	5.044	5.033	5.038	4.997	5.035	5.016	5.018	5.019	4.944
Endmember														
K feldspar	0.4	0.4	0.4	0.6	0.5	0.4	0.7	0.9	1.0	0.2	0.3	0.2	0.2	0.2
Albite	64.1	64.1	63.4	62.0	60.6	60.2	60.1	61.9	62.9	75.8	75.8	75.1	75.5	75.0
Anorthite	35.4	35.4	36.2	37.3	38.9	39.4	39.2	37.2	36.1	24.0	23.9	24.7	24.3	24.7
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75261C F4 Pl1	75261C F4 Pl1	75261C F4 Pl3	75261C F4 Pl4	75261C F4 Pl5	75261C F4 Pl6	75261C F4 Pl11	75261C F4 Pl12	75261C F5 Pl3	75261C F5 Pl4	75261C F5 Pl5	75261C F5 Pl6	75271A F4 Pl2	75271A F4 Pl3
Analysis														
SiO_2	62.66	62.68	62.33	62.60	62.75	62.64	62.68	62.81	62.89	62.09	62.36	61.84	57.62	57.81
Al_2O_3	24.19	24.32	24.25	24.50	24.27	24.36	24.28	24.37	24.23	24.60	24.44	24.62	27.44	27.52
CaO	5.79	5.80	5.81	5.74	5.69	5.69	5.77	5.77	5.79	6.13	6.12	6.15	9.69	9.88
FeO	0.10	0.06	0.08	0.07	0.06	0.11	0.08	0.08	0.05	0.04	0.05	0.04	0.23	0.14
BaO	0.01	0.01	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Na_2O	8.76	9.13	8.90	8.73	8.86	8.47	8.19	7.54	9.02	8.91	8.82	8.93	6.67	6.67
K_2O	0.05	0.05	0.05	0.04	0.05	0.05	0.04	0.05	0.04	0.04	0.05	0.05	0.12	0.05
Total	101.56	102.04	101.42	101.68	101.70	101.32	101.03	100.64	102.02	101.81	101.83	101.63	101.77	102.08
Cations														
Si	2.741	2.733	2.732	2.733	2.740	2.742	2.748	2.756	2.740	2.715	2.725	2.711	2.55	2.55
Al	1.247	1.250	1.253	1.261	1.249	1.257	1.255	1.260	1.244	1.268	1.258	1.272	1.43	1.43
Ca	0.271	0.271	0.273	0.268	0.266	0.267	0.271	0.271	0.270	0.287	0.286	0.289	0.459	0.467
Fe	0.004	0.002	0.003	0.002	0.002	0.004	0.003	0.003	0.002	0.001	0.002	0.001	0.008	0.005
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.743	0.772	0.756	0.739	0.750	0.719	0.696	0.642	0.762	0.755	0.747	0.759	0.572	0.570
K	0.003	0.003	0.003	0.002	0.003	0.003	0.002	0.003	0.002	0.002	0.003	0.003	0.007	0.003
Total	5.008	5.030	5.020	5.007	5.011	4.991	4.974	4.936	5.020	5.029	5.021	5.034	5.026	5.023
Endmember														
K feldspar	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.7	0.3
Albite	73.0	73.8	73.3	73.2	73.6	72.7	71.8	70.1	73.7	72.3	72.1	72.3	55.1	54.8
Anorthite	26.7	25.9	26.4	26.6	26.1	27.0	28.0	29.6	26.1	27.5	27.6	27.5	44.2	44.9
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	75271A F4 Pl4	75271A F11 Pl3	75271A F11 Pl4	75271A F11 Pl13	75271A F11 Pl14	75271A F11 Pl15	75271A F11 Pl16	75271A F11 Pl17	75302A F2 Pl2	75302A F2 Pl3	75302A F2 Pl4	75302A F2 Pl5	75302A F2 Pl6	75302A F2 Pl7
Analysis														
SiO_2	59.00	57.03	57.44	54.81	55.40	53.54	55.84	56.48	58.59	59.18	59.03	58.65	59.14	59.33
Al_2O_3	26.39	27.47	27.36	25.15	26.54	25.14	26.77	26.31	26.79	26.69	26.37	26.79	26.57	26.24
CaO	8.74	10.11	9.87	8.18	9.59	7.75	9.22	8.88	8.91	8.82	8.70	8.91	8.95	8.53
FeO	0.30	0.56	0.18	3.52	2.03	4.70	1.47	1.33	0.07	0.05	0.07	0.09	0.06	0.08
BaO	0.00	0.00	0.02	0.00	0.01	0.01	0.02	0.01	0.00	0.01	0.04	0.00	0.00	0.00
Na_2O	7.25	6.40	6.56	5.77	6.15	5.66	6.42	6.56	6.94	6.99	7.05	6.89	6.99	6.97
K_2O	0.11	0.12	0.07	1.60	0.86	1.62	0.54	0.52	0.07	0.10	0.10	0.11	0.08	0.11
Total	101.79	101.68	101.50	99.03	100.59	98.41	100.28	100.08	101.36	101.84	101.35	101.42	101.79	101.27
Cations														
Si	2.60	2.53	2.55	2.54	2.52	2.52	2.53	2.56	2.59	2.60	2.61	2.59	2.60	2.62
Al	1.37	1.44	1.43	1.38	1.42	1.39	1.43	1.40	1.40	1.38	1.37	1.40	1.38	1.37
Ca	0.413	0.481	0.469	0.407	0.467	0.390	0.447	0.431	0.422	0.415	0.412	0.422	0.422	0.404
Fe	0.011	0.021	0.007	0.137	0.077	0.185	0.056	0.050	0.003	0.002	0.003	0.003	0.002	0.003
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Na	0.620	0.551	0.564	0.519	0.541	0.516	0.563	0.575	0.595	0.596	0.604	0.590	0.597	0.597
K	0.006	0.007	0.004	0.094	0.050	0.097	0.031	0.030	0.004	0.006	0.005	0.006	0.005	0.006
Total	5.025	5.028	5.021	5.075	5.070	5.095	5.055	5.045	5.010	5.006	5.008	5.008	5.008	4.997
Endmember														
K feldspar	0.6	0.7	0.4	9.3	4.7	9.7	3.0	2.9	0.4	0.6	0.5	0.6	0.4	0.6
Albite	59.7	53.0	54.4	50.9	51.2	51.4	54.0	55.5	58.3	58.6	59.1	58.0	58.3	59.3
Anorthite	39.8	46.3	45.2	39.9	44.1	38.9	42.9	41.6	41.4	40.8	40.3	41.4	41.3	40.1
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

	75302A F2 Pl8	75302A F2 Pl9	75302A F2 Pl10	75302A F2 Pl11	75302A F2 Pl21	75302A F2 Pl22	75302A F2 Pl23	75302A F2 Pl24	75302A F2 Pl25	75302A F2 Pl26	75302A F2 Pl27	75302A F2 Pl28	75302A F2 Pl29	75302A F2 Pl30
Analysis														
SiO_2	58.87	58.67	59.68	60.11	60.23	60.12	60.14	59.67	59.96	59.40	58.80	58.87	59.15	58.85
Al_2O_3	26.70	26.67	26.31	26.32	25.88	25.88	25.89	25.78	25.99	26.33	26.50	26.60	26.36	26.66
CaO	8.92	9.01	8.72	8.23	8.00	7.99	8.07	7.88	8.15	8.60	8.88	8.84	8.72	8.77
FeO	0.07	0.07	0.09	0.07	0.22	0.15	0.12	0.11	0.07	0.10	0.05	0.07	0.09	0.09
BaO	0.00	0.04	0.03	0.02	0.02	0.03	0.00	0.00	0.05	0.00	0.00	0.02	0.06	0.06
Na_2O	6.77	6.96	6.87	7.40	7.37	7.52	7.50	7.41	7.27	7.00	6.95	6.91	7.04	6.79
K_2O	0.11	0.10	0.09	0.07	0.10	0.08	0.08	0.09	0.06	0.09	0.09	0.10	0.09	0.08
Total	101.43	101.53	101.79	102.21	101.82	101.77	101.80	100.94	101.55	101.52	101.27	101.41	101.50	101.30
Cations														
Si	2.60	2.59	2.62	2.63	2.64	2.64	2.64	2.64	2.64	2.62	2.60	2.60	2.61	2.60
Al	1.39	1.39	1.36	1.36	1.34	1.34	1.34	1.35	1.35	1.37	1.38	1.38	1.37	1.39
Ca	0.422	0.426	0.410	0.386	0.377	0.376	0.380	0.374	0.384	0.406	0.421	0.419	0.413	0.416
Fe	0.003	0.003	0.003	0.003	0.008	0.005	0.004	0.004	0.002	0.004	0.002	0.003	0.003	0.003
Ba	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001
Na	0.579	0.597	0.586	0.628	0.627	0.641	0.639	0.636	0.621	0.599	0.596	0.592	0.602	0.582
K	0.006	0.006	0.005	0.004	0.005	0.005	0.004	0.005	0.003	0.005	0.005	0.006	0.005	0.005
Total	4.999	5.014	4.991	5.007	5.002	5.011	5.010	5.006	4.999	5.000	5.008	5.005	5.007	4.997
Endmember														
K feldspar	0.6	0.6	0.5	0.4	0.5	0.5	0.4	0.5	0.3	0.5	0.5	0.5	0.5	0.5
Albite	57.5	57.9	58.5	61.7	62.1	62.7	62.5	62.7	61.5	59.3	58.3	58.3	59.0	58.0
Anorthite	41.9	41.4	41.0	37.9	37.3	36.8	37.1	36.8	38.1	40.2	41.2	41.2	40.4	41.4
Celsiane	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1

	75302A F2 Pl31	75302A F2 Pl32	75302A F4 Pl1	75302A F4 Pl2	75302A F4 Pl3	75302A F4 Pl4	75302A F4 Pl5	75302A F4 Pl6	75302A F4 Pl8	75302A F4 Pl9	75302A F4 Pl10	76017A F4 Ab1	76017A F4 Ab2	76017A F4 Ab3
Analysis														
SiO_2	58.61	59.22	60.28	58.96	59.08	58.94	59.77	60.05	60.01	59.99	59.73	68.48	67.86	68.54
Al_2O_3	26.85	26.25	25.76	26.36	26.60	26.30	26.25	25.97	25.98	26.03	25.98	19.70	19.90	19.79
CaO	9.00	8.56	8.32	8.89	8.94	8.73	8.32	8.36	8.39	8.45	8.28	0.07	0.08	0.09
FeO	0.08	0.12	0.13	0.08	0.06	0.07	0.07	0.09	0.07	0.08	0.09	0.00	0.14	0.00
BaO	0.03	0.01	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	6.74	7.07	6.90	6.82	6.87	6.74	7.08	7.18	7.17	6.99	7.36	12.43	12.18	12.27
K_2O	0.08	0.07	0.07	0.09	0.11	0.10	0.10	0.12	0.10	0.09	0.07	0.06	0.43	0.09
Total	101.39	101.28	101.48	101.20	101.67	100.89	101.59	101.80	101.72	101.64	101.51	100.73	100.59	100.77
Cations														
Si	2.59	2.62	2.65	2.61	2.60	2.61	2.63	2.64	2.64	2.64	2.63	2.978	2.964	2.978
Al	1.40	1.37	1.34	1.37	1.38	1.37	1.36	1.34	1.35	1.35	1.35	1.010	1.024	1.013
Ca	0.426	0.405	0.392	0.421	0.422	0.415	0.392	0.393	0.395	0.398	0.391	0.003	0.004	0.004
Fe	0.003	0.004	0.005	0.003	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.000	0.005	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.578	0.605	0.588	0.585	0.587	0.580	0.604	0.612	0.611	0.596	0.629	1.048	1.032	1.034
K	0.005	0.004	0.004	0.005	0.006	0.005	0.006	0.006	0.006	0.005	0.004	0.003	0.024	0.005
Total	5.001	5.004	4.977	4.999	5.003	4.991	4.995	4.999	4.998	4.988	5.009	5.042	5.052	5.034
Endmember														
K feldspar	0.5	0.4	0.4	0.5	0.6	0.5	0.6	0.6	0.6	0.5	0.4	0.3	2.3	0.5
Albite	57.3	59.7	59.7	57.8	57.8	58.0	60.3	60.4	60.4	59.7	61.4	99.4	97.4	99.2
Anorthite	42.2	40.0	39.8	41.6	41.5	41.5	39.2	38.9	39.0	39.8	38.2	0.3	0.4	0.4
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	76017A F4 Ab4	76017A F4 Ab5	76017A F4 Ab6	76017A F4 Ab7	76017A F4 Ab8	76017A F4 Ab9	76017A F4 Ab10	76017A F4 Ab11	76017A F4 Ab12	76017A F4 Ab13	76017A F4 Ab14	76017A F4 Ab15	76017A F4 Ab16	76017A F4 Ab1
Analysis														
SiO_2	68.61	68.47	68.42	68.66	68.41	68.32	68.39	68.48	68.77	67.68	68.47	68.69	68.06	68.48
Al_2O_3	19.77	19.68	19.62	19.49	19.57	19.64	19.75	19.76	19.55	19.52	19.59	19.76	19.46	19.70
CaO	0.11	0.09	0.07	0.10	0.11	0.09	0.09	0.07	0.11	0.32	0.08	0.06	0.04	0.07
FeO	0.00	0.01	0.03	0.03	0.02	0.00	0.04	0.00	0.06	0.00	0.00	0.00	0.01	0.00
BaO	0.01	0.01	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.02	0.01	0.02	0.01	0.00
Na_2O	12.40	12.58	12.59	12.48	12.59	12.69	12.55	12.44	12.14	12.56	12.55	12.28	12.39	12.43
K_2O	0.07	0.07	0.06	0.06	0.07	0.05	0.07	0.07	0.09	0.09	0.07	0.08	0.05	0.06
Total	100.98	100.91	100.79	100.83	100.78	100.79	100.92	100.86	100.70	100.20	100.76	100.90	100.02	100.73
Cations														
Si	2.977	2.976	2.977	2.984	2.977	2.974	2.973	2.976	2.989	2.967	2.979	2.981	2.982	2.978
Al	1.011	1.008	1.006	0.998	1.004	1.007	1.012	1.012	1.001	1.009	1.004	1.011	1.005	1.010
Ca	0.005	0.004	0.003	0.005	0.005	0.004	0.004	0.003	0.005	0.015	0.003	0.003	0.002	0.003
Fe	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.043	1.060	1.062	1.052	1.062	1.071	1.058	1.048	1.023	1.068	1.058	1.033	1.052	1.048
K	0.004	0.004	0.003	0.003	0.004	0.003	0.004	0.004	0.005	0.005	0.004	0.005	0.003	0.003
Total	5.041	5.052	5.053	5.044	5.054	5.059	5.052	5.044	5.025	5.065	5.050	5.033	5.044	5.042
Endmember														
K feldspar	0.4	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.5	0.5	0.4	0.4	0.3	0.3
Albite	99.1	99.3	99.4	99.2	99.1	99.4	99.2	99.3	99.1	98.1	99.3	99.3	99.5	99.4
Anorthite	0.5	0.4	0.3	0.4	0.5	0.4	0.4	0.3	0.5	1.4	0.3	0.3	0.2	0.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	76017A F4 Ab2	76017A F4 Ab3	76017A F4 Ab4	76017A F4 Ab5	76017A F4 Ab6	76017A F4 Ab7	76017A F4 Ab8	76017A F4 Ab9	76017A F4 Ab10	76017A F4 Ab11	76017A F4 Ab12	76017A F4 Ab13	76017A F4 Ab14	76017A F4 Ab15
Analysis														
SiO_2	67.86	68.54	68.61	68.47	68.42	68.66	68.41	68.32	68.39	68.48	68.77	67.68	68.47	68.69
Al_2O_3	19.90	19.79	19.77	19.68	19.62	19.49	19.57	19.64	19.75	19.76	19.55	19.52	19.59	19.76
CaO	0.08	0.09	0.11	0.09	0.07	0.10	0.11	0.09	0.09	0.07	0.11	0.32	0.08	0.06
FeO	0.14	0.00	0.00	0.01	0.03	0.03	0.02	0.00	0.04	0.00	0.06	0.00	0.00	0.00
BaO	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.02	0.01
Na_2O	12.18	12.27	12.40	12.58	12.59	12.48	12.59	12.69	12.55	12.44	12.14	12.56	12.55	12.28
K_2O	0.43	0.09	0.07	0.07	0.06	0.06	0.07	0.05	0.07	0.07	0.09	0.09	0.07	0.08
Total	100.59	100.77	100.98	100.91	100.79	100.83	100.78	100.79	100.92	100.86	100.70	100.20	100.76	100.90
Cations														
Si	2.964	2.978	2.977	2.976	2.977	2.984	2.977	2.974	2.973	2.976	2.989	2.967	2.979	2.981
Al	1.024	1.013	1.011	1.008	1.006	0.998	1.004	1.007	1.012	1.012	1.001	1.009	1.004	1.011
Ca	0.004	0.004	0.005	0.004	0.003	0.005	0.005	0.004	0.004	0.003	0.005	0.015	0.003	0.003
Fe	0.005	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.002	0.000	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Na	1.032	1.034	1.043	1.060	1.062	1.052	1.062	1.071	1.058	1.048	1.023	1.068	1.058	1.033
K	0.024	0.005	0.004	0.004	0.003	0.003	0.004	0.003	0.004	0.004	0.004	0.005	0.004	0.005
Total	5.052	5.034	5.041	5.052	5.053	5.044	5.054	5.059	5.052	5.044	5.025	5.065	5.050	5.033
Endmember														
K feldspar	2.3	0.5	0.4	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.5	0.5	0.4	0.4
Albite	97.4	99.2	99.1	99.3	99.4	99.2	99.1	99.4	99.2	99.3	99.1	98.1	99.3	99.3
Anorthite	0.4	0.4	0.5	0.4	0.3	0.4	0.5	0.4	0.4	0.3	0.5	1.4	0.3	0.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

	76017A F4 Ab16	76017B F3 Pl1	76017B F3 Pl2	76017B F3 Pl3	76017B F3 Pl4	76017B F3 Pl5	76017B F3 Pl6	76017B F3 Pl7	76017B F3 Pl8	76017B F3 Pl9	76017B F3 Pl1	76017B F3 Pl2	76017B F3 Pl3	76017B F3 Pl4
Analysis														
SiO_2	68.06	68.48	68.00	68.41	68.15	68.05	68.19	68.50	68.42	68.50	68.48	68.00	68.41	68.15
Al_2O_3	19.46	19.59	19.93	19.88	19.84	19.80	19.81	19.71	19.52	19.52	19.59	19.93	19.88	19.84
CaO	0.04	0.15	0.21	0.16	0.21	0.14	0.24	0.29	0.21	0.17	0.15	0.21	0.16	0.21
FeO	0.01	0.07	0.07	0.13	0.09	0.06	0.13	0.04	0.16	0.18	0.07	0.07	0.13	0.09
BaO	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.00	0.00
Na_2O	12.39	12.32	12.39	12.17	12.30	12.25	12.13	12.18	12.24	12.18	12.32	12.39	12.17	12.30
K_2O	0.05	0.06	0.07	0.05	0.07	0.06	0.17	0.06	0.07	0.06	0.06	0.07	0.05	0.07
Total	100.02	100.68	100.67	100.80	100.65	100.35	100.68	100.80	100.62	100.63	100.68	100.67	100.80	100.65
Cations														
Si	2.982	2.981	2.963	2.973	2.969	2.971	2.971	2.978	2.981	2.983	2.981	2.963	2.973	2.969
Al	1.005	1.005	1.024	1.018	1.019	1.019	1.017	1.010	1.002	1.002	1.005	1.024	1.018	1.019
Ca	0.002	0.007	0.010	0.008	0.010	0.007	0.011	0.013	0.010	0.008	0.007	0.010	0.008	0.010
Fe	0.000	0.003	0.003	0.005	0.003	0.002	0.005	0.001	0.006	0.006	0.003	0.003	0.005	0.003
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.052	1.040	1.047	1.025	1.039	1.037	1.024	1.027	1.034	1.029	1.040	1.047	1.025	1.039
K	0.003	0.003	0.004	0.003	0.004	0.003	0.009	0.003	0.004	0.003	0.003	0.004	0.003	0.004
Total	5.044	5.038	5.050	5.032	5.043	5.039	5.038	5.033	5.037	5.032	5.038	5.050	5.032	5.043
Endmember														
K feldspar	0.3	0.3	0.4	0.3	0.4	0.3	0.9	0.3	0.4	0.3	0.3	0.4	0.3	0.4
Albite	99.5	99.0	98.7	99.0	98.7	99.1	98.0	98.4	98.7	98.9	99.0	98.7	99.0	98.7
Anorthite	0.2	0.7	0.9	0.7	0.9	0.6	1.1	1.3	0.9	0.8	0.7	0.9	0.7	0.9
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76017B F3 Pl5	76017B F3 Pl6	76017B F3 Pl7	76017B F3 Pl8	76017B F3 Pl9	76022B F4 Ab	76022B F4 Ab	76022B F4 Ab	76022B F4 Ab	76022B F4 Ab	76022B F3 Ab	76022B F3 Ab	76022B F3 Ab	76022B F2 Ab
Analysis														
SiO_2	68.05	68.19	68.50	68.42	68.50	68.37	68.32	68.78	68.99	68.52	68.82	68.70	68.33	68.57
Al_2O_3	19.80	19.81	19.71	19.52	19.52	19.71	19.83	19.75	19.62	19.89	19.67	19.80	19.95	19.73
CaO	0.14	0.24	0.29	0.21	0.17	0.06	0.06	0.09	0.07	0.12	0.06	0.07	0.07	0.13
FeO	0.06	0.13	0.04	0.16	0.18	0.21	0.23	0.19	0.20	0.21	0.17	0.14	0.13	0.22
BaO	0.00	0.02	0.01	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Na_2O	12.25	12.13	12.18	12.24	12.18	12.45	12.11	12.16	12.21	11.99	12.17	12.18	12.27	12.32
K_2O	0.06	0.17	0.06	0.07	0.06	0.05	0.04	0.05	0.04	0.05	0.03	0.03	0.20	0.05
Total	100.35	100.68	100.80	100.62	100.63	100.87	100.59	101.01	101.13	100.78	100.93	100.93	100.94	101.03
Cations														
Si	2.971	2.971	2.978	2.981	2.983	2.974	2.975	2.982	2.987	2.977	2.985	2.980	2.969	2.976
Al	1.019	1.017	1.010	1.002	1.002	1.010	1.018	1.009	1.001	1.018	1.006	1.012	1.021	1.009
Ca	0.007	0.011	0.013	0.010	0.008	0.003	0.003	0.004	0.003	0.006	0.003	0.003	0.003	0.006
Fe	0.002	0.005	0.001	0.006	0.006	0.007	0.008	0.007	0.007	0.008	0.006	0.005	0.005	0.008
Ba	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.037	1.024	1.027	1.034	1.029	1.050	1.023	1.022	1.025	1.009	1.024	1.025	1.033	1.037
K	0.003	0.009	0.003	0.004	0.003	0.003	0.002	0.002	0.002	0.003	0.002	0.001	0.011	0.003
Total	5.039	5.038	5.033	5.037	5.032	5.048	5.029	5.026	5.026	5.020	5.025	5.027	5.043	5.039
Endmember														
K feldspar	0.3	0.9	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.1	1.0	0.3
Albite	99.1	98.0	98.4	98.7	98.9	99.4	99.5	99.4	99.5	99.2	99.6	99.5	98.7	99.1
Anorthite	0.6	1.1	1.3	0.9	0.8	0.3	0.3	0.4	0.3	0.6	0.3	0.3	0.3	0.6
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76022B F2 Ab	76022B F2 Ab	76022B F2 Ab	76022B F1 Amp	76027B F1 Ab	76027B F1 Ab	76027B F1 Ab	76032C F1 Ab	76032C F1 Ab	76032C F2 Ab	76032C F2 Ab	76032C F2 Ab	76032C F4 Ab	76032C F4 Ab
Analysis														
SiO_2	69.00	68.79	68.58	68.62	68.94	68.71	67.70	67.76	68.29	68.71	68.90	68.55	68.67	68.81
Al_2O_3	19.81	19.80	19.70	19.85	19.42	19.47	19.54	19.86	19.61	19.41	19.47	19.73	19.71	19.54
CaO	0.12	0.09	0.09	0.10	0.00	0.01	0.02	0.02	0.04	0.06	0.04	0.04	0.07	0.04
FeO	0.19	0.18	0.15	0.17	0.04	0.04	0.38	0.35	0.44	0.23	0.13	0.15	0.10	0.07
BaO	0.00	0.00	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.04	0.00	0.03	0.02	0.00
Na_2O	12.27	12.33	12.15	12.21	12.23	12.22	11.99	12.25	12.39	12.28	12.21	12.17	12.14	12.22
K_2O	0.07	0.05	0.06	0.06	0.05	0.05	0.07	0.29	0.06	0.06	0.08	0.07	0.08	0.07
Total	101.46	101.23	100.73	101.03	100.71	100.50	99.72	100.53	100.83	100.79	100.83	100.74	100.79	100.75
Cations														
Si	2.980	2.978	2.981	2.976	2.995	2.991	2.976	2.962	2.974	2.988	2.991	2.981	2.983	2.989
Al	1.008	1.010	1.009	1.015	0.994	0.999	1.013	1.023	1.006	0.995	0.996	1.011	1.009	1.001
Ca	0.006	0.004	0.004	0.005	0.000	0.000	0.001	0.001	0.002	0.003	0.002	0.002	0.003	0.002
Fe	0.007	0.006	0.006	0.006	0.001	0.001	0.014	0.013	0.016	0.008	0.005	0.005	0.004	0.003
Ba	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Na	1.028	1.035	1.024	1.027	1.030	1.032	1.022	1.039	1.046	1.036	1.027	1.025	1.023	1.029
K	0.004	0.003	0.003	0.003	0.003	0.003	0.004	0.016	0.004	0.004	0.004	0.004	0.004	0.004
Total	5.032	5.036	5.028	5.032	5.024	5.026	5.030	5.054	5.048	5.034	5.026	5.029	5.026	5.027
Endmember														
K feldspar	0.4	0.3	0.3	0.3	0.3	0.3	0.4	1.5	0.3	0.3	0.4	0.4	0.4	0.4
Albite	99.1	99.3	99.3	99.2	99.7	99.7	99.5	98.4	99.5	99.3	99.4	99.4	99.2	99.5
Anorthite	0.5	0.4	0.4	0.5	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.2
Celsiane	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0

	76032C F4 Ab	76032C F4 Ab	76032C F4 Ab	76045G F1 Afs1	76045G F1 Afs2	76045G F1 Afs3	76045G F1 Afs4	76045G F1 Afs5	76045G F1 Afs6	76045G F1 Afs7	76045G F1 Afs8	76045G F1 Afs9	76045G F1 Afs10	76045G F1 Afs11
Analysis														
SiO_2	68.31	68.45	68.90	69.13	69.17	69.25	68.46	69.36	68.71	68.99	69.11	69.61	68.95	68.92
Al_2O_3	19.81	19.76	19.46	19.88	19.78	19.75	19.82	19.63	19.73	19.71	19.93	19.90	19.84	19.83
CaO	0.03	0.12	0.06	0.17	0.05	0.08	0.06	0.02	0.07	0.07	0.08	0.06	0.08	0.07
FeO	0.02	0.05	0.06	0.01	0.00	0.02	0.06	0.03	0.01	0.00	0.04	0.00	0.06	0.02
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	12.23	12.18	12.29	12.17	12.18	12.13	12.30	12.18	11.86	12.15	12.20	11.99	12.17	12.13
K_2O	0.06	0.06	0.06	0.05	0.08	0.08	0.09	0.08	0.07	0.07	0.09	0.09	0.09	0.08
Total	100.46	100.62	100.83	101.41	101.25	101.30	100.85	101.32	100.44	100.99	101.43	101.65	101.19	101.04
Cations														
Si	2.977	2.979	2.991	2.983	2.988	2.989	2.975	2.994	2.989	2.988	2.981	2.992	2.982	2.984
Al	1.017	1.013	0.996	1.011	1.007	1.005	1.015	0.998	1.011	1.006	1.013	1.008	1.011	1.012
Ca	0.001	0.005	0.003	0.008	0.002	0.004	0.003	0.001	0.003	0.003	0.004	0.003	0.004	0.003
Fe	0.001	0.002	0.002	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.001	0.000	0.002	0.001
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.033	1.028	1.035	1.018	1.020	1.015	1.037	1.019	1.001	1.020	1.020	0.999	1.020	1.018
K	0.004	0.004	0.003	0.003	0.004	0.004	0.005	0.004	0.004	0.004	0.005	0.005	0.005	0.004
Total	5.033	5.030	5.030	5.022	5.021	5.018	5.038	5.018	5.008	5.021	5.025	5.006	5.025	5.021
Endmember														
K feldspar	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.4
Albite	99.5	99.1	99.4	99.0	99.4	99.2	99.2	99.4	99.3	99.3	99.2	99.2	99.1	99.3
Anorthite	0.1	0.5	0.2	0.8	0.2	0.4	0.3	0.1	0.3	0.3	0.4	0.3	0.4	0.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	76045G F1 Afs12	76045G F1 Afs13	76045G F1 Afs14	76045G F1 Afs15	76045G F1 Afs16	76045G F1 Afs17	76045G F1 Afs18	76045G F1 Afs19	76017B F3 Pl1	76017B F3 Pl2	76017B F3 Pl3	76017B F3 Pl4	76017B F3 Pl5	76017B F3 Pl6
Analysis														
SiO_2	68.69	68.64	69.11	68.93	68.96	68.89	68.53	68.91	68.48	68.00	68.41	68.15	68.05	68.19
Al_2O_3	19.86	19.89	19.95	19.85	19.58	19.80	19.74	19.86	19.59	19.93	19.88	19.84	19.80	19.81
CaO	0.06	0.07	0.09	0.05	0.08	0.12	0.08	0.07	0.15	0.21	0.16	0.21	0.14	0.24
FeO	0.00	0.00	0.00	0.05	0.00	0.02	0.01	0.03	0.07	0.07	0.13	0.09	0.06	0.13
BaO	0.03	0.00	0.05	0.00	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	0.02
Na_2O	12.41	12.09	12.26	11.93	12.04	12.01	12.19	12.33	12.32	12.39	12.17	12.30	12.25	12.13
K_2O	0.08	0.08	0.08	0.06	0.05	0.10	0.08	0.06	0.06	0.07	0.05	0.07	0.06	0.17
Total	101.13	100.78	101.54	100.87	100.71	100.92	100.66	101.28	100.68	100.67	100.80	100.65	100.35	100.68
Cations														
Si	2.976	2.980	2.980	2.986	2.993	2.985	2.981	2.979	2.981	2.963	2.973	2.969	2.971	2.971
Al	1.014	1.018	1.014	1.013	1.002	1.011	1.012	1.012	1.005	1.024	1.018	1.019	1.019	1.017
Ca	0.003	0.003	0.004	0.002	0.004	0.005	0.004	0.003	0.007	0.010	0.008	0.010	0.007	0.011
Fe	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.001	0.003	0.003	0.005	0.003	0.002	0.005
Ba	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.043	1.018	1.025	1.002	1.013	1.009	1.028	1.034	1.040	1.047	1.025	1.039	1.037	1.024
K	0.004	0.005	0.005	0.003	0.002	0.005	0.005	0.003	0.003	0.004	0.003	0.004	0.003	0.009
Total	5.040	5.023	5.028	5.010	5.014	5.016	5.030	5.033	5.038	5.050	5.032	5.043	5.039	5.038
Endmember														
K feldspar	0.4	0.5	0.4	0.3	0.2	0.5	0.4	0.3	0.3	0.4	0.3	0.4	0.3	0.9
Albite	99.3	99.2	99.1	99.4	99.4	99.0	99.1	99.3	99.0	98.7	99.0	98.7	99.1	98.0
Anorthite	0.3	0.3	0.4	0.2	0.4	0.5	0.4	0.3	0.7	0.9	0.7	0.9	0.6	1.1
Celsiane	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	76017B F3 Pl7	76017B F3 Pl8	76017B F3 Pl9	76046A F6 Ab1	76046A F6 Ab2	76046A F6 Ab3	76046A F6 Ab4	76046A F6 Ab5	76046A F6 Ab6	76046A F6 Ab7	76046A F6 Ab8	76053A F3 Ab1	76053A F3 Ab2	76053A F3 Ab3
Analysis														
SiO_2	68.50	68.42	68.50	67.94	67.58	68.28	68.10	67.23	68.17	68.09	68.02	68.46	68.87	68.71
Al_2O_3	19.71	19.52	19.52	20.13	19.74	19.61	19.61	19.70	19.75	20.09	19.83	20.01	19.88	19.95
CaO	0.29	0.21	0.17	0.29	0.33	0.31	0.26	1.04	0.33	0.41	0.28	0.11	0.09	0.06
FeO	0.04	0.16	0.18	0.09	0.03	0.00	0.05	0.03	0.07	0.03	0.04	0.29	0.26	0.20
BaO	0.01	0.00	0.02	0.06	0.05	0.00	0.00	0.00	0.04	0.01	0.02	0.00	0.00	0.01
Na_2O	12.18	12.24	12.18	12.08	12.11	12.23	12.10	12.04	12.36	12.22	12.13	12.15	12.18	12.01
K_2O	0.06	0.07	0.06	0.16	0.07	0.07	0.08	0.04	0.05	0.07	0.12	0.07	0.05	0.03
Total	100.80	100.62	100.63	100.76	99.90	100.49	100.19	100.08	100.77	100.92	100.44	101.10	101.33	100.96
Cations														
Si	2.978	2.981	2.983	2.959	2.967	2.978	2.978	2.953	2.969	2.960	2.969	2.969	2.978	2.978
Al	1.010	1.002	1.002	1.033	1.022	1.008	1.011	1.020	1.014	1.029	1.020	1.023	1.013	1.019
Ca	0.013	0.010	0.008	0.014	0.016	0.014	0.012	0.049	0.015	0.019	0.013	0.005	0.004	0.003
Fe	0.001	0.006	0.006	0.003	0.001	0.000	0.002	0.001	0.003	0.001	0.001	0.010	0.010	0.007
Ba	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Na	1.027	1.034	1.029	1.020	1.030	1.034	1.025	1.026	1.044	1.030	1.026	1.022	1.021	1.009
K	0.003	0.004	0.003	0.009	0.004	0.004	0.005	0.002	0.003	0.004	0.007	0.004	0.002	0.002
Total	5.033	5.037	5.032	5.039	5.040	5.037	5.032	5.051	5.048	5.043	5.037	5.033	5.028	5.018
Endmember														
K feldspar	0.3	0.4	0.3	0.9	0.4	0.4	0.4	0.2	0.3	0.3	0.6	0.4	0.2	0.2
Albite	98.4	98.7	98.9	97.7	98.1	98.3	98.4	95.2	98.2	97.8	98.1	99.1	99.4	99.6
Anorthite	1.3	0.9	0.8	1.3	1.5	1.4	1.2	4.6	1.4	1.8	1.2	0.5	0.4	0.3
Celsiane	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

	76053A F3 Ab4	76053A F2 Ab1	76053A F2 Ab2	76053A F2 Ab3	76053A F2 Ab4	76053A F1 Ab1	76053A F1 Ab2	760057A F1 Ab1	760057A F1 Ab2	760057A F1 Ab3	760057A F1 Ab4	760057A F1 Ab5	760057A F1 Ab6	760057A F2 Ab1
Analysis														
SiO_2	68.62	68.86	68.05	68.61	69.35	68.64	68.77	67.90	68.01	67.75	68.42	67.78	68.29	67.15
Al_2O_3	19.84	19.74	19.86	19.67	19.87	19.87	19.90	19.76	20.03	19.84	19.68	19.85	19.86	19.59
CaO	0.10	0.04	0.02	0.04	0.06	0.06	0.05	0.04	0.07	0.05	0.03	0.05	0.07	0.15
FeO	0.27	0.05	0.13	0.10	0.10	0.25	0.24	0.26	0.23	0.28	0.24	0.19	0.21	0.60
BaO	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.03	0.00	0.03	0.05	0.00
Na_2O	12.11	12.09	12.08	12.02	12.15	12.29	12.37	12.44	11.96	12.20	12.42	12.28	12.30	12.01
K_2O	0.05	0.08	0.04	0.04	0.06	0.06	0.05	0.03	0.05	0.03	0.06	0.04	0.02	0.04
Total	101.01	100.86	100.18	100.48	101.61	101.17	101.36	100.45	100.38	100.17	100.86	100.22	100.80	99.54
Cations														
Si	2.977	2.986	2.974	2.986	2.986	2.974	2.974	2.967	2.968	2.966	2.976	2.966	2.971	2.964
Al	1.014	1.009	1.023	1.009	1.008	1.015	1.014	1.018	1.030	1.024	1.009	1.024	1.018	1.019
Ca	0.005	0.002	0.001	0.002	0.003	0.003	0.002	0.002	0.003	0.002	0.001	0.002	0.003	0.007
Fe	0.010	0.002	0.005	0.003	0.003	0.009	0.009	0.010	0.008	0.010	0.009	0.007	0.008	0.022
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Na	1.018	1.017	1.024	1.014	1.015	1.032	1.037	1.054	1.012	1.036	1.047	1.042	1.037	1.028
K	0.003	0.004	0.002	0.002	0.004	0.003	0.003	0.002	0.003	0.001	0.003	0.002	0.001	0.002
Total	5.027	5.020	5.028	5.017	5.019	5.036	5.039	5.052	5.024	5.040	5.045	5.044	5.039	5.042
Endmember														
K feldspar	0.3	0.4	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.3	0.2	0.1	0.2
Albite	99.3	99.4	99.7	99.6	99.4	99.4	99.5	99.7	99.4	99.6	99.5	99.5	99.5	99.1
Anorthite	0.5	0.2	0.1	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.3	0.7
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0

	760057A F2 Ab2	76111A F22 Pl1	76111A F22 Pl2	76111A F22 Pl3	76111A F22 Pl4	76111A F22 Pl5	76111A F22 Pl6	76111A F22 Pl7	76111A F22 Pl8	76111A F22 Pl9	76111A F22 Pl10	76111A F22 Pl11	76111A F24 Pl1	76111A F24 Pl2
Analysis														
SiO_2	67.64	63.58	65.08	64.50	64.60	64.76	63.84	65.01	65.23	65.39	65.74	65.76	63.39	63.40
Al_2O_3	19.56	22.72	21.91	22.83	21.76	22.68	22.87	22.04	22.24	22.06	21.83	21.56	23.32	23.33
CaO	0.05	4.23	3.16	4.03	3.02	3.61	4.12	3.18	3.16	3.11	3.02	2.62	4.56	4.66
FeO	0.31	0.02	0.00	0.02	0.26	0.04	0.00	0.06	0.06	0.02	0.06	0.09	0.12	0.05
BaO	0.05	0.01	0.00	0.01	0.01	0.00	0.07	0.01	0.07	0.00	0.03	0.00	0.00	0.07
Na_2O	12.20	9.35	10.01	9.42	9.84	9.64	9.46	10.06	9.98	10.02	10.29	10.33	8.98	9.08
K_2O	0.04	0.07	0.04	0.05	0.09	0.06	0.04	0.06	0.05	0.10	0.08	0.07	0.06	0.04
Total	99.85	99.98	100.19	100.86	99.59	100.78	100.41	100.40	100.78	100.70	101.06	100.43	100.43	100.62
Cations														
Si	2.972	2.810	2.861	2.822	2.859	2.833	2.810	2.854	2.852	2.860	2.868	2.881	2.791	2.788
Al	1.013	1.184	1.135	1.177	1.135	1.169	1.186	1.141	1.146	1.137	1.122	1.114	1.210	1.209
Ca	0.002	0.200	0.149	0.189	0.143	0.169	0.194	0.149	0.148	0.146	0.141	0.123	0.215	0.219
Fe	0.012	0.001	0.000	0.001	0.010	0.001	0.000	0.002	0.002	0.001	0.002	0.003	0.004	0.002
Ba	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Na	1.039	0.802	0.853	0.799	0.845	0.817	0.807	0.857	0.846	0.850	0.871	0.877	0.766	0.774
K	0.002	0.004	0.002	0.003	0.005	0.003	0.002	0.003	0.003	0.005	0.005	0.004	0.003	0.002
Total	5.042	5.001	5.000	4.991	4.998	4.993	5.002	5.006	4.999	4.999	5.009	5.003	4.990	4.996
Endmember														
K feldspar	0.2	0.4	0.2	0.3	0.5	0.3	0.2	0.3	0.3	0.5	0.5	0.4	0.4	0.2
Albite	99.5	79.7	84.9	80.6	85.0	82.6	80.3	84.9	84.8	84.9	85.6	87.3	77.8	77.6
Anorthite	0.2	19.9	14.8	19.0	14.4	17.1	19.3	14.8	14.8	14.6	13.9	12.3	21.8	22.0
Celsiane	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1

	76111A F24 Pl3	76114C F2 Pl1	76114C F2 Pl3	76114C F2 Pl5	76114C F2 Pl6	76114C F2 Pl7	76114C F2 Pl9	76114C F2 Pl10	76114C F2 Pl11	76114C F2 Pl12	76114C F2 Pl14	76114C F2 Pl21	76114C F2 Pl23	76114C F2 Pl24
Analysis														
SiO_2	64.07	59.41	59.88	60.85	61.27	60.95	60.27	60.35	60.07	59.76	58.05	59.76	60.40	60.13
Al_2O_3	22.76	25.63	25.45	24.93	24.87	24.92	24.74	25.33	25.80	25.97	24.65	25.87	25.56	24.98
CaO	3.82	7.60	7.52	6.68	6.49	6.46	6.87	7.01	6.95	7.53	7.08	7.75	7.28	6.10
FeO	0.06	0.01	0.02	0.00	0.02	0.05	0.02	0.02	0.15	0.02	0.15	0.01	0.05	0.28
BaO	0.00	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.03	0.01	0.00	0.02	0.03	0.00
Na_2O	9.76	7.90	7.83	8.28	8.48	8.29	8.16	7.88	7.73	7.85	7.38	7.85	8.17	8.09
K_2O	0.07	0.15	0.14	0.16	0.17	0.22	0.17	0.23	0.53	0.14	0.46	0.12	0.12	0.99
Total	100.52	100.71	100.84	100.91	101.33	100.91	100.25	100.83	101.27	101.28	97.76	101.39	101.61	100.57
Cations														
Si	2.816	2.640	2.654	2.689	2.696	2.692	2.683	2.670	2.652	2.638	2.656	2.637	2.657	2.677
Al	1.179	1.342	1.329	1.298	1.290	1.298	1.298	1.321	1.343	1.351	1.330	1.346	1.325	1.311
Ca	0.180	0.362	0.357	0.316	0.306	0.306	0.328	0.333	0.329	0.356	0.347	0.366	0.343	0.291
Fe	0.002	0.000	0.001	0.000	0.001	0.002	0.001	0.001	0.006	0.001	0.006	0.000	0.002	0.011
Ba	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Na	0.831	0.681	0.673	0.709	0.723	0.710	0.704	0.676	0.662	0.672	0.654	0.672	0.697	0.698
K	0.004	0.008	0.008	0.009	0.009	0.013	0.010	0.013	0.030	0.008	0.027	0.006	0.007	0.056
Total	5.012	5.033	5.022	5.021	5.026	5.020	5.024	5.014	5.022	5.026	5.020	5.029	5.032	5.044
Endmember														
K feldspar	0.4	0.8	0.7	0.9	0.9	1.2	0.9	1.3	2.9	0.8	2.6	0.6	0.6	5.4
Albite	81.9	64.8	64.8	68.5	69.6	69.0	67.6	66.1	64.8	64.8	63.7	64.3	66.5	66.8
Anorthite	17.7	34.4	34.4	30.6	29.4	29.7	31.5	32.5	32.2	34.4	33.8	35.1	32.8	27.8
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

	76163B F1 Pl1	76163B F1 Pl2	76163B F1 Pl3	76163B F1 Pl4	76163B F1 Pl5	76163B F1 Pl6	76163B F1 Pl7	76163B F1 Pl8	76163B F1 Pl9	76163B F1 Pl10	76163B F1 Pl11	76163B F1 Pl12	76163B F1 Pl13	76163B F1 Pl14
Analysis														
SiO_2	60.80	61.50	61.50	61.08	60.72	60.72	60.96	60.12	60.61	60.97	60.80	59.40	59.10	61.05
Al_2O_3	25.14	24.78	24.68	24.58	24.51	24.58	24.61	24.53	24.63	24.63	24.48	24.63	25.00	24.37
CaO	6.76	6.44	6.42	6.27	6.22	6.19	6.16	5.82	6.22	6.17	5.94	5.92	6.17	6.06
FeO	0.05	0.05	0.00	0.04	0.05	0.05	0.04	0.08	0.05	0.03	0.02	0.06	0.11	0.03
BaO	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.03	0.01	0.02	0.00
Na_2O	8.38	8.40	8.57	8.54	8.59	8.59	8.70	8.42	8.73	8.73	8.54	8.58	8.30	8.71
K_2O	0.17	0.18	0.20	0.20	0.21	0.19	0.22	0.42	0.25	0.20	0.37	0.37	0.42	0.13
Total	101.30	101.35	101.38	100.71	100.29	100.33	100.71	99.39	100.50	100.73	100.17	98.96	99.11	100.35
Cations														
Si	2.68	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.69	2.70	2.71	2.68	2.67	2.71
Al	1.31	1.28	1.28	1.28	1.28	1.29	1.28	1.30	1.29	1.29	1.28	1.31	1.33	1.28
Ca	0.319	0.303	0.302	0.297	0.296	0.295	0.292	0.280	0.296	0.293	0.283	0.286	0.298	0.288
Fe	0.002	0.002	0.000	0.001	0.002	0.002	0.002	0.003	0.002	0.001	0.001	0.002	0.004	0.001
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.716	0.716	0.731	0.733	0.740	0.740	0.747	0.732	0.752	0.749	0.737	0.750	0.725	0.750
K	0.009	0.010	0.011	0.011	0.012	0.011	0.012	0.024	0.014	0.011	0.021	0.021	0.024	0.007
Total	5.031	5.018	5.027	5.028	5.034	5.034	5.038	5.033	5.046	5.038	5.031	5.050	5.046	5.031
Endmember														
K feldspar	0.9	1.0	1.1	1.1	1.1	1.0	1.2	2.3	1.3	1.1	2.0	2.0	2.3	0.7
Albite	68.5	69.6	69.9	70.4	70.6	70.8	71.0	70.7	70.8	71.1	70.7	70.9	69.2	71.7
Anorthite	30.6	29.5	29.0	28.5	28.3	28.2	27.8	27.0	27.9	27.8	27.2	27.1	28.4	27.6
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76163B F1 Pl15	76163B F1 Pl16	76163B F1 Pl17	76163B F1 Pl18	76163B F3 Pl L1	76163B F3 Pl L2	76163B F3 Pl L3	76163B F3 Pl L4	76163B F3 Pl L5	76163B F3 Pl L6	76163B F3 Pl L7	76163B F3 Pl L8	76163B F3 Pl L9	76163B F3 Pl L10
Analysis														
SiO_2	59.52	60.42	60.17	60.45	58.87	58.60	59.20	59.39	59.66	59.91	59.89	60.42	59.60	60.09
Al_2O_3	24.88	24.94	24.76	24.98	24.69	24.78	25.08	24.93	25.02	24.87	24.63	24.47	24.45	24.70
CaO	6.76	6.73	6.52	6.92	6.84	6.61	6.92	6.88	6.88	6.48	6.41	6.17	6.32	6.29
FeO	0.07	0.01	0.03	0.10	0.00	0.05	0.00	0.01	0.06	0.03	0.00	0.03	0.00	0.00
BaO	0.00	0.01	0.00	0.00	0.01	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.02	0.00
Na_2O	8.21	8.59	8.46	8.42	8.21	8.14	8.09	8.08	8.39	8.42	8.54	8.51	8.62	8.60
K_2O	0.12	0.15	0.16	0.15	0.16	0.21	0.20	0.21	0.21	0.19	0.19	0.24	0.24	0.20
Total	99.56	100.85	100.10	101.03	98.78	98.40	99.52	99.52	100.22	99.90	99.67	99.84	99.24	99.86
Cations														
Si	2.67	2.68	2.68	2.67	2.66	2.66	2.66	2.67	2.66	2.68	2.68	2.70	2.68	2.69
Al	1.32	1.30	1.30	1.30	1.32	1.33	1.33	1.32	1.32	1.31	1.30	1.29	1.30	1.30
Ca	0.325	0.319	0.311	0.328	0.332	0.322	0.333	0.331	0.329	0.310	0.308	0.295	0.305	0.301
Fe	0.003	0.000	0.001	0.004	0.000	0.002	0.000	0.000	0.002	0.001	0.000	0.001	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.714	0.738	0.731	0.722	0.720	0.717	0.704	0.703	0.726	0.730	0.742	0.736	0.752	0.745
K	0.007	0.009	0.009	0.009	0.009	0.012	0.012	0.012	0.012	0.011	0.011	0.014	0.013	0.011
Total	5.033	5.045	5.037	5.040	5.042	5.040	5.036	5.032	5.048	5.039	5.043	5.033	5.051	5.043
Endmember														
K feldspar	0.7	0.8	0.9	0.8	0.9	1.2	1.1	1.1	1.1	1.1	1.0	1.3	1.3	1.1
Albite	68.3	69.2	69.5	68.2	67.9	68.2	67.1	67.2	68.0	69.4	70.0	70.4	70.3	70.5
Anorthite	31.0	30.0	29.6	31.0	31.2	30.6	31.7	31.6	30.9	29.5	29.0	28.3	28.4	28.5
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76163B F3 Pl L11	76163B F3 Pl L12	76163B F3 Pl L17	76163B F3 Pl L18	76163B F3 Pl L19	76163F F1 Pl1	76163F F1 Pl2	76163F F1 Pl3	76163F F1 Pl4	76163F F1 Pl5	76163F F1 Pl6	76163F F1 Pl8	76163F F1 Pl9	76163F F1 Pl10
Analysis														
SiO_2	59.84	64.21	59.63	59.21	59.67	45.56	45.50	45.49	45.22	45.39	45.24	45.92	46.61	45.64
Al_2O_3	24.73	21.92	25.11	24.82	24.96	34.78	34.69	35.02	35.12	34.99	34.93	34.72	33.83	34.79
CaO	6.59	5.79	6.94	6.89	6.49	19.33	19.32	19.52	19.57	19.69	19.63	17.99	16.87	18.83
FeO	0.01	0.06	0.03	0.06	0.09	0.08	0.10	0.07	0.07	0.01	0.09	0.14	0.20	0.17
BaO	0.00	0.01	0.03	0.05	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.06	0.00
Na_2O	8.52	7.51	8.34	8.17	8.43	1.08	0.97	0.99	1.06	0.90	1.00	1.08	1.51	1.26
K_2O	0.21	0.12	0.12	0.14	0.21	0.01	0.15	0.03	0.02	0.01	0.01	0.74	1.02	0.25
Total	99.91	99.61	100.20	99.33	99.87	100.85	100.73	101.12	101.08	101.00	100.91	100.58	100.10	100.95
Cations														
Si	2.68	2.84	2.66	2.66	2.67	2.09	2.09	2.08	2.07	2.08	2.08	2.11	2.15	2.09
Al	1.30	1.14	1.32	1.32	1.32	1.88	1.88	1.89	1.90	1.89	1.89	1.88	1.84	1.88
Ca	0.316	0.274	0.332	0.332	0.311	0.950	0.951	0.957	0.961	0.967	0.965	0.885	0.834	0.925
Fe	0.000	0.002	0.001	0.002	0.004	0.003	0.004	0.003	0.003	0.000	0.004	0.005	0.008	0.006
Ba	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Na	0.739	0.645	0.721	0.713	0.731	0.096	0.087	0.088	0.094	0.080	0.089	0.096	0.135	0.112
K	0.012	0.007	0.007	0.008	0.012	0.001	0.009	0.002	0.001	0.001	0.000	0.043	0.060	0.015
Total	5.047	4.913	5.043	5.037	5.044	5.019	5.018	5.019	5.027	5.016	5.024	5.020	5.028	5.031
Endmember														
K feldspar	1.1	0.7	0.7	0.8	1.1	0.1	0.9	0.1	0.1	0.1	0.0	4.2	5.8	1.4
Albite	69.3	69.6	68.0	67.6	69.3	9.1	8.3	8.4	8.9	7.6	8.4	9.4	13.1	10.6
Anorthite	29.6	29.6	31.3	31.5	29.5	90.8	90.9	91.5	91.0	92.3	91.5	86.4	80.9	88.0
Celsiane	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

	76163F F3 Pl2	76163F F3 Pl3	76163F F3 Pl4	76163F F3 Pl5	76163F F7 Pl2	76163F F7 Pl3	76163F F7 Pl4	76163F F7 Pl5	76163F F7 Pl6	76163F F7 Pl7	76163F F8 Pl2	76163F F8 Pl4	76163F F8 Pl6	76172C F3 Pl L2
Analysis														
SiO_2	46.34	45.36	46.68	45.98	45.69	46.45	45.58	46.09	45.74	45.05	45.29	45.74	45.13	59.23
Al_2O_3	33.92	33.75	34.31	34.27	35.15	34.46	35.09	34.82	34.83	35.21	35.24	34.99	34.94	26.24
CaO	18.55	19.17	11.31	15.45	19.29	16.63	19.53	18.80	19.47	19.60	19.47	19.37	19.51	8.38
FeO	0.01	0.08	0.62	0.47	0.11	0.25	0.07	0.28	0.16	0.12	0.15	0.14	0.16	0.14
BaO	0.03	0.08	0.06	0.04	0.00	0.00	0.01	0.03	0.00	0.01	0.02	0.00	0.03	0.00
Na_2O	1.22	0.96	0.80	1.07	1.13	1.32	1.07	1.25	1.05	0.97	1.09	1.19	1.09	7.45
K_2O	0.44	0.40	4.41	2.17	0.04	1.28	0.02	0.16	0.03	0.02	0.03	0.01	0.01	0.05
Total	100.50	99.81	98.18	99.44	101.42	100.39	101.36	101.43	101.28	100.98	101.28	101.43	100.88	101.49
Cations														
Si	2.13	2.11	2.19	2.14	2.08	2.14	2.08	2.10	2.09	2.07	2.07	2.09	2.07	2.62
Al	1.84	1.85	1.90	1.88	1.89	1.87	1.89	1.87	1.88	1.90	1.90	1.88	1.89	1.37
Ca	0.914	0.954	0.569	0.771	0.943	0.819	0.955	0.919	0.953	0.963	0.954	0.947	0.960	0.396
Fe	0.000	0.003	0.024	0.018	0.004	0.010	0.003	0.011	0.006	0.004	0.006	0.005	0.006	0.005
Ba	0.001	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Na	0.108	0.087	0.073	0.097	0.100	0.118	0.095	0.110	0.093	0.086	0.097	0.106	0.097	0.638
K	0.026	0.024	0.264	0.129	0.002	0.075	0.001	0.009	0.002	0.001	0.002	0.000	0.000	0.003
Total	5.018	5.024	5.025	5.033	5.022	5.026	5.023	5.022	5.019	5.025	5.028	5.026	5.030	5.023
Endmember														
K feldspar	2.5	2.2	29.1	12.9	0.2	7.4	0.1	0.9	0.1	0.1	0.1	0.0	0.0	0.3
Albite	10.3	8.1	8.0	9.7	9.6	11.7	9.0	10.6	8.8	8.2	9.2	10.0	9.2	61.5
Anorthite	87.1	89.5	62.8	77.3	90.2	80.9	90.9	88.4	91.0	91.7	90.6	89.9	90.7	38.2
Celsiane	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

	76172C F3 Pl L3	76172C F3 Pl L4	76172C F3 Pl L5	76172C F3 Pl L6	76172C F3 Pl L7	76172C F3 Pl L8	76172C F3 Pl L9	76172C F3 Pl L10	76172C F3 Pl L11	76172C F3 Pl L12	76172C F3 Pl L13	76172C F3 Pl L14	76172C F3 Pl L15	76172C F3 Pl L16
Analysis														
SiO_2	60.15	60.50	61.17	61.65	61.55	61.12	61.34	60.85	60.52	59.98	60.56	60.55	59.81	59.47
Al_2O_3	25.95	24.94	24.97	24.73	24.73	24.87	25.11	25.19	25.26	25.59	25.56	25.31	25.69	25.57
CaO	7.68	6.79	6.73	6.45	6.40	6.63	6.83	6.92	7.16	7.35	7.45	6.54	7.49	7.67
FeO	0.05	0.05	0.05	0.06	0.03	0.03	0.02	0.02	0.03	0.07	0.00	0.03	0.03	0.08
BaO	0.02	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.02
Na_2O	7.97	8.14	8.32	8.70	8.75	8.56	8.35	8.38	8.15	7.94	7.96	8.16	7.88	7.83
K_2O	0.12	0.06	0.10	0.08	0.08	0.09	0.09	0.09	0.10	0.09	0.11	0.46	0.11	0.09
Total	101.94	100.47	101.36	101.66	101.55	101.31	101.74	101.44	101.23	101.05	101.65	101.05	101.00	100.74
Cations														
Si	2.64	2.68	2.69	2.70	2.70	2.69	2.69	2.68	2.67	2.65	2.66	2.68	2.65	2.64
Al	1.34	1.30	1.29	1.28	1.28	1.29	1.30	1.31	1.31	1.33	1.32	1.32	1.34	1.34
Ca	0.361	0.323	0.317	0.303	0.301	0.313	0.321	0.326	0.339	0.348	0.351	0.310	0.355	0.365
Fe	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.003	0.000	0.001	0.001	0.003
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.678	0.700	0.709	0.740	0.745	0.730	0.709	0.715	0.697	0.681	0.678	0.699	0.676	0.674
K	0.007	0.003	0.006	0.004	0.004	0.005	0.005	0.005	0.006	0.005	0.006	0.026	0.006	0.005
Total	5.031	5.016	5.019	5.030	5.033	5.031	5.021	5.030	5.025	5.024	5.020	5.028	5.024	5.028
Endmember														
K feldspar	0.6	0.3	0.5	0.4	0.4	0.5	0.5	0.5	0.6	0.5	0.6	2.5	0.6	0.5
Albite	64.8	68.2	68.7	70.7	70.9	69.7	68.5	68.3	66.9	65.8	65.5	67.5	65.2	64.5
Anorthite	34.5	31.4	30.7	28.9	28.6	29.8	31.0	31.2	32.5	33.7	33.9	29.9	34.2	35.0
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76172C F3 Pl L17	76172C F4 Pl L1	76172C F4 Pl L2	76172C F4 Pl L3	76172C F4 Pl L4	76172C F4 Pl L5	76172C F4 Pl L6	76172C F4 Pl L7	76172C F4 Pl L8	76172C F4 Pl L9	76172C F4 Pl L10	76172C F4 Pl L11	76172C F4 Pl L12	76172C F4 Pl L13
Analysis														
SiO_2	58.22	58.60	59.56	59.68	59.74	59.76	59.94	59.21	59.80	60.04	59.89	59.77	60.14	59.70
Al_2O_3	25.54	26.00	26.01	26.13	25.87	25.93	25.92	25.91	25.74	25.79	25.54	25.58	25.75	25.74
CaO	7.80	8.15	8.22	8.03	7.89	7.78	7.74	7.91	7.90	7.85	7.80	7.71	7.69	7.76
FeO	0.83	0.44	0.14	0.06	0.02	0.05	0.03	0.03	0.06	0.04	0.01	0.03	0.06	0.00
BaO	0.01	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.00	0.02	0.01	0.01	0.00	0.00
Na_2O	7.38	7.50	7.61	7.80	7.68	7.87	7.81	7.70	7.76	7.80	7.89	7.96	7.84	7.83
K_2O	0.51	0.22	0.06	0.06	0.07	0.10	0.09	0.10	0.11	0.10	0.09	0.12	0.11	0.11
Total	100.29	100.93	101.62	101.76	101.31	101.49	101.54	100.86	101.37	101.63	101.22	101.18	101.59	101.14
Cations														
Si	2.61	2.61	2.63	2.63	2.64	2.64	2.64	2.63	2.64	2.64	2.65	2.64	2.65	2.64
Al	1.35	1.36	1.35	1.36	1.35	1.35	1.35	1.36	1.34	1.34	1.33	1.33	1.34	1.34
Ca	0.375	0.389	0.388	0.378	0.373	0.368	0.365	0.376	0.374	0.370	0.369	0.365	0.362	0.368
Fe	0.031	0.017	0.005	0.002	0.001	0.002	0.001	0.001	0.002	0.001	0.000	0.001	0.002	0.000
Ba	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.643	0.648	0.650	0.665	0.658	0.673	0.667	0.663	0.664	0.666	0.676	0.683	0.669	0.671
K	0.029	0.012	0.003	0.003	0.004	0.005	0.005	0.006	0.006	0.005	0.005	0.006	0.006	0.006
Total	5.045	5.039	5.025	5.031	5.020	5.031	5.023	5.029	5.026	5.024	5.028	5.034	5.023	5.027
Endmember														
K feldspar	2.8	1.2	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.6	0.6
Albite	61.4	61.8	62.4	63.5	63.5	64.3	64.3	63.4	63.6	63.9	64.4	64.7	64.5	64.2
Anorthite	35.8	37.1	37.2	36.1	36.1	35.1	35.2	36.0	35.8	35.5	35.2	34.7	34.9	35.2
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	76172C F4 Pl L14	76172C F4 Pl L15	76172C F4 Pl L16	76172C F4 Pl L17	76172C F4 Pl L18	76172C F4 Pl L19	76172C F4 Pl L20	76172C F4 Pl L21	76172C F4 Pl L22	76172C F4 Pl L23	76172C F4 Pl L24	76172C F4 Pl L25	76175A F1ms Pl L1	76175A F1ms Pl L2
Analysis														
SiO_2	60.05	60.14	60.15	60.13	60.14	60.15	59.81	60.43	59.93	59.81	59.97	60.04	58.40	61.66
Al_2O_3	25.48	25.20	25.51	25.30	25.85	25.33	25.53	25.46	25.72	25.75	25.76	25.65	23.53	24.25
CaO	7.70	7.37	7.65	7.67	7.76	7.63	7.58	7.75	7.79	7.80	7.83	7.72	5.47	6.05
FeO	0.00	0.03	0.00	0.08	0.05	0.03	0.06	0.00	0.07	0.02	0.02	0.13	2.71	0.19
BaO	0.03	0.00	0.03	0.02	0.00	0.01	0.02	0.02	0.01	0.00	0.02	0.01	0.00	0.03
Na_2O	7.84	7.87	7.90	7.72	7.94	7.86	8.00	7.88	7.86	7.98	7.86	7.89	8.05	8.80
K_2O	0.12	0.12	0.10	0.12	0.11	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.60	0.24
Total	101.22	100.73	101.34	101.03	101.86	101.12	101.10	101.64	101.47	101.46	101.55	101.53	98.76	101.22
Cations														
Si	2.65	2.67	2.65	2.66	2.64	2.66	2.65	2.66	2.64	2.64	2.64	2.65	2.674	2.717
Al	1.33	1.32	1.33	1.32	1.34	1.32	1.33	1.32	1.34	1.34	1.34	1.33	1.270	1.260
Ca	0.365	0.350	0.362	0.363	0.365	0.362	0.359	0.365	0.368	0.369	0.370	0.364	0.268	0.286
Fe	0.000	0.001	0.000	0.003	0.002	0.001	0.002	0.000	0.003	0.001	0.001	0.005	0.104	0.007
Ba	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Na	0.672	0.676	0.676	0.662	0.677	0.674	0.687	0.672	0.672	0.683	0.671	0.675	0.714	0.752
K	0.007	0.007	0.006	0.007	0.006	0.005	0.006	0.006	0.006	0.005	0.005	0.005	0.035	0.013
Total	5.023	5.017	5.024	5.015	5.030	5.021	5.033	5.021	5.027	5.036	5.027	5.028	5.066	5.036
Endmember														
K feldspar	0.6	0.6	0.5	0.7	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	3.4	1.3
Albite	64.4	65.5	64.8	64.1	64.6	64.7	65.3	64.4	64.3	64.6	64.1	64.6	70.2	71.5
Anorthite	34.9	33.9	34.7	35.2	34.8	34.7	34.2	35.0	35.2	34.9	35.3	34.9	26.4	27.1
Celsiane	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

	76175A F1ms Pl L3	76175A F1ms Pl L4	76175A F1ms Pl L5	76175A F1ms Pl L6	76175A F1ms Pl L7	76175A F1ms Pl L8	76175A F1ms Pl L9	76175A F1ms Pl L10	76175A F1ms Pl L11	76175A F1ms Pl L12	76175A F1ms Pl L13	76175A F1ms Pl L14	76175A F1ms Pl L15	76175A F1ms Pl L16
Analysis														
SiO_2	61.41	62.18	62.14	61.69	61.79	62.10	62.38	62.00	61.82	62.10	61.95	61.58	61.90	61.92
Al_2O_3	24.31	24.35	24.32	24.22	24.42	24.29	24.30	24.30	24.19	24.31	24.27	24.22	24.36	24.31
CaO	5.97	5.95	5.96	5.98	5.99	5.92	5.92	5.87	5.91	5.90	5.87	5.96	6.05	5.99
FeO	0.09	0.03	0.07	0.09	0.02	0.05	0.05	0.08	0.04	0.00	0.00	0.05	0.02	0.00
BaO	0.02	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.01
Na_2O	8.63	8.46	8.67	8.60	8.66	8.84	8.82	8.89	8.85	8.81	8.79	8.63	8.84	8.76
K_2O	0.27	0.26	0.29	0.31	0.32	0.25	0.26	0.33	0.30	0.30	0.30	0.28	0.34	0.32
Total	100.70	101.22	101.45	100.92	101.20	101.45	101.73	101.46	101.11	101.43	101.17	100.74	101.53	101.30
Cations														
Si	2.717	2.731	2.727	2.723	2.719	2.726	2.730	2.723	2.724	2.726	2.726	2.722	2.718	2.723
Al	1.268	1.260	1.258	1.260	1.267	1.257	1.253	1.258	1.256	1.258	1.259	1.262	1.261	1.260
Ca	0.283	0.280	0.280	0.283	0.283	0.279	0.278	0.276	0.279	0.278	0.277	0.282	0.285	0.282
Fe	0.003	0.001	0.002	0.003	0.001	0.002	0.002	0.003	0.001	0.000	0.000	0.002	0.001	0.000
Ba	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Na	0.741	0.720	0.737	0.736	0.739	0.753	0.748	0.757	0.757	0.750	0.750	0.740	0.753	0.747
K	0.015	0.014	0.016	0.017	0.018	0.014	0.015	0.018	0.017	0.017	0.017	0.016	0.019	0.018
Total	5.027	5.006	5.021	5.023	5.026	5.029	5.025	5.036	5.034	5.028	5.028	5.025	5.037	5.030
Endmember														
K feldspar	1.4	1.4	1.5	1.7	1.7	1.4	1.4	1.8	1.6	1.6	1.6	1.5	1.8	1.7
Albite	71.3	71.0	71.3	71.0	71.1	72.0	71.9	72.0	71.9	71.8	71.9	71.2	71.2	71.3
Anorthite	27.3	27.6	27.1	27.3	27.2	26.7	26.7	26.3	26.5	26.6	26.5	27.2	26.9	26.9
Celsiane	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

	76175A F1ms Pl L17	76175A F1ms Pl L18	76175A F1ms Pl L19	76175A F1ms Pl L20	76175A F3Iq Pl L1	76175A F3Iq Pl L2	76175A F3Iq Pl L3	76175A F3Iq Pl L4	76175A F3Iq Pl L5	76175A F3Iq Pl L6	76175A F3Iq Pl L7	76175A F3Iq Pl L8	76175A F3Iq Pl L9	76175A F3Iq Pl L10
Analysis														
SiO_2	62.02	62.13	61.84	61.64	61.42	61.50	61.22	61.75	61.44	61.22	61.81	61.61	61.82	61.80
Al_2O_3	24.35	24.46	24.49	24.46	24.28	24.28	24.31	24.44	24.19	24.30	24.45	24.34	24.48	24.36
CaO	6.07	6.02	5.98	6.05	5.94	5.90	6.01	5.89	5.94	5.96	5.96	5.84	5.90	5.80
FeO	0.03	0.02	0.05	0.00	0.03	0.03	0.02	0.00	0.06	0.03	0.05	0.03	0.01	0.00
BaO	0.01	0.01	0.00	0.02	0.03	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.00	0.00
Na_2O	8.71	8.65	8.66	8.53	8.53	8.71	8.59	8.63	8.57	8.63	8.51	8.66	8.54	8.83
K_2O	0.35	0.32	0.26	0.27	0.30	0.25	0.28	0.27	0.30	0.29	0.30	0.27	0.28	0.25
Total	101.54	101.61	101.29	100.97	100.53	100.68	100.43	100.97	100.51	100.45	101.08	100.78	101.02	101.05
Cations														
Si	2.722	2.723	2.718	2.717	2.720	2.720	2.715	2.721	2.722	2.715	2.721	2.721	2.722	2.722
Al	1.260	1.263	1.269	1.271	1.267	1.266	1.271	1.269	1.263	1.270	1.269	1.267	1.270	1.265
Ca	0.286	0.282	0.282	0.286	0.282	0.280	0.285	0.278	0.282	0.283	0.281	0.276	0.278	0.274
Fe	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.000	0.002	0.001	0.002	0.001	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Na	0.741	0.735	0.738	0.729	0.732	0.747	0.739	0.737	0.736	0.742	0.726	0.741	0.729	0.754
K	0.020	0.018	0.015	0.015	0.017	0.014	0.016	0.015	0.017	0.016	0.017	0.015	0.016	0.014
Total	5.029	5.022	5.023	5.019	5.020	5.027	5.026	5.020	5.023	5.029	5.016	5.023	5.015	5.030
Endmember														
K feldspar	1.9	1.7	1.4	1.5	1.6	1.3	1.5	1.5	1.6	1.6	1.6	1.5	1.5	1.4
Albite	70.8	71.0	71.3	70.8	71.0	71.8	71.0	71.6	71.1	71.2	70.9	71.7	71.3	72.4
Anorthite	27.3	27.3	27.2	27.7	27.3	26.9	27.4	27.0	27.2	27.2	27.5	26.8	27.2	26.3
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

	76175A F3Iq Pl L11	76175A F3Iq Pl L12	76175A F3Iq Pl L13	76175A F3Iq Pl L14	76175A F3Iq Pl L15	76175A F3Iq Pl L16	76175A F3Iq Pl L17	76175A F3Iq Pl L18	76175A F3Iq Pl L19	76175A F3Iq Pl L20	760210A F3 Ab1	760210A F3 Ab2	760210A F3 Ab3	760210A F3 Ab4
Analysis														
SiO_2	61.43	61.40	61.42	61.45	61.59	61.92	61.96	61.80	61.35	62.20	68.54	68.28	68.86	68.96
Al_2O_3	24.41	24.11	24.23	24.05	24.41	24.41	24.32	24.19	24.40	24.42	19.98	19.84	19.77	19.90
CaO	5.77	5.77	5.76	5.84	5.85	5.86	5.87	5.88	5.76	5.65	0.07	0.04	0.03	0.05
FeO	0.00	0.02	0.06	0.06	0.00	0.05	0.03	0.00	0.00	0.01	0.08	0.08	0.06	0.06
BaO	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Na_2O	8.97	8.63	8.23	8.17	8.73	8.79	8.64	8.77	8.82	8.94	12.19	12.24	12.16	12.13
K_2O	0.15	0.16	0.25	0.25	0.24	0.23	0.24	0.23	0.24	0.29	0.06	0.06	0.06	0.05
Total	100.73	100.10	99.94	99.82	100.83	101.26	101.06	100.86	100.57	101.50	100.92	100.54	100.94	101.14
Cations														
Si	2.715	2.727	2.729	2.734	2.719	2.722	2.727	2.727	2.716	2.727	2.974	2.974	2.985	2.982
Al	1.272	1.262	1.269	1.261	1.270	1.265	1.262	1.258	1.273	1.262	1.021	1.019	1.010	1.014
Ca	0.273	0.275	0.274	0.279	0.277	0.276	0.277	0.278	0.273	0.265	0.003	0.002	0.001	0.002
Fe	0.000	0.001	0.002	0.002	0.000	0.002	0.001	0.000	0.000	0.000	0.003	0.003	0.002	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.769	0.743	0.709	0.705	0.747	0.749	0.737	0.751	0.757	0.760	1.026	1.034	1.022	1.017
K	0.008	0.009	0.014	0.014	0.013	0.013	0.013	0.013	0.013	0.016	0.003	0.003	0.003	0.003
Total	5.038	5.017	4.998	4.995	5.026	5.027	5.017	5.026	5.032	5.030	5.030	5.035	5.023	5.021
Endmember														
K feldspar	0.8	0.9	1.4	1.4	1.3	1.2	1.3	1.2	1.3	1.6	0.3	0.3	0.3	0.2
Albite	73.2	72.4	71.1	70.7	72.0	72.2	71.8	72.1	72.5	73.0	99.3	99.5	99.6	99.5
Anorthite	26.0	26.7	27.5	27.9	26.7	26.6	26.9	26.7	26.2	25.5	0.3	0.2	0.1	0.2
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	760210A F3 Ab5	760210A F3 Ab6	760210A F3 Ab7	760210A F2 Ab1	760210A F2 Ab2	760210A F1 Ab1	760210A F1 Ab2	760210A F1 Ab3	760210A F1 Ab4	760210A F1 Ab1	760210A F1 Ab2	760210A F1 Ab3	760210A F1 Ab4	760210A F1 Ab5
Analysis														
SiO_2	68.60	68.93	69.31	68.98	68.25	68.17	69.03	68.45	68.73	68.67	68.83	68.27	68.14	68.89
Al_2O_3	19.92	19.91	19.96	19.91	19.88	19.74	19.90	19.83	19.81	19.81	19.91	19.86	19.81	19.66
CaO	0.06	0.03	0.05	0.04	0.04	0.14	0.08	0.07	0.04	0.08	0.04	0.05	0.06	0.03
FeO	0.07	0.11	0.17	0.03	0.08	0.10	0.10	0.05	0.09	0.56	0.30	0.25	0.22	0.27
BaO	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.05	0.01	0.00	0.04	0.02	0.07
Na_2O	12.41	12.19	12.20	12.44	12.34	12.27	12.13	12.27	12.15	12.16	12.38	12.42	12.22	12.17
K_2O	0.05	0.05	0.02	0.04	0.02	0.06	0.06	0.04	0.06	0.31	0.05	0.04	0.05	0.05
Total	101.10	101.22	101.72	101.44	100.60	100.48	101.30	100.74	100.92	101.58	101.51	100.92	100.50	101.14
Cations														
Si	2.973	2.980	2.982	2.978	2.972	2.973	2.982	2.976	2.981	2.971	2.973	2.969	2.972	2.985
Al	1.017	1.015	1.012	1.013	1.020	1.015	1.013	1.016	1.013	1.010	1.014	1.018	1.018	1.004
Ca	0.003	0.001	0.002	0.002	0.002	0.006	0.004	0.003	0.002	0.003	0.002	0.002	0.003	0.001
Fe	0.003	0.004	0.006	0.001	0.003	0.004	0.004	0.002	0.003	0.020	0.011	0.009	0.008	0.010
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001
Na	1.043	1.022	1.018	1.041	1.041	1.038	1.016	1.034	1.022	1.020	1.037	1.047	1.033	1.022
K	0.003	0.002	0.001	0.002	0.001	0.003	0.003	0.002	0.003	0.017	0.003	0.002	0.003	0.003
Total	5.041	5.025	5.021	5.037	5.039	5.040	5.021	5.034	5.025	5.042	5.040	5.047	5.037	5.026
Endmember														
K feldspar	0.3	0.2	0.1	0.2	0.1	0.3	0.3	0.2	0.3	1.6	0.3	0.2	0.3	0.3
Albite	99.5	99.6	99.6	99.6	99.7	99.1	99.3	99.4	99.4	98.0	99.6	99.5	99.4	99.5
Anorthite	0.3	0.1	0.2	0.2	0.2	0.6	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.1
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1

	760210A F2 Ab1	760210A F2 Ab2	760210A F2 Ab3	760210A F4tg Ab1	760210A F4tg Ab2	760210A F4tg Ab3	760210A F4tg Ab4	760210A F4tg Ab5	811042C F4 Ab	811042C F4 Ab	811042C F4 Ab	811042C F4 Ab	811042C F4 Ab	811042C F2 Ab
Analysis														
SiO_2	69.11	68.60	67.37	68.48	68.80	68.69	68.86	68.99	68.85	68.85	68.82	68.24	68.83	65.94
Al_2O_3	19.74	19.90	20.02	19.99	19.78	20.17	19.93	19.89	19.61	19.52	19.48	19.82	19.49	18.93
CaO	0.05	0.02	0.01	0.04	0.03	0.03	0.06	0.07	0.05	0.07	0.09	0.07	0.12	0.14
FeO	0.19	0.17	0.47	0.05	0.08	0.06	0.10	0.12	0.22	0.24	0.34	0.31	0.40	0.29
BaO	0.01	0.03	0.03	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.00
Na_2O	12.09	12.24	11.89	12.43	12.34	12.10	12.11	12.32	12.15	12.11	12.24	12.16	12.25	11.69
K_2O	0.03	0.05	0.49	0.05	0.03	0.04	0.02	0.06	0.05	0.04	0.08	0.05	0.05	0.05
Total	101.21	101.01	100.28	101.04	101.09	101.10	101.08	101.44	100.92	100.83	101.06	100.65	101.15	97.03
Cations														
Si	2.988	2.975	2.955	2.970	2.981	2.972	2.980	2.979	2.99	2.99	2.99	2.97	2.98	2.98
Al	1.006	1.017	1.035	1.022	1.010	1.029	1.017	1.012	1.00	1.00	1.00	1.02	1.00	1.01
Ca	0.002	0.001	0.000	0.002	0.001	0.001	0.003	0.003	0.002	0.003	0.004	0.003	0.006	0.007
Fe	0.007	0.006	0.017	0.002	0.003	0.002	0.004	0.004	0.008	0.009	0.012	0.011	0.014	0.011
Ba	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.013	1.029	1.011	1.045	1.037	1.015	1.017	1.031	1.022	1.020	1.029	1.027	1.030	1.024
K	0.002	0.003	0.027	0.003	0.002	0.002	0.001	0.003	0.003	0.002	0.004	0.003	0.003	0.003
Total	5.017	5.032	5.047	5.043	5.033	5.022	5.020	5.033	5.024	5.022	5.033	5.034	5.034	5.031
Endmember														
K feldspar	0.2	0.3	2.6	0.3	0.1	0.2	0.1	0.3	0.3	0.2	0.4	0.3	0.3	0.3
Albite	99.6	99.6	97.3	99.6	99.7	99.6	99.6	99.4	99.5	99.5	99.2	99.4	99.2	99.1
Anorthite	0.2	0.1	0.0	0.2	0.1	0.1	0.3	0.3	0.2	0.3	0.4	0.3	0.6	0.6
Celsiane	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	811042C F2 Ab	811042C F2 Ab	811042C F2 Ab	811042C F2 Ab	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl
Analysis														
SiO_2	67.78	67.33	68.41	68.00	58.77	58.04	58.98	58.96	58.68	58.96	58.99	59.30	58.84	58.89
Al_2O_3	19.25	19.09	19.67	19.55	26.34	26.09	26.06	25.93	25.82	25.95	25.86	25.71	25.67	25.98
CaO	0.13	0.34	0.08	0.06	7.96	7.95	7.87	7.76	7.76	7.50	7.32	7.36	7.38	7.52
FeO	0.32	0.36	0.20	0.25	0.07	0.08	0.09	0.02	0.11	0.06	0.00	0.07	0.04	0.07
BaO	0.00	0.00	0.06	0.00	0.00	0.06	0.04	0.03	0.01	0.00	0.03	0.00	0.00	0.00
Na_2O	12.14	12.15	12.12	12.11	7.42	7.57	7.65	7.61	7.64	7.36	7.67	7.80	7.57	7.82
K_2O	0.08	0.06	0.06	0.11	0.23	0.25	0.27	0.29	0.33	0.35	0.36	0.36	0.34	0.32
Total	99.71	99.33	100.60	100.08	100.78	100.04	100.96	100.59	100.33	100.16	100.22	100.59	99.84	100.59
Cations														
Si	2.98	2.98	2.98	2.98	2.611	2.604	2.619	2.625	2.622	2.632	2.633	2.639	2.636	2.623
Al	1.00	1.00	1.01	1.01	1.380	1.380	1.364	1.361	1.360	1.365	1.360	1.348	1.355	1.364
Ca	0.006	0.016	0.004	0.003	0.379	0.382	0.374	0.370	0.371	0.358	0.350	0.351	0.354	0.359
Fe	0.012	0.013	0.007	0.009	0.003	0.003	0.003	0.001	0.004	0.002	0.000	0.002	0.002	0.003
Ba	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	1.036	1.042	1.023	1.028	0.639	0.658	0.659	0.657	0.662	0.637	0.664	0.673	0.658	0.675
K	0.005	0.004	0.004	0.006	0.013	0.014	0.015	0.016	0.019	0.020	0.020	0.020	0.019	0.018
Total	5.039	5.047	5.029	5.034	5.025	5.042	5.036	5.031	5.038	5.014	5.029	5.034	5.024	5.041
Endmember														
K feldspar	0.4	0.3	0.3	0.6	1.3	1.3	1.5	1.6	1.8	2.0	2.0	1.9	1.9	1.7
Albite	99.0	98.2	99.2	99.2	62.0	62.4	62.8	62.9	62.9	62.7	64.2	64.5	63.8	64.2
Anorthite	0.6	1.5	0.3	0.3	36.7	36.2	35.7	35.5	35.3	35.3	33.8	33.6	34.3	34.1
Celsiane	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811079A F2 Pl	811084A F3 Pl1	811084A F3 Pl2	811084A F3 Pl3	811084A F3 Pl4	811084A F3 Pl5
Analysis														
SiO_2	59.24	58.91	58.95	58.60	58.59	58.78	58.45	58.85	58.98	66.80	66.17	66.69	66.46	66.48
Al_2O_3	26.12	25.66	25.72	25.76	26.11	26.17	26.07	26.20	26.15	21.09	21.41	21.15	21.36	21.28
CaO	7.47	7.44	7.62	7.59	7.73	7.76	7.80	7.63	7.82	2.63	1.94	1.99	2.02	2.01
FeO	0.06	0.05	0.05	0.04	0.04	0.07	0.08	0.05	0.04	0.29	0.08	0.09	0.10	0.07
BaO	0.03	0.01	0.05	0.01	0.07	0.04	0.00	0.01	0.04	0.00	0.03	0.00	0.01	0.00
Na_2O	7.62	7.69	7.61	7.58	7.75	7.60	7.57	7.54	7.65	10.89	11.37	11.32	10.99	11.16
K_2O	0.23	0.29	0.27	0.26	0.23	0.22	0.24	0.26	0.24	0.04	0.06	0.05	0.06	0.04
Total	100.75	100.06	100.26	99.84	100.52	100.62	100.20	100.54	100.92	101.73	101.05	101.28	101.00	101.03
Cations														
Si	2.629	2.635	2.633	2.628	2.614	2.617	2.614	2.620	2.619	2.896	2.886	2.900	2.896	2.896
Al	1.366	1.353	1.354	1.361	1.373	1.373	1.374	1.374	1.368	1.078	1.100	1.084	1.097	1.092
Ca	0.355	0.356	0.365	0.365	0.369	0.370	0.374	0.364	0.372	0.122	0.091	0.093	0.094	0.094
Fe	0.002	0.002	0.002	0.001	0.002	0.003	0.003	0.002	0.002	0.010	0.003	0.003	0.003	0.002
Ba	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Na	0.655	0.667	0.659	0.659	0.670	0.656	0.656	0.651	0.659	0.915	0.962	0.954	0.928	0.943
K	0.013	0.017	0.015	0.015	0.013	0.013	0.014	0.015	0.013	0.002	0.003	0.003	0.003	0.002
Total	5.022	5.030	5.027	5.029	5.042	5.031	5.034	5.026	5.033	5.024	5.046	5.037	5.022	5.030
Endmember														
K feldspar	1.3	1.6	1.5	1.4	1.2	1.2	1.3	1.4	1.3	0.2	0.3	0.3	0.3	0.2
Albite	64.0	64.1	63.4	63.4	63.6	63.1	62.9	63.2	63.0	88.0	91.1	90.9	90.5	90.7
Anorthite	34.7	34.3	35.1	35.1	35.0	35.6	35.8	35.3	35.6	11.7	8.6	8.8	9.2	9.0
Celsiane	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

	811084A F3 Pl6	811084A F3 Pl7	811084A F3 Pl8	811084A F3 Pl9	811084A F3 Pl10	811081A7 F6 Pl1	811081A7 F6 Pl2	811081A7 F6 Pl3	811081A7 F6 Pl4	811081A7 F6 Pl5	811081A7 F6 Pl6	811081A7 F6 Pl7	811084A F3 Pl1	811084A F3 Pl2
Analysis														
SiO_2	66.21	67.03	67.03	67.43	65.80	66.32	65.73	65.88	66.08	65.87	65.27	65.88	66.80	66.17
Al_2O_3	21.46	21.36	21.27	21.43	21.47	22.18	21.99	22.25	22.54	21.74	22.06	22.08	21.09	21.41
CaO	2.05	2.04	2.03	1.97	2.03	2.86	2.89	2.63	3.04	2.38	2.43	2.78	2.63	1.94
FeO	0.00	0.03	0.06	0.09	0.16	0.11	0.16	0.15	0.09	0.04	0.12	0.18	0.29	0.08
BaO	0.03	0.06	0.02	0.01	0.01	0.01	0.04	0.00	0.02	0.03	0.06	0.00	0.00	0.03
Na_2O	11.04	11.02	10.93	11.15	11.04	10.39	10.52	10.82	10.58	11.05	10.94	10.83	10.89	11.37
K_2O	0.04	0.04	0.06	0.06	0.04	0.06	0.08	0.04	0.05	0.06	0.07	0.06	0.04	0.06
Total	100.81	101.58	101.40	102.15	100.55	101.93	101.42	101.77	102.39	101.16	100.94	101.80	101.73	101.05
Cations														
Si	2.890	2.902	2.906	2.903	2.883	2.866	2.860	2.856	2.848	2.871	2.855	2.857	2.90	2.89
Al	1.104	1.090	1.087	1.088	1.109	1.130	1.128	1.137	1.145	1.117	1.137	1.129	1.08	1.10
Ca	0.096	0.095	0.094	0.091	0.095	0.132	0.135	0.122	0.140	0.111	0.114	0.129	0.122	0.091
Fe	0.000	0.001	0.002	0.003	0.006	0.004	0.006	0.006	0.003	0.001	0.004	0.006	0.010	0.003
Ba	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Na	0.934	0.925	0.919	0.931	0.938	0.870	0.888	0.909	0.884	0.934	0.927	0.911	0.915	0.962
K	0.002	0.002	0.004	0.003	0.002	0.003	0.004	0.002	0.003	0.003	0.004	0.003	0.002	0.003
Total	5.026	5.016	5.012	5.020	5.033	5.006	5.022	5.032	5.023	5.039	5.042	5.036	5.024	5.046
Endmember														
K feldspar	0.2	0.2	0.3	0.3	0.2	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.2	0.3
Albite	90.5	90.4	90.3	90.8	90.6	86.5	86.4	88.0	86.1	89.1	88.7	87.3	88.0	91.1
Anorthite	9.3	9.3	9.3	8.9	9.2	13.2	13.1	11.8	13.6	10.6	10.9	12.4	11.7	8.6
Celsiane	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0

	811084A F3 Pl3	811084A F3 Pl4	811084A F3 Pl5	811084A F3 Pl6	811084A F3 Pl7	811084A F3 Pl8	811084A F3 Pl9	811084A F3 Pl10	811102F F2 Kfs1	811102F F2 Kfs2	811102F F2 Kfs3	811102F F2 Kfs4	811102F F2 Kfs5	811102F F2 Kfs6
Analysis														
SiO_2	66.69	66.46	66.48	66.21	67.03	67.03	67.43	65.80	63.83	63.76	63.87	64.13	64.33	64.04
Al_2O_3	21.15	21.36	21.28	21.46	21.36	21.27	21.43	21.47	18.91	18.88	18.93	18.79	18.82	18.91
CaO	1.99	2.02	2.01	2.05	2.04	2.03	1.97	2.03	0.00	0.01	0.02	0.04	0.04	0.04
FeO	0.09	0.10	0.07	0.00	0.03	0.06	0.09	0.16	0.04	0.00	0.04	0.02	0.04	0.01
BaO	0.00	0.01	0.00	0.03	0.06	0.02	0.01	0.01	0.93	1.16	0.93	0.82	0.76	0.77
Na_2O	11.32	10.99	11.16	11.04	11.02	10.93	11.15	11.04	0.94	0.85	0.85	1.06	1.16	1.09
K_2O	0.05	0.06	0.04	0.04	0.04	0.06	0.06	0.04	15.32	15.20	15.23	15.02	15.01	15.11
Total	101.28	101.00	101.03	100.81	101.58	101.40	102.15	100.55	99.97	99.86	99.87	99.86	100.14	99.97
Cations														
Si	2.90	2.90	2.90	2.89	2.90	2.91	2.90	2.88	2.966	2.968	2.968	2.975	2.975	2.969
Al	1.08	1.10	1.09	1.10	1.09	1.09	1.09	1.11	1.036	1.036	1.037	1.028	1.026	1.033
Ca	0.093	0.094	0.094	0.096	0.095	0.094	0.091	0.095	0.000	0.000	0.001	0.002	0.002	0.002
Fe	0.003	0.003	0.002	0.000	0.001	0.002	0.003	0.006	0.002	0.000	0.002	0.001	0.001	0.001
Ba	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.017	0.021	0.017	0.015	0.014	0.014
Na	0.954	0.928	0.943	0.934	0.925	0.919	0.931	0.938	0.085	0.077	0.077	0.095	0.104	0.098
K	0.003	0.003	0.002	0.002	0.002	0.004	0.003	0.002	0.908	0.902	0.903	0.889	0.885	0.894
Total	5.037	5.022	5.030	5.026	5.016	5.012	5.020	5.033	5.013	5.004	5.004	5.003	5.007	5.010
Endmember														
K feldspar	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	89.9	90.2	90.5	88.8	88.1	88.7
Albite	90.9	90.5	90.7	90.5	90.4	90.3	90.8	90.6	8.4	7.7	7.7	9.5	10.3	9.7
Anorthite	8.8	9.2	9.0	9.3	9.3	9.3	8.9	9.2	0.0	0.0	0.1	0.2	0.2	0.2
Celsiane	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.7	2.1	1.7	1.5	1.4	1.4

	811102F F2 Kfs7	811102F F3 Pl1	811102F F3 Pl2	811102F F3 Pl3	811102F F3 Pl4	811102F F3 Pl5	811102F F3 Pl6	811102F F2 Pl1	811102F F2 Pl2	811102F F2 Pl3	811102F F2 Pl4	811102F F2 Pl5	811102F F2 Pl6	D7625A F5 Plma-trix1
Analysis														
SiO_2	64.07	61.73	61.78	62.24	61.74	62.21	61.66	62.71	61.96	62.18	62.22	62.21	62.15	45.80
Al_2O_3	18.99	24.20	24.33	24.21	23.69	23.81	24.19	24.01	24.24	24.28	24.29	24.28	24.28	34.46
CaO	0.04	5.14	5.28	5.25	5.13	5.19	5.10	5.00	5.16	5.29	5.21	5.24	5.14	17.38
FeO	0.00	0.26	0.09	0.08	0.05	0.03	0.07	0.01	0.05	0.00	0.02	0.00	0.04	0.01
BaO	0.70	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.04	0.05	0.01	0.00
Na_2O	1.01	9.27	9.18	9.19	9.26	9.18	9.15	9.26	9.35	9.07	9.31	9.27	9.22	1.46
K_2O	15.11	0.24	0.26	0.29	0.26	0.24	0.26	0.18	0.22	0.27	0.27	0.28	0.21	0.00
Total	99.92	100.84	100.93	101.26	100.12	100.67	100.44	101.16	100.97	101.09	101.37	101.32	101.04	99.12
Cations														
Si	2.969	2.727	2.725	2.735	2.744	2.747	2.731	2.752	2.730	2.734	2.732	2.732	2.734	2.123
Al	1.037	1.260	1.265	1.254	1.241	1.239	1.262	1.242	1.259	1.258	1.257	1.257	1.259	1.883
Ca	0.002	0.243	0.250	0.247	0.244	0.246	0.242	0.235	0.243	0.249	0.245	0.246	0.242	0.863
Fe	0.000	0.009	0.003	0.003	0.002	0.001	0.002	0.000	0.002	0.000	0.001	0.000	0.001	0.000
Ba	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Na	0.091	0.794	0.785	0.783	0.798	0.786	0.786	0.788	0.799	0.774	0.792	0.789	0.786	0.132
K	0.893	0.013	0.015	0.016	0.015	0.014	0.015	0.010	0.012	0.015	0.015	0.016	0.012	0.000
Total	5.004	5.047	5.042	5.038	5.042	5.033	5.038	5.026	5.046	5.031	5.043	5.041	5.035	5.001
Endmember														
K feldspar	89.4	1.3	1.4	1.6	1.4	1.3	1.4	1.0	1.2	1.5	1.5	1.5	1.1	0.0
Albite	9.1	75.6	74.8	74.8	75.5	75.2	75.3	76.3	75.7	74.5	75.2	75.0	75.6	13.2
Anorthite	0.2	23.1	23.8	23.6	23.1	23.5	23.2	22.8	23.1	24.0	23.3	23.4	23.3	86.8
Celsiane	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0

	D7625A F5 Plma-trix2	D7625A F5 Plma-trix3	D7625A F5 Plma-trix4	D7625A F2 Plzon1	D7625A F2 Plzon2	D7625A F2 Plzon3	D7625A F2 Plzon4	D7625A F2 Plzon5	D7625A F5 Plx1	D7625A F5 Plx2	D7625A F5 Plx3	D7625A F5 Plx4	D7625A F5 Plx5	D7626A F4 Pl2
Analysis														
SiO_2	45.39	44.81	44.59	49.44	57.61	57.97	49.02	48.01	44.22	45.43	45.29	44.36	45.26	63.48
Al_2O_3	35.05	35.09	35.30	31.91	26.89	26.83	32.25	33.39	35.51	35.12	34.69	35.54	34.76	22.04
CaO	17.91	18.21	17.73	14.60	8.18	8.16	14.91	15.72	18.45	17.95	17.37	18.40	17.51	2.47
FeO	0.05	0.04	0.07	0.16	0.39	0.25	0.18	0.12	0.09	0.01	0.47	0.04	0.01	0.02
BaO	0.02	0.00	0.00	0.02	0.02	0.00	0.02	0.05	0.00	0.05	0.00	0.02	0.03	0.05
Na_2O	1.19	1.02	1.02	3.38	7.27	7.14	3.18	2.51	0.79	1.01	1.44	0.78	1.54	10.28
K_2O	0.00	0.00	0.16	0.02	0.03	0.06	0.03	0.02	0.13	0.08	0.08	0.01	0.01	0.07
Total	99.61	99.17	98.86	99.53	100.39	100.41	99.59	99.82	99.19	99.64	99.34	99.14	99.12	98.40
Cations														
Si	2.097	2.082	2.077	2.268	2.576	2.587	2.250	2.201	2.058	2.098	2.102	2.063	2.102	2.843
Al	1.909	1.921	1.938	1.726	1.417	1.411	1.744	1.805	1.948	1.911	1.898	1.947	1.903	1.164
Ca	0.887	0.907	0.885	0.718	0.392	0.390	0.733	0.772	0.920	0.888	0.864	0.917	0.871	0.118
Fe	0.002	0.002	0.003	0.006	0.015	0.009	0.007	0.005	0.003	0.001	0.018	0.002	0.001	0.001
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001
Na	0.107	0.092	0.092	0.300	0.631	0.617	0.283	0.223	0.072	0.091	0.129	0.070	0.139	0.892
K	0.000	0.000	0.009	0.001	0.001	0.003	0.002	0.001	0.008	0.004	0.005	0.000	0.000	0.004
Total	5.002	5.003	5.004	5.020	5.032	5.018	5.020	5.008	5.008	4.994	5.016	4.999	5.016	5.023
Endmember														
K feldspar	0.0	0.0	0.9	0.1	0.1	0.3	0.2	0.1	0.8	0.4	0.5	0.0	0.0	0.4
Albite	10.8	9.2	9.3	29.5	61.6	61.1	27.8	22.4	7.2	9.2	12.9	7.1	13.7	87.9
Anorthite	89.2	90.8	89.8	70.4	38.3	38.6	72.0	77.4	92.1	90.3	86.6	92.8	86.2	11.7
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1

	D7626A F4 Pl4	D7626A F4 Pl5	D7626A F4 Pl6	D7626A F2 Pl2	D7626A F2 Pl3	D7626A F2 Pl4	D7626A F2 Pl6	D7626A F2 Pl8	D7626A F2 Pl10	D7626A F2 Pl12	Q09B F5 Plg 3 1	Q09B F5 Plg 3 2	Q09B F5 Plg 3 3	Q09B F5 Plg 3 4
Analysis														
SiO_2	63.63	63.58	61.55	60.81	61.53	61.70	60.96	61.54	61.79	61.24	65.72	65.12	65.06	64.80
Al_2O_3	22.53	22.39	23.89	23.97	23.17	23.84	23.97	23.98	23.81	23.93	22.60	22.38	22.20	22.15
CaO	3.00	3.18	4.78	5.17	4.15	4.87	5.11	4.96	4.63	5.06	2.76	2.74	2.73	2.80
FeO	0.02	0.12	0.10	0.08	0.04	0.11	0.01	0.11	0.08	0.14	0.12	0.11	0.09	0.06
BaO	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.00	0.03
Na_2O	10.56	10.04	9.34	8.95	9.55	9.32	8.96	9.06	9.09	9.06	10.48	10.13	10.35	10.19
K_2O	0.02	0.04	0.06	0.05	0.04	0.00	0.03	0.03	0.04	0.05	0.03	0.05	0.05	0.03
Total	99.77	99.38	99.72	99.03	98.48	99.84	99.04	99.72	99.44	99.49	101.71	100.54	100.48	100.06
Cations														
Si	2.819	2.825	2.741	2.728	2.769	2.744	2.732	2.740	2.753	2.735	2.848	2.852	2.853	2.853
Al	1.176	1.173	1.254	1.267	1.229	1.249	1.266	1.258	1.250	1.260	1.154	1.155	1.147	1.149
Ca	0.142	0.151	0.228	0.249	0.200	0.232	0.245	0.236	0.221	0.242	0.128	0.129	0.128	0.132
Fe	0.001	0.005	0.004	0.003	0.002	0.004	0.000	0.004	0.003	0.005	0.004	0.004	0.003	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.907	0.865	0.806	0.779	0.833	0.804	0.779	0.782	0.785	0.784	0.880	0.860	0.880	0.870
K	0.001	0.002	0.003	0.003	0.002	0.000	0.001	0.002	0.002	0.003	0.001	0.003	0.003	0.002
Total	5.047	5.022	5.036	5.029	5.035	5.033	5.025	5.023	5.015	5.029	5.016	5.003	5.015	5.008
Endmember														
K feldspar	0.1	0.2	0.3	0.3	0.2	0.0	0.1	0.2	0.2	0.3	0.1	0.3	0.3	0.2
Albite	86.3	84.9	77.7	75.6	80.4	77.6	75.9	76.6	77.9	76.2	87.1	86.7	87.0	86.6
Anorthite	13.5	14.9	22.0	24.2	19.3	22.4	23.9	23.1	21.9	23.5	12.7	13.0	12.7	13.1
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

	Q09B F5 Plg 3 6	Q09B F5 Plg 3 7	Q09B F5 Plg 3 9	Q09B F5 Plg 3 10	Q09B F9 Plg 4 1	Q09B F9 Plg 4 2	Q09B F9 Plg 4 3	Q09B F9 Plg 4 5	Q09B F9 Plg 4 6	Q09B F9 Plg 4 7	Q09B F9 Plg 4 8	Q09B F9 Plg 4 9	Q33B F3 KFsp 1 1	Q33B F3 KFsp 1 2
Analysis														
SiO_2	64.96	64.59	64.87	65.16	64.97	66.13	65.53	64.00	64.75	64.84	65.46	64.64	64.85	64.76
Al_2O_3	22.04	22.32	22.20	22.25	21.95	22.20	22.07	21.12	22.45	22.07	22.13	21.99	19.50	19.22
CaO	2.96	2.62	2.76	2.81	2.60	2.53	2.88	3.39	2.98	2.64	2.81	2.75	0.04	0.04
FeO	0.07	0.09	0.10	0.16	0.07	0.01	0.08	0.20	0.07	0.04	0.03	0.05	0.00	0.00
BaO	0.00	0.05	0.00	0.00	0.02	0.01	0.04	0.00	0.01	0.08	0.06	0.01	1.08	1.02
Na_2O	10.06	10.14	9.98	9.84	10.69	10.32	10.30	9.33	10.03	9.81	10.62	9.93	1.29	1.71
K_2O	0.06	0.04	0.04	0.06	0.04	0.04	0.05	0.02	0.04	0.03	0.06	0.05	13.90	13.26
Total	100.15	99.85	99.94	100.28	100.34	101.25	100.97	98.06	100.32	99.52	101.17	99.42	100.67	100.00
Cations														
Si	2.857	2.849	2.856	2.858	2.856	2.871	2.860	2.873	2.843	2.864	2.855	2.860	2.969	2.977
Al	1.142	1.160	1.152	1.150	1.137	1.136	1.136	1.118	1.162	1.149	1.137	1.147	1.052	1.041
Ca	0.140	0.124	0.130	0.132	0.123	0.118	0.135	0.163	0.140	0.125	0.131	0.130	0.002	0.002
Fe	0.002	0.003	0.004	0.006	0.003	0.000	0.003	0.008	0.003	0.002	0.001	0.002	0.000	0.000
Ba	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.019	0.018
Na	0.858	0.867	0.852	0.837	0.911	0.869	0.872	0.812	0.854	0.840	0.898	0.852	0.115	0.153
K	0.003	0.003	0.002	0.003	0.002	0.002	0.003	0.001	0.002	0.002	0.003	0.003	0.812	0.778
Total	5.002	5.006	4.995	4.987	5.032	4.996	5.009	4.975	5.004	4.983	5.027	4.994	4.969	4.968
Endmember														
K feldspar	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.1	0.2	0.2	0.3	0.3	85.6	81.8
Albite	85.7	87.2	86.5	86.1	88.0	87.9	86.3	83.2	85.7	86.8	86.9	86.4	12.1	16.1
Anorthite	14.0	12.4	13.2	13.6	11.8	11.9	13.3	16.7	14.1	12.9	12.7	13.2	0.2	0.2
Celsiane	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	2.0	1.9

	Q33B F3 KFsp 1 3	Q33B F3 KFsp 1 4	Q33B F3 KFsp 1 5	Q33B F3 KFsp 1 6	Q33B F3 KFsp 1 7	Q33B F3 KFsp 1 8	Q33B F3 KFsp 1 9	Q33B F3 KFsp 1 10	Q33B F3 KFsp 1 11	Q33B F3 KFsp 1 12	Q33B F3 KFsp 1 13	Q33B F4 Plag 1 1	Q33B F4 Plag 1 2	Q33B F4 Plag 1 3
Analysis														
SiO_2	65.44	65.29	64.94	65.28	64.92	65.23	64.62	64.63	64.87	65.64	64.55	64.08	64.45	63.18
Al_2O_3	19.35	19.51	19.62	19.72	19.80	19.75	19.71	19.38	19.49	19.88	19.38	19.02	19.46	19.15
CaO	0.03	0.07	0.12	0.08	0.09	0.11	0.09	0.06	0.02	0.00	0.00	0.07	0.04	0.26
FeO	0.03	0.07	0.05	0.05	0.01	0.03	0.00	0.00	0.03	0.02	0.04	0.00	0.00	0.00
BaO	1.06	1.03	1.01	1.14	1.17	1.11	1.11	1.27	1.20	1.30	1.56	1.46	1.30	1.36
Na_2O	1.80	1.89	1.79	1.86	1.73	2.06	1.68	1.43	1.48	1.56	1.27	1.15	1.13	1.02
K_2O	12.91	13.04	12.84	12.91	13.21	12.77	13.34	13.56	13.51	13.21	13.48	14.09	13.49	13.54
Total	100.62	100.90	100.37	101.05	100.92	101.05	100.55	100.33	100.61	101.61	100.29	99.88	99.87	98.51
Cations														
Si	2.982	2.972	2.968	2.967	2.959	2.964	2.958	2.969	2.969	2.969	2.970	2.971	2.971	2.962
Al	1.039	1.047	1.057	1.056	1.063	1.057	1.063	1.050	1.051	1.059	1.051	1.040	1.057	1.058
Ca	0.002	0.004	0.006	0.004	0.005	0.005	0.004	0.003	0.001	0.000	0.000	0.003	0.002	0.013
Fe	0.001	0.002	0.002	0.002	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.000
Ba	0.019	0.018	0.018	0.020	0.021	0.020	0.020	0.023	0.022	0.023	0.028	0.026	0.023	0.025
Na	0.159	0.166	0.159	0.164	0.153	0.181	0.149	0.127	0.132	0.137	0.114	0.103	0.101	0.093
K	0.751	0.757	0.748	0.749	0.768	0.740	0.779	0.795	0.789	0.762	0.791	0.834	0.793	0.810
Total	4.953	4.967	4.958	4.962	4.969	4.968	4.974	4.967	4.965	4.951	4.957	4.977	4.947	4.960
Endmember														
K feldspar	80.7	80.1	80.4	79.9	81.2	78.2	81.8	83.9	83.7	82.7	84.8	86.2	86.3	86.1
Albite	17.1	17.6	17.1	17.5	16.1	19.1	15.6	13.4	14.0	14.8	12.2	10.7	10.9	9.9
Anorthite	0.2	0.4	0.6	0.4	0.5	0.6	0.4	0.3	0.1	0.0	0.0	0.3	0.2	1.4
Celsiane	2.0	1.9	1.9	2.2	2.2	2.1	2.1	2.4	2.3	2.5	3.0	2.7	2.6	2.7

	Q33B F4 Plag 1 4	Q33B F4 Plag 1 5	Q33B F4 Plag 1 6	Q33B F4 Plag 1 7	Q33B F4 Plag 1 8	Q33B F4 Plag 1 9	Q33B F4 Plag 1 10	Q33B F4 Plag 1 11	Q33B F4 Plag 1 12	Q33B F4 Plag 1 13	Q33B F4 Plag 1 14	Q33B F4 Plag 1 15	Q33B F4 Plag 1 16	Q33B F4 Plag 1 17
Analysis														
SiO_2	65.01	65.06	64.99	65.06	64.39	64.14	64.63	64.75	65.26	64.75	65.22	64.88	65.46	64.63
Al_2O_3	19.62	19.25	19.50	19.37	19.27	19.24	19.47	19.38	19.64	19.52	19.41	19.32	19.43	19.63
CaO	0.07	0.05	0.02	0.04	0.05	0.02	0.07	0.06	0.07	0.07	0.02	0.03	0.04	0.04
FeO	0.01	0.06	0.00	0.02	0.01	0.05	0.05	0.00	0.00	0.00	0.02	0.02	0.00	0.00
BaO	1.42	1.39	1.33	1.35	1.33	1.19	1.28	1.23	1.27	1.25	1.25	1.27	1.23	1.28
Na_2O	1.50	1.38	1.44	1.37	1.58	1.33	1.51	1.41	1.27	1.55	1.05	1.09	1.16	1.10
K_2O	13.95	13.80	13.66	13.65	13.64	13.74	13.43	13.79	13.72	13.63	14.02	13.57	13.69	13.87
Total	101.58	100.99	100.94	100.87	100.26	99.71	100.43	100.62	101.23	100.76	101.00	100.17	101.00	100.56
Cations														
Si	2.960	2.975	2.969	2.974	2.966	2.968	2.966	2.969	2.970	2.964	2.977	2.980	2.982	2.964
Al	1.053	1.038	1.050	1.043	1.046	1.049	1.053	1.047	1.053	1.053	1.044	1.046	1.043	1.061
Ca	0.003	0.002	0.001	0.002	0.002	0.001	0.003	0.003	0.003	0.003	0.001	0.002	0.002	0.002
Fe	0.000	0.002	0.000	0.001	0.000	0.002	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Ba	0.025	0.025	0.024	0.024	0.024	0.022	0.023	0.022	0.023	0.022	0.022	0.023	0.022	0.023
Na	0.133	0.122	0.128	0.122	0.141	0.119	0.135	0.126	0.112	0.138	0.093	0.097	0.102	0.098
K	0.811	0.805	0.796	0.796	0.801	0.811	0.786	0.807	0.797	0.796	0.817	0.795	0.795	0.812
Total	4.985	4.970	4.968	4.963	4.982	4.972	4.968	4.974	4.958	4.976	4.955	4.943	4.946	4.960
Endmember														
K feldspar	83.4	84.3	83.9	84.3	82.7	85.1	83.0	84.3	85.2	83.0	87.5	86.8	86.3	86.8
Albite	13.6	12.8	13.5	12.9	14.6	12.5	14.2	13.1	12.0	14.4	10.0	10.6	11.1	10.5
Anorthite	0.4	0.2	0.1	0.2	0.3	0.1	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2
Celsiane	2.6	2.6	2.5	2.6	2.5	2.3	2.4	2.3	2.4	2.3	2.4	2.5	2.4	2.5

	Q33B F4 Plag 1 18	Q33B F4 Plag 1 19	Q33B F4 Plag 1 20	Q33B F10? Plag 2 1	Q33B F10? Plag 2 2	Q33B F10? Plag 2 3	Q33B F10? Plag 2 4	Q33B F10? Plag 2 5	Q33B F10? Plag 2 6	Q33B F10? Plag 2 7	Q33B F10? Plag 2 8	Q33B F10? Plag 2 9	Q33B F10? Plag 2 10	Q33B F10? Plag 2 11
Analysis														
SiO_2	65.09	65.42	65.11	59.58	59.21	59.91	59.67	59.44	59.33	59.34	59.39	59.51	58.98	60.27
Al_2O_3	19.59	19.42	19.76	27.46	27.34	27.03	27.07	26.99	26.81	26.80	27.28	26.97	27.11	26.55
CaO	0.06	0.01	0.01	7.58	7.80	7.54	7.54	7.66	7.51	7.69	7.90	7.02	7.83	7.14
FeO	0.00	0.00	0.10	0.28	0.07	0.07	0.03	0.00	0.05	0.06	0.10	0.08	0.12	0.16
BaO	1.43	1.39	1.70	0.08	0.06	0.00	0.00	0.04	0.09	0.00	0.05	0.01	0.00	0.00
Na_2O	1.53	1.20	0.88	7.23	7.57	6.95	7.07	7.05	7.56	7.24	6.96	6.80	7.24	7.56
K_2O	13.40	13.80	14.08	0.08	0.11	0.18	0.17	0.17	0.17	0.15	0.18	0.24	0.12	0.15
Total	101.10	101.23	101.63	102.28	102.15	101.68	101.54	101.35	101.52	101.28	101.86	100.63	101.40	101.83
Cations														
Si	2.968	2.979	2.964	2.602	2.594	2.625	2.619	2.616	2.613	2.616	2.604	2.630	2.600	2.639
Al	1.052	1.042	1.060	1.414	1.412	1.396	1.401	1.400	1.392	1.392	1.410	1.405	1.409	1.370
Ca	0.003	0.000	0.000	0.355	0.366	0.354	0.355	0.361	0.354	0.363	0.371	0.332	0.370	0.335
Fe	0.000	0.000	0.004	0.010	0.002	0.003	0.001	0.000	0.002	0.002	0.004	0.003	0.004	0.006
Ba	0.026	0.025	0.030	0.001	0.001	0.000	0.000	0.001	0.002	0.000	0.001	0.000	0.000	0.000
Na	0.135	0.106	0.078	0.612	0.643	0.590	0.602	0.601	0.645	0.619	0.592	0.583	0.618	0.642
K	0.779	0.802	0.818	0.004	0.006	0.010	0.009	0.010	0.010	0.009	0.010	0.013	0.007	0.008
Total	4.963	4.954	4.954	4.999	5.024	4.977	4.986	4.989	5.018	5.001	4.991	4.966	5.008	5.001
Endmember														
K feldspar	82.6	86.0	88.3	0.5	0.6	1.1	1.0	1.0	1.0	0.9	1.0	1.4	0.7	0.9
Albite	14.3	11.4	8.4	62.9	63.3	61.8	62.3	61.8	63.8	62.5	60.8	62.8	62.1	65.1
Anorthite	0.3	0.0	0.0	36.5	36.0	37.1	36.7	37.1	35.0	36.7	38.1	35.8	37.2	34.0
Celsiane	2.7	2.7	3.3	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0.0

	Q33B F10? Plag2 12	Q61E F3 Fsp1 1	Q61E F3 Fsp1 2	Q61E F3 Fsp1 3	Q61E F3 Fsp1 4	Q61E F3 Fsp1 5	Q61E F3 Fsp1 6	Q61E F3 Fsp1 7	Q61E F3 Fsp1 8	Q61E F3 Fsp1 9	Q61E F3 Fsp1 10	Q61E F4 Fsp2 1	Q61E F4 Fsp2 2	Q61E F4 Fsp2 3
Analysis														
SiO_2	59.90	64.85	64.23	64.19	64.21	64.28	64.30	65.19	65.19	59.27	64.00	65.46	65.40	65.62
Al_2O_3	26.11	22.68	22.90	22.64	22.63	22.78	22.57	22.72	22.68	21.10	22.53	23.36	23.20	23.69
CaO	7.29	3.34	3.48	3.47	3.38	3.47	3.50	3.47	3.45	2.99	3.21	3.22	3.05	3.32
FeO	0.20	0.01	0.04	0.04	0.00	0.03	0.05	0.02	0.00	0.32	0.01	0.05	0.00	0.01
BaO	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.03	0.08	0.06	0.03	0.00	0.00
Na_2O	7.52	10.05	9.90	10.09	10.19	9.70	10.18	9.75	11.07	9.12	9.59	10.52	10.19	10.17
K_2O	0.11	0.03	0.07	0.08	0.07	0.06	0.05	0.07	0.05	0.15	0.08	0.02	0.03	0.05
Total	101.15	100.96	100.63	100.50	100.49	100.34	100.66	101.30	102.47	93.03	99.49	102.66	101.87	102.86
Cations														
Si	2.643	2.833	2.818	2.822	2.823	2.825	2.823	2.837	2.820	2.818	2.834	2.817	2.828	2.814
Al	1.358	1.168	1.184	1.173	1.172	1.180	1.168	1.165	1.156	1.182	1.176	1.184	1.183	1.197
Ca	0.345	0.156	0.164	0.163	0.159	0.163	0.165	0.162	0.160	0.153	0.152	0.149	0.141	0.152
Fe	0.007	0.000	0.001	0.002	0.000	0.001	0.002	0.001	0.000	0.013	0.001	0.002	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000
Na	0.643	0.851	0.842	0.860	0.869	0.826	0.866	0.823	0.928	0.841	0.823	0.877	0.855	0.845
K	0.006	0.002	0.004	0.004	0.004	0.003	0.003	0.004	0.003	0.009	0.004	0.001	0.001	0.003
Total	5.002	5.010	5.013	5.024	5.027	5.000	5.027	4.993	5.067	5.016	4.992	5.030	5.008	5.012
Endmember														
K feldspar	0.6	0.2	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.9	0.5	0.1	0.1	0.3
Albite	64.7	84.4	83.4	83.7	84.2	83.2	83.8	83.1	85.1	83.8	83.9	85.4	85.7	84.5
Anorthite	34.7	15.5	16.2	15.9	15.4	16.4	15.9	16.4	14.6	15.2	15.5	14.5	14.2	15.2
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0

	Q61E F4 Fsp2 4	Q61E F4 Fsp2 5	Q61E F4 Fsp2 6	Q61E F4 Fsp2 7	Q61E F4 Fsp2 8	Q61E F4 Fsp2 9	Q61E F5 Fsp3 1	Q61E F5 Fsp3 2	Q61E F5 Fsp3 3	Q61E F5 Fsp3 4	Q61E F5 Fsp3 5	Q61E F5 Fsp3 6	Q61E F5 Fsp3 7	Q61E F5 Fsp3 8
Analysis														
SiO_2	65.61	66.00	65.70	65.24	68.65	67.56	64.89	65.34	65.42	64.87	65.32	65.15	64.79	65.40
Al_2O_3	23.75	23.34	23.49	23.44	21.84	21.54	23.56	23.30	23.29	23.54	24.09	23.60	23.38	23.52
CaO	3.28	3.24	3.13	3.38	0.32	0.33	3.37	3.40	3.39	3.50	3.47	3.38	3.48	3.37
FeO	0.02	0.00	0.08	0.02	0.00	0.06	0.16	0.09	0.07	0.04	0.09	0.03	0.00	0.00
BaO	0.01	0.00	0.02	0.00	0.00	0.08	0.00	0.00	0.06	0.04	0.00	0.00	0.01	0.00
Na_2O	9.72	10.14	10.16	9.91	11.21	10.12	9.77	10.17	10.13	10.00	10.34	10.37	10.23	10.13
K_2O	0.06	0.06	0.05	0.05	0.74	1.70	0.04	0.08	0.09	0.05	0.07	0.07	0.03	0.07
Total	102.44	102.78	102.63	102.04	102.76	101.38	101.79	102.38	102.46	102.03	103.36	102.60	101.93	102.49
Cations														
Si	2.819	2.830	2.822	2.818	2.928	2.929	2.811	2.818	2.820	2.807	2.793	2.806	2.808	2.815
Al	1.203	1.179	1.189	1.193	1.098	1.101	1.203	1.184	1.183	1.200	1.214	1.198	1.194	1.193
Ca	0.151	0.149	0.144	0.157	0.015	0.015	0.156	0.157	0.157	0.162	0.159	0.156	0.162	0.155
Fe	0.001	0.000	0.003	0.001	0.000	0.002	0.006	0.003	0.003	0.001	0.003	0.001	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Na	0.810	0.843	0.846	0.830	0.927	0.851	0.820	0.851	0.847	0.839	0.857	0.866	0.860	0.845
K	0.003	0.003	0.002	0.003	0.040	0.094	0.002	0.004	0.005	0.003	0.004	0.004	0.002	0.004
Total	4.986	5.004	5.008	5.002	5.007	4.993	4.999	5.018	5.014	5.014	5.030	5.030	5.026	5.013
Endmember														
K feldspar	0.3	0.3	0.3	0.3	4.1	9.8	0.2	0.4	0.5	0.3	0.4	0.4	0.2	0.4
Albite	84.0	84.7	85.2	83.9	94.4	88.5	83.8	84.0	83.9	83.5	84.0	84.4	84.0	84.2
Anorthite	15.7	15.0	14.5	15.8	1.5	1.6	16.0	15.5	15.5	16.1	15.6	15.2	15.8	15.5
Celsiane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

	Q61E F5 Fsp3 9	Q61E F5 Fsp3 10	Q61E F5 Fsp3 11	Q61E F5 Fsp4 1	Q61E F5 Fsp4 2	Q61E F5 Fsp4 3	Q61E F5 Fsp4 4	Q61E F5 Fsp4 5	Q61E F5 Fsp4 6	Q61E F5 Fsp4 7	Q61E F5 Fsp4 8	Q61E F5 Fsp4 9	Q61E F5 Fsp4 10	Q61E F9 Fsp5 1
Analysis														
SiO_2	65.53	65.63	67.13	63.11	64.84	64.92	64.79	64.28	64.46	64.93	64.89	64.02	64.41	64.84
Al_2O_3	22.59	23.12	22.01	21.61	23.44	23.31	22.94	23.14	23.17	23.30	23.34	22.84	23.37	23.34
CaO	2.08	3.30	1.58	1.36	3.41	3.38	3.10	3.41	3.49	3.47	3.30	3.30	3.59	3.57
FeO	0.01	0.01	0.06	3.34	0.12	0.07	0.06	0.08	0.02	0.05	0.11	0.05	0.00	0.13
BaO	0.04	0.03	0.02	0.07	0.00	0.02	0.03	0.00	0.01	0.00	0.02	0.00	0.00	0.01
Na_2O	10.34	10.01	10.66	9.69	9.98	10.04	10.30	9.69	10.42	10.41	9.98	9.80	10.35	10.15
K_2O	0.49	0.11	0.34	1.15	0.04	0.03	0.11	0.09	0.02	0.04	0.13	0.06	0.04	0.03
Total	101.08	102.22	101.81	100.32	101.83	101.79	101.33	100.70	101.61	102.21	101.77	100.07	101.77	102.07
Cations														
Si	2.856	2.831	2.895	2.823	2.810	2.815	2.824	2.816	2.806	2.809	2.815	2.821	2.800	2.808
Al	1.160	1.176	1.119	1.139	1.198	1.191	1.178	1.195	1.189	1.188	1.193	1.186	1.197	1.191
Ca	0.097	0.153	0.073	0.065	0.158	0.157	0.145	0.160	0.163	0.161	0.153	0.156	0.167	0.166
Fe	0.000	0.000	0.002	0.125	0.004	0.003	0.002	0.003	0.001	0.002	0.004	0.002	0.000	0.005
Ba	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.873	0.837	0.891	0.840	0.838	0.844	0.870	0.823	0.880	0.873	0.839	0.838	0.872	0.852
K	0.027	0.006	0.019	0.066	0.002	0.002	0.006	0.005	0.001	0.002	0.007	0.003	0.002	0.002
Total	5.015	5.003	5.000	5.060	5.011	5.012	5.026	5.001	5.040	5.035	5.012	5.006	5.039	5.024
Endmember														
K feldspar	2.7	0.6	1.9	6.8	0.2	0.2	0.6	0.5	0.1	0.2	0.7	0.3	0.2	0.2
Albite	87.5	84.0	90.6	86.4	83.9	84.1	85.2	83.3	84.3	84.3	83.9	84.0	83.7	83.6
Anorthite	9.7	15.3	7.4	6.7	15.8	15.7	14.2	16.2	15.6	15.5	15.3	15.6	16.1	16.2
Celsiane	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Q61E F9 Fsp5 2	Q61E F9 Fsp5 3	Q61E F9 Fsp5 4	Q61E F9 Fsp5 5	Q63B F8Plg 1 1	Q63B F8Plg 1 2	Q63B F8Plg 1 3	Q63B F8Plg 1 4	Q63B F8Plg 1 5	Q63B F8Plg 1 6	Q63B F8Plg 1 7	Q63B F8Plg 1 8	Q63B F8Plg 1 9	Q63B F8Plg 1 10
Analysis														
SiO_2	64.86	62.30	65.03	62.56	59.64	60.05	59.81	60.22	60.53	60.52	60.93	60.60	60.87	60.04
Al_2O_3	23.15	21.95	23.27	20.64	25.40	25.93	25.82	25.69	26.24	25.65	25.81	25.81	26.44	26.20
CaO	3.46	2.97	3.40	0.94	6.66	6.65	6.46	6.44	6.51	6.33	6.42	6.36	6.30	6.19
FeO	0.14	0.69	0.12	3.29	0.14	0.10	0.06	0.08	0.05	0.05	0.05	0.08	0.01	0.08
BaO	0.04	0.06	0.00	0.01	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Na_2O	9.88	10.26	9.97	10.28	7.71	7.55	7.56	7.01	7.52	7.75	7.61	7.42	8.01	7.57
K_2O	0.07	0.06	0.02	1.54	0.20	0.21	0.24	0.25	0.25	0.29	0.28	0.29	0.29	0.28
Total	101.59	98.29	101.81	99.25	99.76	100.51	99.96	99.71	101.11	100.60	101.12	100.57	101.93	100.34
Cations														
Si	2.819	2.813	2.818	2.838	2.665	2.660	2.662	2.680	2.662	2.676	2.678	2.677	2.658	2.660
Al	1.185	1.168	1.188	1.104	1.337	1.353	1.355	1.347	1.360	1.337	1.337	1.344	1.361	1.368
Ca	0.161	0.144	0.158	0.046	0.319	0.316	0.308	0.307	0.307	0.300	0.303	0.301	0.295	0.294
Fe	0.005	0.026	0.004	0.125	0.005	0.004	0.002	0.003	0.002	0.002	0.002	0.003	0.000	0.003
Ba	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.832	0.898	0.837	0.905	0.668	0.648	0.652	0.605	0.641	0.665	0.648	0.636	0.678	0.650
K	0.004	0.003	0.001	0.089	0.012	0.012	0.014	0.014	0.014	0.017	0.016	0.016	0.016	0.016
Total	5.007	5.054	5.007	5.106	5.006	4.993	4.993	4.956	4.986	4.996	4.985	4.977	5.009	4.989
Endmember														
K feldspar	0.4	0.3	0.1	8.6	1.2	1.2	1.4	1.5	1.5	1.7	1.6	1.7	1.6	1.6
Albite	83.4	85.9	84.0	87.0	66.9	66.4	66.9	65.3	66.6	67.7	67.0	66.7	68.5	67.8
Anorthite	16.1	13.7	15.9	4.4	31.9	32.3	31.6	33.2	31.9	30.6	31.3	31.6	29.8	30.6
Celsiane	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Q63B F8Plg 1 11	Q63B F8Plg 1 12	Q63B F8Plg 1 13	Q63B F8Plg 1 14	Q63B F8Plg 1 15	Q63B F8Plg 1 16	Q63B F8 K Fsp 1 1	Q63B F8 K Fsp 1 2	Q63B F8 K Fsp 1 3	Q63B F8 K Fsp 1 4	Q63B F8 K Fsp 1 5	Q63B F8 K Fsp 1 6	Q63B F8 K Fsp 1 7	Q63B F8 K Fsp 1 8
Analysis														
SiO_2	60.43	60.26	60.32	60.30	59.25	59.56	64.28	64.65	63.88	64.17	64.53	64.98	64.24	65.01
Al_2O_3	25.94	26.11	25.76	26.57	26.39	26.02	19.23	19.25	18.87	18.86	18.85	18.99	19.02	19.13
CaO	6.27	6.22	6.27	6.57	6.80	6.93	0.07	0.05	0.05	0.03	0.04	0.06	0.05	0.05
FeO	0.08	0.07	0.06	0.05	0.29	0.27	0.21	0.08	0.04	0.05	0.00	0.03	0.00	0.02
BaO	0.00	0.01	0.05	0.00	0.00	0.02	0.34	0.37	0.29	0.34	0.34	0.33	0.31	0.25
Na_2O	7.61	7.74	7.96	7.51	7.60	7.20	0.78	0.79	0.85	0.92	0.76	0.92	0.80	0.73
K_2O	0.31	0.19	0.26	0.24	0.22	0.21	14.48	14.48	14.33	14.44	14.66	14.31	14.33	14.36
Total	100.65	100.61	100.69	101.25	100.55	100.21	99.39	99.67	98.31	98.81	99.18	99.62	98.74	99.55
Cations														
Si	2.670	2.663	2.668	2.649	2.631	2.649	2.974	2.979	2.984	2.985	2.990	2.992	2.984	2.991
Al	1.350	1.360	1.343	1.376	1.381	1.364	1.049	1.045	1.039	1.034	1.030	1.030	1.042	1.037
Ca	0.297	0.294	0.297	0.309	0.323	0.330	0.003	0.002	0.002	0.002	0.002	0.003	0.002	0.002
Fe	0.003	0.003	0.002	0.002	0.011	0.010	0.008	0.003	0.002	0.002	0.000	0.001	0.000	0.001
Ba	0.000	0.000	0.001	0.000	0.000	0.000	0.006	0.007	0.005	0.006	0.006	0.006	0.006	0.005
Na	0.652	0.663	0.683	0.640	0.654	0.621	0.070	0.070	0.077	0.083	0.068	0.083	0.072	0.065
K	0.018	0.011	0.015	0.013	0.012	0.012	0.855	0.851	0.854	0.857	0.866	0.840	0.850	0.843
Total	4.990	4.994	5.009	4.989	5.012	4.986	4.964	4.959	4.962	4.968	4.962	4.955	4.955	4.944
Endmember														
K feldspar	1.8	1.1	1.5	1.4	1.2	1.2	91.5	91.4	91.0	90.4	91.9	90.2	91.4	92.1
Albite	67.5	68.5	68.6	66.5	66.1	64.5	7.5	7.6	8.2	8.7	7.2	8.9	7.7	7.1
Anorthite	30.7	30.4	29.8	32.1	32.7	34.3	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.2
Celsiane	0.0	0.0	0.1	0.0	0.0	0.0	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.5

	Q63B F8 K Fsp 1 9	Q63B F8 K Fsp 1 10	Q63B F9 Plg 2 1	Q63B F9 Plg 2 2	Q63B F9 Plg 2 3	Q63B F9 Plg 2 4	Q63B F9 Plg 2 5	Q63B F9 Plg 2 6	Q63B F9 Plg 2 7	Q63B F9 Plg 2 8	Q63B F9 Plg 2 9	Q63B F9 Plg 2 10	Q63B F9 Plg 2 11	Q63B F9 Plg 2 12
Analysis														
SiO_2	64.78	64.65	60.03	60.31	60.22	59.47	59.68	59.61	59.82	59.83	60.15	59.67	60.04	59.05
Al_2O_3	18.88	18.47	25.39	25.72	26.33	25.91	25.78	26.11	26.00	26.15	25.99	26.28	26.63	27.04
CaO	0.01	0.06	6.82	6.82	6.62	6.80	6.65	6.73	6.74	6.65	6.86	6.98	6.96	7.56
FeO	0.01	0.02	0.05	0.08	0.07	0.05	0.08	0.13	0.08	0.08	0.02	0.05	0.05	0.07
BaO	0.24	0.37	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.02	0.06	0.04	0.00	0.03
Na_2O	0.80	0.47	7.39	7.14	7.42	7.70	7.50	7.70	7.52	7.48	7.19	7.65	7.33	6.98
K_2O	14.21	14.75	0.21	0.21	0.23	0.21	0.20	0.19	0.17	0.14	0.23	0.20	0.21	0.13
Total	98.92	98.78	99.89	100.27	100.89	100.15	99.90	100.54	100.32	100.36	100.49	100.86	101.22	100.86
Cations														
Si	2.998	3.006	2.674	2.673	2.655	2.648	2.659	2.645	2.654	2.653	2.662	2.639	2.641	2.611
Al	1.030	1.012	1.333	1.343	1.368	1.360	1.354	1.365	1.360	1.367	1.356	1.370	1.380	1.409
Ca	0.001	0.003	0.325	0.324	0.313	0.324	0.318	0.320	0.321	0.316	0.325	0.331	0.328	0.358
Fe	0.000	0.001	0.002	0.003	0.002	0.002	0.003	0.005	0.003	0.003	0.001	0.002	0.002	0.003
Ba	0.004	0.007	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000
Na	0.071	0.042	0.638	0.613	0.635	0.665	0.648	0.663	0.647	0.643	0.617	0.656	0.625	0.599
K	0.839	0.875	0.012	0.012	0.013	0.012	0.011	0.011	0.009	0.008	0.013	0.011	0.012	0.007
Total	4.943	4.946	4.985	4.968	4.985	5.011	4.993	5.009	4.994	4.990	4.975	5.009	4.988	4.987
Endmember														
K feldspar	91.7	94.4	1.2	1.3	1.3	1.2	1.2	1.1	1.0	0.8	1.4	1.1	1.2	0.8
Albite	7.8	4.6	65.4	64.6	66.1	66.4	66.3	66.7	66.2	66.5	64.5	65.7	64.8	62.1
Anorthite	0.1	0.3	33.3	34.1	32.6	32.4	32.5	32.2	32.8	32.6	34.0	33.1	34.0	37.1
Celsiane	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0

	Q63B F9 Plg 2 13	Q63B F9 K Fsp 2 1	Q63B F9 K Fsp 2 2	Q63B F9 K Fsp 2 3	Q63B F9 K Fsp 2 4	Q63B F9 K Fsp 2 5	Q63B F9 K Fsp 2 6	Q63B F9 K Fsp 2 7	Q63B F9 K Fsp 2 8	Q63B F9 K Fsp 2 9	Q63B F9 K Fsp 2 10	Q63B F9 K Fsp 2 11	Q63B F9 K Fsp 2 12	Q63B F9 K Fsp 2 13
Analysis														
SiO_2	57.63	65.08	63.97	65.11	65.18	64.80	65.15	65.36	65.34	65.08	64.37	64.51	63.91	65.09
Al_2O_3	27.60	19.26	18.52	19.53	19.09	19.06	19.60	19.31	19.39	19.29	19.14	19.46	19.10	19.00
CaO	8.49	0.00	0.01	0.00	0.00	0.04	0.09	0.08	0.06	0.08	0.08	0.06	0.10	0.07
FeO	0.06	0.02	0.10	0.00	0.03	0.05	0.00	0.00	0.07	0.01	0.05	0.02	0.03	0.02
BaO	0.00	0.30	0.26	0.26	0.41	0.27	0.29	0.24	0.35	0.29	0.35	0.32	0.33	0.39
Na_2O	6.42	0.33	0.35	0.65	0.54	0.84	0.84	0.91	0.79	0.91	0.68	0.70	0.75	0.93
K_2O	0.15	14.66	13.90	14.16	14.38	13.83	14.24	14.41	14.06	14.12	13.86	14.35	14.24	14.26
Total	100.35	99.65	97.11	99.71	99.64	98.90	100.23	100.32	100.06	99.79	98.54	99.43	98.46	99.77
Cations														
Si	2.568	2.992	3.009	2.985	2.997	2.994	2.977	2.986	2.988	2.986	2.988	2.975	2.979	2.992
Al	1.450	1.044	1.027	1.055	1.035	1.038	1.055	1.040	1.045	1.043	1.047	1.058	1.049	1.030
Ca	0.405	0.000	0.001	0.000	0.000	0.002	0.005	0.004	0.003	0.004	0.004	0.003	0.005	0.003
Fe	0.002	0.001	0.004	0.000	0.001	0.002	0.000	0.000	0.003	0.000	0.002	0.001	0.001	0.001
Ba	0.000	0.005	0.005	0.005	0.007	0.005	0.005	0.004	0.006	0.005	0.006	0.006	0.006	0.007
Na	0.555	0.029	0.032	0.058	0.048	0.076	0.075	0.081	0.070	0.081	0.061	0.063	0.068	0.083
K	0.008	0.860	0.834	0.828	0.843	0.815	0.830	0.840	0.820	0.827	0.821	0.844	0.846	0.836
Total	4.989	4.931	4.911	4.931	4.932	4.932	4.948	4.954	4.935	4.946	4.930	4.950	4.954	4.953
Endmember														
K feldspar	0.9	96.1	95.7	93.0	93.8	90.8	90.7	90.4	91.2	90.2	92.0	92.2	91.5	89.9
Albite	57.3	3.3	3.6	6.5	5.4	8.4	8.2	8.7	7.8	8.8	6.9	6.9	7.3	9.0
Anorthite	41.8	0.0	0.1	0.0	0.0	0.2	0.5	0.4	0.3	0.4	0.5	0.3	0.6	0.4
Celsiane	0.0	0.6	0.6	0.5	0.8	0.6	0.6	0.5	0.7	0.6	0.7	0.6	0.6	0.8

	Q63B F9 K Fsp 2 14	Q63B F9 K Fsp 2 15	Q63B F9 K Fsp 2 16	Q63B F9 K Fsp 2 17	Q63B F4 50µm 1	Q63B F4 50µm 2	Q63B F4 50µm 3	Q63B F4 50µm 4	Q63B F4 50µm 5	Q63B F4 50µm 6	Q63B F4 50µm 7	Q63B F4 50µm 8	Q63B F4 50µm 9	Q63B F4 50µm 10
Analysis														
SiO_2	65.19	65.64	65.40	65.01	0.00	45.44	54.62	50.16	49.81	45.60	50.37	49.55	48.88	49.93
Al_2O_3	19.58	19.63	19.53	19.44	0.00	24.85	27.09	29.98	30.23	27.35	29.68	30.21	30.71	30.12
CaO	0.05	0.09	0.04	0.00	52.21	16.92	10.46	13.98	14.04	12.86	13.83	14.46	14.43	14.19
FeO	0.00	0.00	0.05	0.12	0.34	0.09	0.05	0.04	0.02	0.11	0.05	0.01	0.00	0.01
BaO	0.37	0.38	0.41	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.06
Na_2O	0.93	0.80	0.83	0.65	0.07	3.56	5.67	3.58	3.39	3.25	3.45	3.43	3.20	3.47
K_2O	14.19	14.48	14.43	14.96	0.00	1.11	0.10	0.06	0.08	0.09	0.07	0.05	0.06	0.04
Total	100.31	101.01	100.69	100.54	52.63	91.96	97.98	97.81	97.57	89.25	97.53	97.71	97.28	97.82
Cations														
Si	64.61	65.06	64.83	64.43	0.000	2.313	2.512	2.335	2.324	2.329	2.350	2.313	2.291	2.326
Al	19.41	19.45	19.35	19.27	0.000	1.491	1.468	1.645	1.663	1.646	1.632	1.662	1.697	1.654
Ca	0.05	0.09	0.04	0.00	7.949	0.923	0.515	0.697	0.702	0.704	0.691	0.724	0.725	0.708
Fe	0.00	0.00	0.05	0.12	0.041	0.004	0.002	0.002	0.001	0.005	0.002	0.000	0.000	0.000
Ba	0.37	0.37	0.41	0.35	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001
Na	0.92	0.79	0.82	0.64	0.020	0.351	0.506	0.324	0.307	0.322	0.312	0.310	0.291	0.313
K	14.07	14.35	14.30	14.82	0.000	0.072	0.006	0.003	0.005	0.006	0.004	0.003	0.003	0.002
Total	99.43	100.12	99.79	99.65	8.010	5.153	5.009	5.006	5.001	5.011	4.993	5.013	5.007	5.005
Endmember														
K feldspar	90.1	91.1	91.1	93.2	0.0	5.4	0.6	0.3	0.5	0.6	0.4	0.3	0.3	0.2
Albite	8.9	7.7	7.9	6.1	0.3	26.1	49.2	31.6	30.3	31.2	31.0	29.9	28.5	30.6
Anorthite	0.2	0.5	0.2	0.0	99.7	68.6	50.2	68.1	69.3	68.2	68.5	69.8	71.1	69.1
Celsiane	0.7	0.7	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1

	Q63B F4 50µm 11	Q63B F4 50µm 12	Q63B F4 50µm 13	Q63B F4 50µm 14	Q63B F4 50µm 15	Q63B F4 50µm 16	Q63B F4 50µm 17	Q63B F4 50µm 18	Q63B F4 50µm 19	Q63B F4 50µm 20	Q63B F4 50µm 21	Q63B F4 50µm 22	Q63B F4 50µm 23	Q63B F4 50µm 24
Analysis														
SiO_2	50.70	50.47	50.40	52.24	51.11	51.54	51.67	52.86	54.44	51.63	51.09	48.62	51.51	51.78
Al_2O_3	30.42	29.97	30.39	28.46	28.75	29.74	29.30	29.19	27.07	29.69	30.21	27.77	30.33	30.51
CaO	13.59	13.52	13.58	12.25	12.59	12.86	12.86	12.45	9.85	13.08	13.64	11.90	12.87	13.07
FeO	0.01	0.07	0.04	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.03	0.13	0.05	0.05
BaO	0.02	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.00
Na_2O	3.51	4.05	3.85	4.44	3.97	3.77	4.02	4.20	5.85	4.15	4.10	4.00	3.73	4.06
K_2O	0.07	0.05	0.08	0.07	0.08	0.07	0.06	0.07	0.11	0.04	0.08	0.07	0.07	0.09
Total	98.32	98.15	98.36	97.48	96.54	98.02	97.91	98.76	97.32	98.57	99.15	92.52	98.57	99.55
Cations														
Si	2.342	2.342	2.332	2.426	2.399	2.381	2.391	2.419	2.517	2.376	2.346	2.384	2.366	2.360
Al	1.656	1.639	1.657	1.557	1.590	1.619	1.598	1.575	1.475	1.611	1.635	1.605	1.642	1.639
Ca	0.673	0.672	0.673	0.610	0.633	0.637	0.638	0.611	0.488	0.645	0.671	0.625	0.633	0.638
Fe	0.000	0.003	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.005	0.002	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Na	0.314	0.364	0.345	0.400	0.361	0.338	0.361	0.372	0.524	0.370	0.365	0.380	0.333	0.358
K	0.004	0.003	0.005	0.004	0.005	0.004	0.004	0.004	0.006	0.002	0.005	0.004	0.004	0.005
Total	4.989	5.022	5.014	4.997	4.989	4.980	4.992	4.981	5.011	5.004	5.022	5.005	4.981	5.003
Endmember														
K feldspar	0.4	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.6	0.2	0.4	0.4	0.4	0.5
Albite	31.7	35.0	33.7	39.5	36.1	34.5	36.0	37.7	51.4	36.4	35.1	37.6	34.3	35.8
Anorthite	67.8	64.7	65.8	60.1	63.4	65.0	63.6	61.9	47.9	63.4	64.5	61.9	65.3	63.7
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

	Q63B F4 50µm 25	Q 64D F3 Plag 1 1	Q 64D F3 Plag 1 2	Q 64D F3 Plag 1 3	Q 64D F3 Plag 1 4	Q 64D F3 Plag 1 5	Q 64D F3 Plag 1 6	Q 64D F3 Plag 1 7	Q 64D F3 Plag 1 8	Q 64D F3 Plag 1 9	Q 64D F3 Plag 1 10	Q 64D F3 Plag 1 11	Q 64D F3 Plag 1 12	Q 64D F3 Plag 1 13
Analysis														
SiO_2	46.27	61.51	62.62	62.47	62.29	62.43	62.56	62.33	62.50	62.62	62.36	62.59	62.16	62.16
Al_2O_3	27.32	24.26	24.57	24.07	23.82	24.08	24.20	23.87	24.14	24.44	23.82	24.49	24.48	24.42
CaO	14.55	4.99	4.68	4.67	4.69	4.52	4.36	4.52	4.41	4.36	4.48	4.73	4.58	4.66
FeO	0.22	0.06	0.07	0.04	0.03	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.04	0.00
BaO	0.00	0.07	0.00	0.08	0.02	0.02	0.02	0.04	0.00	0.03	0.00	0.01	0.04	0.02
Na_2O	2.73	8.86	9.00	8.77	8.57	8.94	9.13	8.79	8.66	9.05	8.83	8.89	9.09	8.86
K_2O	1.29	0.30	0.33	0.37	0.41	0.45	0.44	0.38	0.36	0.30	0.23	0.32	0.27	0.22
Total	92.37	100.05	101.27	100.46	99.82	100.44	100.70	99.95	100.07	100.80	99.75	101.02	100.67	100.33
Cations														
Si	2.312	2.732	2.742	2.757	2.764	2.756	2.754	2.763	2.762	2.751	2.766	2.746	2.739	2.744
Al	1.609	1.270	1.268	1.252	1.246	1.253	1.256	1.247	1.257	1.265	1.245	1.266	1.272	1.270
Ca	0.779	0.237	0.220	0.221	0.223	0.214	0.206	0.215	0.209	0.205	0.213	0.222	0.216	0.221
Fe	0.009	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Ba	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000
Na	0.264	0.763	0.764	0.751	0.737	0.765	0.779	0.755	0.742	0.771	0.760	0.756	0.777	0.758
K	0.082	0.017	0.018	0.021	0.023	0.025	0.024	0.021	0.021	0.017	0.013	0.018	0.015	0.012
Total	5.056	5.023	5.015	5.003	4.994	5.013	5.020	5.002	4.991	5.010	4.998	5.008	5.021	5.006
Endmember														
K feldspar	7.3	1.7	1.8	2.1	2.3	2.5	2.4	2.2	2.1	1.7	1.3	1.8	1.5	1.3
Albite	23.5	74.9	76.2	75.6	75.0	76.2	77.2	76.1	76.4	77.6	77.1	75.9	77.0	76.5
Anorthite	69.2	23.3	21.9	22.2	22.7	21.3	20.4	21.7	21.5	20.6	21.6	22.3	21.4	22.3
Celsiane	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0

	Q 64D F4 Plag2 1	Q 64D F4 Plag2 2	Q 64D F4 Plag2 3	Q 64D F4 Plag2 4	Q 64D F4 Plag2 5	Q 64D F4 Plag2 6	Q 64D F4 Plag2 8	Q 64D F4 Plag2 9	Q 64D F4 Plag2 10	Q64E F4 Plg 1 1	Q64E F4 Plg 1 3	Q64E F4 Plg 1 5	Q64E F4 Plg 1 6	Q64E F4 Plg 1 7
Analysis														
SiO_2	61.77	62.00	60.30	62.40	62.13	61.57	62.36	60.12	61.95	48.53	48.32	48.33	48.16	48.41
Al_2O_3	23.88	23.72	22.74	23.46	24.36	24.46	23.85	23.06	24.04	33.02	32.67	32.75	32.36	32.91
CaO	4.66	4.55	4.30	4.48	5.05	5.25	4.69	4.51	4.64	16.58	16.25	16.15	16.07	16.01
FeO	0.04	0.00	0.07	0.03	0.03	0.00	0.00	0.05	0.00	0.06	0.07	0.06	0.09	0.07
BaO	0.02	0.04	0.06	0.14	0.00	0.02	0.00	0.06	0.03	0.01	0.05	0.00	0.03	0.00
Na_2O	8.97	9.02	8.53	8.31	8.65	8.28	8.73	8.60	8.34	2.11	2.31	2.40	2.34	2.50
K_2O	0.21	0.32	0.35	0.32	0.36	0.29	0.29	0.30	0.23	0.04	0.00	0.01	0.01	0.01
Total	99.54	99.65	96.35	99.14	100.57	99.87	99.92	96.71	99.22	100.35	99.68	99.71	99.06	99.90
Cations														
Si	2.751	2.759	2.773	2.782	2.740	2.733	2.763	2.757	2.759	2.214	2.220	2.219	2.226	2.218
Al	1.254	1.244	1.232	1.233	1.266	1.280	1.245	1.247	1.262	1.776	1.769	1.772	1.762	1.777
Ca	0.222	0.217	0.212	0.214	0.239	0.250	0.223	0.222	0.221	0.810	0.800	0.795	0.796	0.786
Fe	0.002	0.000	0.003	0.001	0.001	0.000	0.000	0.002	0.000	0.002	0.003	0.002	0.004	0.003
Ba	0.000	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000
Na	0.774	0.778	0.760	0.719	0.740	0.713	0.750	0.765	0.720	0.187	0.205	0.214	0.209	0.222
K	0.012	0.018	0.021	0.018	0.020	0.016	0.016	0.018	0.013	0.002	0.000	0.000	0.001	0.000
Total	5.015	5.017	5.002	4.970	5.007	4.992	4.998	5.011	4.976	4.992	4.998	5.002	4.998	5.005
Endmember														
K feldspar	1.2	1.8	2.1	1.9	2.0	1.7	1.7	1.8	1.4	0.2	0.0	0.0	0.1	0.0
Albite	76.7	76.7	76.5	75.4	74.1	72.8	75.8	76.1	75.4	18.7	20.4	21.2	20.8	22.0
Anorthite	22.0	21.4	21.3	22.4	23.9	25.5	22.5	22.0	23.2	81.1	79.5	78.8	79.1	78.0
Celsiane	0.0	0.1	0.1	0.3	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0

	Q64E F4 Plg 1 11	Q64E F4 Plg 1 12	Q64E F4 Plg 1 13	Q64E F5 Plg 2 1	Q64E F5 Plg 2 2	Q64E F5 Plg 2 3	Q64E F5 Plg 2 5	Q64E F5 Plg 2 6	Q64E F5 Plg 2 7	Q64E F5 Plg 2 8	Q64E F5 Plg 2 9	Q64E F5 Plg 2 10	Q64E F5 Plg 2 12	Q67F F9 Fsp 2 1
Analysis														
SiO_2	48.59	48.30	67.95	47.03	48.56	48.43	47.82	47.94	47.33	47.56	47.98	47.40	47.26	56.74
Al_2O_3	32.75	32.92	19.34	33.71	32.88	33.29	32.83	33.08	33.58	33.33	33.56	33.13	33.47	29.41
CaO	16.31	16.11	0.16	17.39	16.63	16.48	16.47	16.75	16.78	17.11	17.07	17.04	17.15	10.57
FeO	0.13	0.15	0.23	0.05	0.05	0.05	0.08	0.07	0.00	0.06	0.09	0.09	0.41	0.07
BaO	0.01	0.03	0.00	0.00	0.05	0.00	0.03	0.06	0.00	0.04	0.04	0.03	0.00	0.00
Na_2O	2.33	2.35	10.72	1.82	2.44	2.40	2.12	2.22	1.95	2.02	2.02	2.00	2.14	6.08
K_2O	0.01	0.04	1.31	0.00	0.00	0.03	0.04	0.01	0.02	0.01	0.00	0.01	0.03	0.04
Total	100.12	99.91	99.72	100.00	100.61	100.67	99.39	100.14	99.66	100.13	100.78	99.71	100.47	102.91
Cations														
Si	2.222	2.214	2.992	2.161	2.214	2.204	2.205	2.197	2.177	2.182	2.185	2.183	2.167	2.483
Al	1.765	1.779	1.004	1.826	1.766	1.786	1.784	1.787	1.820	1.802	1.802	1.799	1.808	1.517
Ca	0.799	0.792	0.008	0.856	0.812	0.804	0.814	0.823	0.827	0.841	0.833	0.841	0.842	0.496
Fe	0.005	0.006	0.009	0.002	0.002	0.002	0.003	0.003	0.000	0.002	0.004	0.004	0.016	0.002
Ba	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000
Na	0.206	0.209	0.915	0.162	0.215	0.212	0.190	0.198	0.174	0.180	0.179	0.178	0.190	0.516
K	0.001	0.002	0.073	0.000	0.000	0.001	0.002	0.000	0.001	0.001	0.000	0.001	0.002	0.002
Total	4.999	5.002	5.001	5.007	5.011	5.009	4.999	5.008	5.000	5.008	5.003	5.007	5.026	5.017
Endmember														
K feldspar	0.1	0.2	7.4	0.0	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.1	0.2	0.2
Albite	20.5	20.8	91.9	15.9	20.9	20.8	18.9	19.3	17.4	17.6	17.6	17.5	18.4	50.9
Anorthite	79.4	78.9	0.8	84.1	79.0	79.0	80.9	80.5	82.5	82.3	82.3	82.4	81.4	48.9
Celsiane	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0

	Q67F F9 Fsp 2 2	Q67F F9 Fsp 2 3	Q67F F9 Fsp 2 4	Q67F F9 Fsp 2 5	Q67F F9 Fsp 2 8	Q67F F9 Fsp 2 9	Q67F F9 Fsp 2 10	Q67F F9 Fsp 2 11	Q67F F9 Fsp 2 12	Q67F F9 Fsp 2 15	Q67F F9 Fsp 2 16	Q67F F9 Fsp 2 17	Q67F F5 Pl 1 1	Q67F F5 Pl 1 2
Analysis														
SiO_2	58.96	54.44	55.11	54.07	55.15	58.28	59.21	58.19	59.05	59.46	58.58	56.92	55.32	56.84
Al_2O_3	27.11	30.39	29.65	30.64	29.54	27.50	27.15	26.75	26.91	27.31	27.22	28.78	28.17	27.16
CaO	8.18	12.39	11.50	12.22	10.66	8.95	8.11	8.04	8.23	8.23	8.64	9.96	10.67	9.56
FeO	0.12	0.10	0.08	0.02	0.01	0.00	0.00	0.05	0.04	0.00	0.06	0.04	0.02	0.04
BaO	0.00	0.00	0.01	0.00	0.00	0.03	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00
Na_2O	7.37	4.93	5.00	5.02	6.03	6.51	7.47	7.38	6.99	7.24	6.76	6.37	5.77	6.51
K_2O	0.07	0.07	0.06	0.06	0.03	0.02	0.07	0.10	0.08	0.09	0.05	0.03	0.08	0.10
Total	101.81	102.32	101.41	102.04	101.42	101.30	102.03	100.52	101.33	102.33	101.31	102.10	100.04	100.22
Cations														
Si	2.593	2.409	2.450	2.399	2.453	2.574	2.597	2.593	2.605	2.598	2.587	2.507	2.493	2.549
Al	1.405	1.585	1.554	1.602	1.549	1.432	1.403	1.405	1.399	1.406	1.417	1.494	1.496	1.436
Ca	0.386	0.588	0.548	0.581	0.508	0.424	0.381	0.384	0.389	0.385	0.409	0.470	0.515	0.459
Fe	0.004	0.004	0.003	0.001	0.000	0.000	0.000	0.002	0.002	0.000	0.002	0.001	0.001	0.001
Ba	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.628	0.423	0.431	0.432	0.520	0.558	0.635	0.638	0.598	0.613	0.579	0.544	0.504	0.566
K	0.004	0.004	0.003	0.004	0.002	0.001	0.004	0.006	0.005	0.005	0.003	0.002	0.004	0.006
Total	5.021	5.012	4.990	5.018	5.033	4.989	5.021	5.027	4.997	5.008	4.996	5.019	5.014	5.019
Endmember														
K feldspar	0.4	0.4	0.3	0.4	0.2	0.1	0.4	0.5	0.5	0.5	0.3	0.2	0.4	0.5
Albite	61.7	41.7	43.9	42.5	50.5	56.7	62.2	62.1	60.3	61.1	58.5	53.5	49.3	54.9
Anorthite	37.9	57.9	55.8	57.1	49.3	43.1	37.3	37.4	39.2	38.4	41.3	46.3	50.3	44.5
Celsiane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Q67F F5 Pl 1 3	Q67F F5 Pl 1 4	Q67F F5 Pl 1 5	Q67F F5 Pl 1 6	Q67F F5 Pl 1 7	Q67F F5 Pl 1 8	Q67F F5 Pl 1 10	Q67F F5 Pl 1 11	Q67F F5 Pl 1 12	Q67F F5 Pl 1 13	Q67F F5 Pl 1 14	Q67F F5 Pl 1 15	Q67F F5 Pl 1 16	Q67F F5 Pl 1 17
Analysis														
SiO_2	57.38	57.55	56.77	57.97	55.46	57.86	58.71	58.04	58.29	57.97	57.75	58.38	59.09	58.26
Al_2O_3	26.74	26.85	26.29	26.33	25.02	26.33	26.18	26.05	26.06	26.08	26.40	26.16	26.92	26.14
CaO	9.28	9.01	8.67	8.73	8.25	8.54	8.34	8.42	8.18	8.54	8.53	8.38	8.57	8.24
FeO	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.02	0.00	0.03	0.03	0.03	0.13	0.00
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	6.55	6.84	6.79	7.20	6.47	7.22	7.15	7.25	7.36	7.03	7.09	7.10	7.06	7.47
K_2O	0.09	0.10	0.08	0.07	0.07	0.09	0.09	0.09	0.10	0.09	0.09	0.08	0.15	0.07
Total	100.04	100.40	98.63	100.36	95.30	100.07	100.50	99.88	99.99	99.75	99.89	100.16	102.02	100.21
Cations														
Si	2.573	2.573	2.581	2.592	2.605	2.593	2.614	2.605	2.611	2.604	2.592	2.609	2.595	2.605
Al	1.413	1.415	1.409	1.387	1.385	1.391	1.374	1.378	1.375	1.381	1.396	1.378	1.393	1.378
Ca	0.446	0.432	0.422	0.418	0.415	0.410	0.398	0.405	0.393	0.411	0.410	0.401	0.403	0.395
Fe	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.005	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.569	0.593	0.598	0.624	0.589	0.628	0.617	0.631	0.639	0.613	0.617	0.615	0.601	0.648
K	0.005	0.006	0.005	0.004	0.004	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.008	0.004
Total	5.007	5.019	5.016	5.028	5.000	5.028	5.010	5.024	5.024	5.015	5.021	5.011	5.013	5.032
Endmember														
K feldspar	0.5	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.8	0.4
Albite	55.8	57.5	58.3	59.6	58.4	60.2	60.5	60.6	61.6	59.5	59.7	60.2	59.3	61.9
Anorthite	43.7	41.9	41.2	40.0	41.1	39.3	39.0	38.9	37.8	39.9	39.8	39.3	39.8	37.7
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Q67F F5 Pl 1 18	Q67F F5 Pl 1 19	Q67F F5 Pl 1 20	Q67F F5 Pl 1 22	Q67F F5 Pl 1 24	Q67F F5 Pl 1 26	Q67F F5 Pl 1 27	Q67F F5 Pl 1 28	Q67F F5 Pl 1 29	Q67F F5 Pl 1 30	Q67F F5 Pl 1 31	Q67F F5 Pl 1 32	Q67F F5 Pl 1 33	Q67F F5 Pl 1 34
Analysis														
SiO_2	58.66	58.10	57.92	58.20	58.20	59.01	58.52	49.93	56.02	57.65	57.86	57.64	57.09	57.54
Al_2O_3	26.22	26.53	26.61	26.41	26.05	25.63	26.78	23.30	27.35	26.33	26.12	25.79	26.43	26.28
CaO	8.28	8.66	8.52	8.51	8.11	7.60	8.53	6.71	8.95	8.45	8.42	7.98	8.74	8.61
FeO	0.00	0.03	0.02	0.02	0.01	0.00	0.03	2.35	0.19	0.06	0.12	0.16	0.04	0.04
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	7.39	7.11	7.08	7.22	7.20	7.71	7.21	5.05	6.47	6.90	7.11	7.29	6.93	6.92
K_2O	0.08	0.06	0.14	0.08	0.08	0.09	0.08	0.24	0.22	0.08	0.07	0.08	0.07	0.06
Total	100.63	100.50	100.29	100.45	99.68	100.05	101.17	88.41	99.32	99.47	99.71	98.97	99.32	99.46
Cations														
Si	2.611	2.592	2.589	2.597	2.613	2.637	2.592	2.553	2.536	2.596	2.601	2.610	2.579	2.592
Al	1.375	1.395	1.402	1.389	1.378	1.350	1.398	1.404	1.459	1.397	1.384	1.376	1.407	1.395
Ca	0.395	0.414	0.408	0.407	0.390	0.364	0.405	0.368	0.434	0.408	0.405	0.387	0.423	0.416
Fe	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.100	0.007	0.002	0.004	0.006	0.002	0.002
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.638	0.615	0.614	0.625	0.626	0.668	0.619	0.500	0.568	0.603	0.620	0.640	0.607	0.605
K	0.005	0.003	0.008	0.005	0.005	0.005	0.004	0.015	0.013	0.004	0.004	0.005	0.004	0.004
Total	5.023	5.020	5.021	5.023	5.014	5.024	5.021	5.003	5.025	5.009	5.019	5.025	5.023	5.014
Endmember														
K feldspar	0.4	0.3	0.8	0.5	0.5	0.5	0.4	1.7	1.2	0.4	0.4	0.4	0.4	0.4
Albite	61.5	59.6	59.6	60.3	61.3	64.4	60.2	56.6	56.0	59.4	60.2	62.0	58.7	59.0
Anorthite	38.1	40.1	39.6	39.3	38.2	35.1	39.4	41.6	42.8	40.2	39.4	37.5	40.9	40.6
Celsiane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Q67F F5 Pl 1 35	Q67F F5 Pl 1 36	Q67F F5 Pl 1 37	Q67F F5 Pl 1 38	Q67F F5 Pl 1 39
Analysis					
SiO_2	58.63	55.47	58.83	58.15	57.68
Al_2O_3	25.57	24.49	25.73	26.02	26.09
CaO	7.99	7.46	7.84	8.13	8.56
FeO	0.04	1.59	0.02	0.03	0.00
BaO	0.00	0.00	0.00	0.00	0.00
Na_2O	7.67	6.96	7.56	7.27	7.27
K_2O	0.09	0.08	0.10	0.07	0.08
Total	100.00	96.07	100.09	99.68	99.71
Cations					
Si	2.627	2.604	2.630	2.612	2.596
Al	1.350	1.355	1.356	1.377	1.384
Ca	0.383	0.375	0.376	0.391	0.413
Fe	0.001	0.062	0.001	0.001	0.000
Ba	0.000	0.000	0.000	0.000	0.000
Na	0.666	0.634	0.655	0.633	0.634
K	0.005	0.005	0.005	0.004	0.005
Total	5.034	5.037	5.023	5.018	5.032
Endmember					
K feldspar	0.5	0.5	0.5	0.4	0.5
Albite	63.1	62.5	63.2	61.5	60.3
Anorthite	36.3	37.0	36.2	38.0	39.3
Celsiane	0.0	0.0	0.0	0.0	0.0

Garnet

Electron microprobe analyses of garnet. Cations based on a 12 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

	75214D F1 Grt L2	75214D F1 Grt L3	75214D F1 Grt L4	75214D F1 Grt L5	75214D F1 Grt L6	75214D F1 Grt L7	75214D F1 Grt L8	75214D F1 Grt L9	75214D F1 Grt L10	75214D F1 Grt L11	75214D F1 Grt L12	75214D F1 Grt L13	75214D F1 Grt L15	75214D F1 Grt L16
Analysis														
SiO_2	36.78	37.62	37.32	37.36	37.39	37.57	37.06	37.44	37.45	37.58	37.55	37.50	37.35	37.48
TiO_2	0.03	0.05	0.06	0.06	0.05	0.08	0.08	0.09	0.10	0.11	0.12	0.09	0.11	0.07
Al_2O_3	20.25	20.70	20.70	20.61	20.79	20.46	20.37	20.67	20.55	20.63	20.63	20.66	20.61	20.81
Cr_2O_3	0.00	0.00	0.01	0.01	0.01	0.04	0.03	0.02	0.00	0.00	0.00	0.02	0.00	0.00
Fe_2O_3	0.91	0.72	0.83	0.78	0.59	0.77	0.77	1.04	1.00	1.15	1.20	1.16	1.14	0.33
MgO	2.48	2.56	2.53	2.51	2.49	2.47	2.50	2.39	2.48	2.44	2.43	2.43	2.46	2.40
CaO	4.94	5.50	6.04	6.23	5.51	4.60	4.14	6.35	6.81	7.25	7.07	7.17	6.90	6.08
MnO	6.43	6.26	6.15	6.22	6.58	6.89	6.96	6.22	6.25	6.50	6.65	6.56	6.58	6.40
FeO	26.75	26.83	26.32	25.93	26.59	27.19	27.45	26.28	25.38	24.88	25.00	24.90	25.03	25.98
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.58	100.25	99.95	99.71	100.00	100.07	99.36	100.49	100.02	100.54	100.64	100.49	100.17	99.54
Cations														
Si	2.997	3.006	2.991	2.998	2.997	3.015	3.002	2.988	2.996	2.990	2.988	2.987	2.985	3.009
Ti	0.002	0.003	0.004	0.004	0.003	0.005	0.005	0.005	0.006	0.007	0.007	0.005	0.007	0.004
Al	1.945	1.949	1.955	1.950	1.964	1.935	1.944	1.944	1.938	1.935	1.934	1.939	1.941	1.969
Cr	0.000	0.000	0.001	0.001	0.000	0.003	0.002	0.001	0.000	0.000	0.000	0.001	0.000	0.000
Fe^{3+}	0.056	0.043	0.050	0.047	0.036	0.046	0.047	0.063	0.060	0.069	0.072	0.069	0.069	0.020
Mg	0.302	0.305	0.302	0.300	0.298	0.295	0.302	0.284	0.296	0.289	0.288	0.289	0.293	0.287
Ca	0.431	0.471	0.518	0.536	0.474	0.396	0.359	0.543	0.583	0.618	0.603	0.612	0.591	0.523
Mn	0.444	0.424	0.417	0.423	0.446	0.469	0.477	0.420	0.423	0.438	0.448	0.442	0.445	0.436
Fe^{2+}	1.823	1.793	1.764	1.740	1.783	1.825	1.859	1.754	1.697	1.655	1.663	1.659	1.673	1.744
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.995	8.002	7.999	8.000	7.988	7.997	8.003	7.999	8.001	8.002	8.003	8.003	7.992
Endmember														
Pyrope	10.1	10.2	10.1	10.0	9.9	9.9	10.1	9.5	9.9	9.6	9.6	9.6	9.8	9.6
Almandine	60.8	59.9	58.8	58.0	59.4	61.1	62.0	58.4	56.6	55.2	55.4	55.3	55.7	58.3
Spessartine	14.8	14.2	13.9	14.1	14.9	15.7	15.9	14.0	14.1	14.6	14.9	14.7	14.8	14.6
Grossular	14.4	15.7	17.3	17.9	15.8	13.3	12.0	18.1	19.4	20.6	20.1	20.4	19.7	17.5

	75214D F1 Grt L2	75214D F1 Grt L3	75214D F1 Grt L4	75214D F1 Grt L5	75214D F1 Grt L6	75214D F1 Grt L7	75214D F1 Grt L8	75214D F1 Grt L9	75214D F1 Grt L10	75214D F1 Grt L11	75214D F1 Grt L12	75214D F1 Grt L13	75214D F1 Grt L15	75214D F1 Grt L16
Analysis														
SiO_2	36.78	37.62	37.32	37.36	37.39	37.57	37.06	37.44	37.45	37.58	37.55	37.50	37.35	37.48
TiO_2	0.03	0.05	0.06	0.06	0.05	0.08	0.08	0.09	0.10	0.11	0.12	0.09	0.11	0.07
Al_2O_3	20.25	20.70	20.70	20.61	20.79	20.46	20.37	20.67	20.55	20.63	20.63	20.66	20.61	20.81
Cr_2O_3	0.00	0.00	0.01	0.01	0.01	0.04	0.03	0.02	0.00	0.00	0.00	0.02	0.00	0.00
Fe_2O_3	0.91	0.72	0.83	0.78	0.59	0.77	0.77	1.04	1.00	1.15	1.20	1.16	1.14	0.33
MgO	2.48	2.56	2.53	2.51	2.49	2.47	2.50	2.39	2.48	2.44	2.43	2.43	2.46	2.40
CaO	4.94	5.50	6.04	6.23	5.51	4.60	4.14	6.35	6.81	7.25	7.07	7.17	6.90	6.08
MnO	6.43	6.26	6.15	6.22	6.58	6.89	6.96	6.22	6.25	6.50	6.65	6.56	6.58	6.40
FeO	26.75	26.83	26.32	25.93	26.59	27.19	27.45	26.28	25.38	24.88	25.00	24.90	25.03	25.98
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.58	100.25	99.95	99.71	100.00	100.07	99.36	100.49	100.02	100.54	100.64	100.49	100.17	99.54
Cations														
Si	2.997	3.006	2.991	2.998	2.997	3.015	3.002	2.988	2.996	2.990	2.988	2.987	2.985	3.009
Ti	0.002	0.003	0.004	0.004	0.003	0.005	0.005	0.005	0.006	0.007	0.007	0.005	0.007	0.004
Al	1.945	1.949	1.955	1.950	1.964	1.935	1.944	1.944	1.938	1.935	1.934	1.939	1.941	1.969
Cr	0.000	0.000	0.001	0.001	0.000	0.003	0.002	0.001	0.000	0.000	0.000	0.001	0.000	0.000
Fe^{3+}	0.056	0.043	0.050	0.047	0.036	0.046	0.047	0.063	0.060	0.069	0.072	0.069	0.069	0.020
Mg	0.302	0.305	0.302	0.300	0.298	0.295	0.302	0.284	0.296	0.289	0.288	0.289	0.293	0.287
Ca	0.431	0.471	0.518	0.536	0.474	0.396	0.359	0.543	0.583	0.618	0.603	0.612	0.591	0.523
Mn	0.444	0.424	0.417	0.423	0.446	0.469	0.477	0.420	0.423	0.438	0.448	0.442	0.445	0.436
Fe^{2+}	1.823	1.793	1.764	1.740	1.783	1.825	1.859	1.754	1.697	1.655	1.663	1.659	1.673	1.744
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.995	8.002	7.999	8.000	7.988	7.997	8.003	7.999	8.001	8.002	8.003	8.003	7.992
Endmember														
Pyrope	10.1	10.2	10.1	10.0	9.9	9.9	10.1	9.5	9.9	9.6	9.6	9.6	9.8	9.6
Almandine	60.8	59.9	58.8	58.0	59.4	61.1	62.0	58.4	56.6	55.2	55.4	55.3	55.7	58.3
Spessartine	14.8	14.2	13.9	14.1	14.9	15.7	15.9	14.0	14.1	14.6	14.9	14.7	14.8	14.6
Grossular	14.4	15.7	17.3	17.9	15.8	13.3	12.0	18.1	19.4	20.6	20.1	20.4	19.7	17.5

	75223A F1 Grt5	75223A F1 Grt6	75223A F1 Grt7	75223A F1 Grt8	75223A F1 Grt9	75223A F1 Grt10	75223A F1 Grt12	75223A F1 Grt13	75247F F0 Grt 1	75247F F0 Grt 2	75247F F0 Grt 3	75247F F0 Grt 4	75247F F0 Grt 5	75247F F0 Grt 6
Analysis														
SiO_2	36.47	37.64	37.22	37.29	36.81	37.19	36.85	37.51	37.42	37.39	37.54	37.49	37.36	37.45
TiO_2	0.05	0.04	0.03	0.07	0.09	0.39	0.14	0.10	0.00	0.00	0.02	0.01	0.00	0.00
Al_2O_3	20.49	20.64	20.64	20.70	20.37	20.82	20.79	20.83	20.52	20.49	20.64	20.50	20.40	20.57
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	0.34	0.00	0.00	0.00	0.73	0.49	0.76	0.00	0.30	0.31	0.37	0.38	0.51	0.30
MgO	1.82	1.64	2.09	2.15	1.98	1.96	2.11	2.23	1.31	1.67	1.86	1.99	2.01	2.05
CaO	6.35	5.89	4.83	5.12	5.95	6.72	5.13	3.60	1.51	1.34	1.30	1.30	1.30	1.29
MnO	1.12	1.49	0.99	0.99	1.05	1.10	1.40	1.61	7.54	6.85	6.56	6.05	6.43	5.84
FeO	30.67	31.72	32.41	32.90	31.58	31.55	32.06	33.30	31.88	32.11	32.53	32.52	32.06	32.66
Na_2O	0.11	0.05	0.04	0.03	0.06	0.02	0.08	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Total	97.40	99.11	98.24	99.25	98.62	100.22	99.37	99.26	100.48	100.16	100.83	100.24	100.07	100.16
Cations														
Si	3.001	3.043	3.033	3.016	2.999	2.980	2.982	3.032	3.032	3.033	3.024	3.033	3.029	3.030
Ti	0.003	0.002	0.002	0.004	0.005	0.024	0.009	0.006	0.000	0.000	0.001	0.001	0.000	0.000
Al	1.987	1.966	1.982	1.974	1.957	1.966	1.983	1.984	1.960	1.959	1.960	1.954	1.949	1.962
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{3+}	0.021	0.000	0.000	0.000	0.045	0.029	0.046	0.000	0.018	0.019	0.023	0.023	0.031	0.018
Mg	0.223	0.198	0.254	0.259	0.240	0.234	0.255	0.268	0.158	0.202	0.223	0.240	0.243	0.247
Ca	0.560	0.510	0.422	0.444	0.520	0.577	0.445	0.311	0.131	0.116	0.112	0.113	0.113	0.112
Mn	0.078	0.102	0.068	0.068	0.072	0.074	0.096	0.110	0.518	0.471	0.448	0.415	0.442	0.400
Fe^{2+}	2.111	2.145	2.209	2.225	2.152	2.114	2.169	2.251	2.160	2.178	2.192	2.200	2.174	2.210
Na	0.017	0.008	0.006	0.005	0.010	0.002	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.976	7.976	7.995	8.000	8.000	8.000	7.975	7.978	7.978	7.983	7.978	7.981	7.980
Endmember														
Pyrope	7.5	6.7	8.6	8.7	8.0	7.8	8.6	9.1	5.3	6.8	7.5	8.1	8.2	8.3
Almandine	71.0	72.6	74.8	74.3	72.1	70.5	73.2	76.5	72.8	73.4	73.7	74.1	73.2	74.4
Spessartine	2.6	3.5	2.3	2.3	2.4	2.5	3.2	3.7	17.4	15.9	15.0	14.0	14.9	13.5
Grossular	18.8	17.3	14.3	14.8	17.4	19.2	15.0	10.6	4.4	3.9	3.8	3.8	3.8	3.8

	75247F F0 Grt 7	75247F F0 Grt 8	75247F F0 Grt 9	75247F F0 Grt 10	75247F F0 Grt 11	75247F F0 Grt 12	75247F F0 Grt 13	75247F F0 Grt 14	75247F F0 Grt 15	75247F F0 Grt 16	75247F F0 Grt 17	75247F F0 Grt 18	75247F F0 Grt 19	75247F F0 Grt 20
Analysis														
SiO_2	37.32	37.20	37.67	37.51	37.26	37.50	37.67	37.51	37.54	37.56	37.56	37.50	37.40	37.44
TiO_2	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.01
Al_2O_3	20.58	20.45	20.61	20.69	20.64	20.56	20.75	20.72	20.33	20.68	20.67	20.55	20.52	20.63
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	0.30	0.60	0.54	0.31	0.08	0.54	0.36	0.54	0.39	0.04	0.29	0.07	0.47	0.58
MgO	2.06	2.20	2.19	2.21	2.17	2.15	2.19	2.20	2.20	2.10	2.18	2.12	2.16	2.06
CaO	1.29	1.28	1.26	1.32	1.31	1.32	1.30	1.27	1.27	1.30	1.26	1.31	1.30	1.27
MnO	5.75	5.65	5.92	5.77	5.57	5.72	5.73	5.46	5.60	5.85	5.67	6.08	5.79	6.22
FeO	32.77	32.76	32.80	32.69	32.56	32.89	32.99	33.46	32.28	32.45	32.85	31.92	32.65	32.81
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.07	100.14	101.01	100.50	99.60	100.70	100.99	101.15	99.61	99.99	100.48	99.56	100.31	101.02
Cations														
Si	3.024	3.015	3.024	3.023	3.027	3.021	3.023	3.011	3.047	3.038	3.028	3.044	3.023	3.012
Ti	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Al	1.965	1.953	1.950	1.965	1.976	1.952	1.963	1.960	1.945	1.971	1.964	1.966	1.955	1.956
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{3+}	0.018	0.037	0.033	0.019	0.005	0.033	0.022	0.033	0.024	0.002	0.018	0.005	0.029	0.035
Mg	0.249	0.266	0.262	0.266	0.263	0.258	0.262	0.263	0.266	0.253	0.262	0.257	0.260	0.247
Ca	0.112	0.111	0.108	0.114	0.114	0.114	0.111	0.109	0.110	0.113	0.109	0.114	0.113	0.110
Mn	0.395	0.388	0.403	0.394	0.383	0.390	0.389	0.371	0.385	0.401	0.387	0.418	0.396	0.424
Fe^{2+}	2.221	2.220	2.202	2.203	2.212	2.216	2.214	2.246	2.191	2.195	2.214	2.167	2.207	2.207
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.984	7.990	7.983	7.984	7.982	7.986	7.984	7.993	7.969	7.974	7.982	7.971	7.984	7.992
Endmember														
Pyrope	8.4	8.9	8.8	8.9	8.8	8.7	8.8	8.8	9.0	8.5	8.8	8.7	8.7	8.3
Almandine	74.6	74.4	74.0	74.0	74.4	74.4	74.4	75.1	74.2	74.1	74.5	73.3	74.1	73.9
Spessartine	13.3	13.0	13.5	13.2	12.9	13.1	13.1	12.4	13.0	13.5	13.0	14.1	13.3	14.2
Grossular	3.8	3.7	3.6	3.8	3.9	3.8	3.7	3.6	3.7	3.8	3.7	3.9	3.8	3.7

	75247F F0 Grt 21	75247F F0 Grt 22	75247F F0 Grt 23	75247F F0 Grt 24	75248C F1 Grt L1	75248C F1 Grt L2	75248C F1 Grt L3	75248C F1 Grt L4	75248C F1 Grt L5	75248C F1 Grt L6	75248C F1 Grt L7	75248C F1 Grt L8	75248C F1 Grt L9	75248C F1 Grt L10
Analysis														
SiO_2	37.48	37.35	37.44	36.94	36.47	36.34	36.76	36.63	36.92	36.81	36.81	36.63	36.68	36.59
TiO_2	0.00	0.02	0.00	0.01	0.01	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.02
Al_2O_3	20.72	20.42	20.63	20.85	20.59	20.68	20.56	20.56	20.72	20.66	20.80	20.72	20.63	20.70
Cr_2O_3	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.04	0.02	0.01	0.03	0.02	0.03	0.02
Fe_2O_3	0.54	0.22	0.39	0.00	0.00	0.00	0.00	0.34	0.00	0.24	0.00	0.00	0.03	0.03
MgO	1.96	1.91	1.73	1.27	1.81	2.03	2.01	2.18	2.21	2.19	2.24	2.25	2.26	2.29
CaO	1.33	1.20	1.27	1.28	1.28	1.25	1.26	1.28	1.28	1.23	1.20	1.19	1.22	1.16
MnO	6.47	6.43	6.87	7.17	7.59	7.66	7.46	7.64	7.28	7.56	7.03	7.04	6.99	6.86
FeO	32.78	32.03	32.47	32.19	30.77	30.59	30.26	30.63	30.83	30.89	31.11	31.07	31.01	31.29
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	101.29	99.59	100.81	99.71	98.54	98.59	98.34	99.30	99.26	99.60	99.21	98.92	98.85	98.94
Cations														
Si	3.009	3.040	3.021	3.015	3.005	2.993	3.024	2.996	3.011	2.999	3.005	3.000	3.006	2.998
Ti	0.000	0.001	0.000	0.001	0.001	0.002	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001
Al	1.961	1.959	1.962	2.006	2.000	2.007	1.993	1.981	1.992	1.984	2.001	2.001	1.992	1.999
Cr	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.001	0.001	0.002	0.001	0.002	0.001
Fe^{3+}	0.033	0.013	0.024	0.000	0.000	0.000	0.000	0.021	0.000	0.015	0.000	0.000	0.002	0.002
Mg	0.235	0.232	0.208	0.154	0.222	0.249	0.247	0.265	0.269	0.265	0.272	0.275	0.276	0.279
Ca	0.115	0.105	0.110	0.112	0.113	0.110	0.111	0.112	0.112	0.108	0.105	0.104	0.107	0.102
Mn	0.440	0.443	0.470	0.496	0.530	0.534	0.519	0.529	0.503	0.521	0.486	0.489	0.485	0.476
Fe^{2+}	2.201	2.180	2.191	2.197	2.121	2.107	2.081	2.095	2.103	2.105	2.124	2.129	2.125	2.144
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.994	7.973	7.986	7.981	7.993	8.002	7.978	8.002	7.991	8.000	7.994	7.999	7.996	8.001
Endmember														
Pyrope	7.8	7.8	7.0	5.2	7.4	8.3	8.3	8.8	9.0	8.8	9.1	9.2	9.2	9.3
Almandine	73.6	73.7	73.6	74.3	71.0	70.2	70.4	69.8	70.4	70.2	71.1	71.0	71.0	71.5
Spessartine	14.7	15.0	15.8	16.8	17.8	17.8	17.6	17.6	16.8	17.4	16.3	16.3	16.2	15.9
Grossular	3.8	3.5	3.7	3.8	3.8	3.7	3.7	3.7	3.7	3.6	3.5	3.5	3.6	3.4

	75248C F1 Grt L11	75248C F1 Grt L12	75248C F1 Grt L13	75248C F1 Grt L14	75248C F1 Grt L15	75248C F1 Grt L16	75248C F1 Grt L17	75248C F1 Grt L18	75248C F1 Grt L19	75248C F1 Grt L20	75248C F1 Grt L21	75248C F1 Grt L22	75248C F1 Grt L23	75248C F1 Grt L24
Analysis														
SiO_2	36.68	36.51	36.78	36.72	36.73	37.01	37.19	36.96	36.65	36.91	36.90	36.83	36.76	36.68
TiO_2	0.01	0.02	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al_2O_3	20.64	20.82	20.85	20.82	20.94	20.82	20.88	20.68	20.77	20.57	20.65	20.73	20.68	20.68
Cr_2O_3	0.03	0.03	0.02	0.01	0.01	0.03	0.03	0.01	0.00	0.03	0.05	0.02	0.03	0.02
Fe_2O_3	0.19	0.16	0.00	0.01	0.00	0.00	0.00	0.14	0.36	0.30	0.00	0.36	0.00	0.49
MgO	2.33	2.18	2.21	2.31	2.37	2.38	2.40	2.35	2.37	2.42	2.38	2.38	2.33	2.39
CaO	1.23	1.19	1.21	1.18	1.21	1.18	1.20	1.16	1.17	1.19	1.22	1.27	1.21	1.23
MnO	6.84	6.95	6.82	6.66	6.71	6.65	6.41	6.79	6.72	6.52	6.57	6.68	6.78	7.07
FeO	31.24	31.49	31.35	31.59	31.51	31.34	31.41	31.38	31.56	31.50	31.13	31.55	31.06	31.10
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.20	99.33	99.24	99.32	99.51	99.43	99.52	99.46	99.59	99.44	98.89	99.82	98.84	99.67
Cations														
Si	2.998	2.984	3.002	2.996	2.991	3.010	3.017	3.009	2.986	3.007	3.016	2.993	3.009	2.986
Ti	0.001	0.001	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	1.988	2.006	2.006	2.002	2.009	1.996	1.997	1.984	1.994	1.975	1.990	1.985	1.995	1.985
Cr	0.002	0.002	0.001	0.000	0.001	0.002	0.002	0.001	0.000	0.002	0.003	0.002	0.002	0.001
Fe^{3+}	0.012	0.010	0.000	0.001	0.000	0.000	0.000	0.008	0.022	0.018	0.000	0.022	0.000	0.030
Mg	0.284	0.266	0.268	0.281	0.287	0.288	0.290	0.285	0.287	0.294	0.290	0.288	0.285	0.290
Ca	0.107	0.104	0.106	0.103	0.105	0.103	0.105	0.101	0.102	0.104	0.106	0.110	0.106	0.108
Mn	0.473	0.481	0.471	0.460	0.463	0.458	0.441	0.468	0.464	0.450	0.455	0.460	0.470	0.488
Fe^{2+}	2.135	2.153	2.140	2.156	2.145	2.131	2.132	2.136	2.150	2.146	2.128	2.143	2.126	2.118
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.001	8.006	7.995	8.001	8.003	7.990	7.983	7.994	8.006	7.996	7.988	8.003	7.993	8.006
Endmember														
Pyrope	9.5	8.8	9.0	9.4	9.6	9.7	9.8	9.5	9.6	9.8	9.7	9.6	9.5	9.7
Almandine	71.2	71.7	71.7	71.8	71.5	71.5	71.8	71.4	71.6	71.7	71.4	71.4	71.2	70.5
Spessartine	15.8	16.0	15.8	15.3	15.4	15.4	14.8	15.7	15.4	15.0	15.3	15.3	15.7	16.2
Grossular	3.6	3.5	3.5	3.4	3.5	3.5	3.5	3.4	3.4	3.5	3.6	3.7	3.5	3.6

	75248C F1 Grt L25	75248C F1 Grt L26	75248C F1 Grt L27	75248C F1 Grt L28	75248C F1 Grt L29	75248C F1 Grt L30	75248C F1 Grt L31	75248C F1 Grt L32	75248C F1 Grt L33	75248C F1 Grt L34	75248C F1 Grt L35	75248C F1 Grt L36	75248C F1 Grt L37	75248C F1 Grt L38
Analysis														
SiO_2	36.54	36.60	36.58	36.80	36.55	36.70	36.65	36.61	36.77	36.96	36.64	36.63	36.82	36.64
TiO_2	0.02	0.02	0.00	0.00	0.02	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
Al_2O_3	20.62	20.61	20.48	20.54	20.57	20.64	20.85	20.95	20.93	20.76	20.89	20.60	20.69	20.79
Cr_2O_3	0.02	0.01	0.02	0.02	0.02	0.03	0.03	0.00	0.06	0.03	0.00	0.00	0.01	0.00
Fe_2O_3	0.34	0.08	0.48	0.27	0.20	0.10	0.00	0.36	0.00	0.33	0.00	0.29	0.02	0.00
MgO	2.29	2.22	2.28	2.24	2.20	2.23	2.29	2.40	2.33	2.42	2.39	2.39	2.30	2.34
CaO	1.21	1.25	1.28	1.21	1.22	1.26	1.26	1.21	1.24	1.26	1.22	1.19	1.21	1.20
MnO	6.92	7.13	6.94	6.93	7.01	6.91	6.77	6.96	6.64	7.03	6.81	6.83	6.73	6.72
FeO	31.25	30.95	31.12	31.26	31.18	31.23	30.98	31.36	31.48	31.22	31.14	31.16	31.30	30.90
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.21	98.88	99.18	99.26	98.96	99.11	98.82	99.85	99.45	100.00	99.09	99.10	99.06	98.60
Cations														
Si	2.990	3.001	2.995	3.006	2.997	3.002	3.001	2.975	2.994	2.996	2.994	2.996	3.009	3.004
Ti	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Al	1.988	1.992	1.976	1.978	1.988	1.990	2.011	2.006	2.009	1.983	2.011	1.986	1.992	2.009
Cr	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.000	0.004	0.002	0.000	0.000	0.001	0.000
Fe^{3+}	0.021	0.005	0.029	0.017	0.012	0.006	0.000	0.022	0.000	0.020	0.000	0.018	0.001	0.000
Mg	0.279	0.271	0.278	0.272	0.268	0.272	0.279	0.291	0.282	0.292	0.291	0.291	0.281	0.287
Ca	0.106	0.110	0.112	0.105	0.107	0.111	0.110	0.105	0.108	0.110	0.107	0.105	0.106	0.105
Mn	0.479	0.495	0.481	0.480	0.487	0.479	0.469	0.479	0.458	0.483	0.471	0.473	0.466	0.467
Fe^{2+}	2.138	2.122	2.130	2.136	2.138	2.136	2.121	2.131	2.143	2.117	2.128	2.132	2.139	2.119
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.004	7.999	8.002	7.996	8.001	7.998	7.993	8.010	7.999	8.002	8.001	8.002	7.994	7.991
Endmember														
Pyrope	9.3	9.1	9.3	9.1	8.9	9.1	9.4	9.7	9.4	9.7	9.7	9.7	9.4	9.6
Almandine	71.2	70.8	71.0	71.4	71.3	71.3	71.2	70.9	71.7	70.5	71.0	71.0	71.5	71.2
Spessartine	16.0	16.5	16.0	16.0	16.2	16.0	15.7	15.9	15.3	16.1	15.7	15.8	15.6	15.7
Grossular	3.5	3.7	3.7	3.5	3.6	3.7	3.7	3.5	3.6	3.7	3.6	3.5	3.5	3.5

	75248C F1 Grt L39	75248C F1 Grt L40	75248C F1 Grt L41	75248C F1 Grt L42	75248C F1 Grt L43	75248C F1 Grt L44	75248C F1 Grt L45	75248C F1 Grt L46	75248C F1 Grt L47	75248C F1 Grt L48	75248C F1 Grt L49	75248C F1 Grt L52	75248C F1 Grt L54	75248C F1 Grt L55
Analysis														
SiO_2	36.57	36.80	36.54	36.59	36.81	36.71	36.83	36.63	36.49	36.50	36.65	36.59	36.28	36.65
TiO_2	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.03
Al_2O_3	20.67	20.85	20.83	20.88	20.74	20.69	20.87	20.82	20.69	20.60	20.65	20.81	20.76	20.58
Cr_2O_3	0.03	0.01	0.00	0.01	0.00	0.02	0.01	0.03	0.02	0.03	0.03	0.03	0.05	0.02
Fe_2O_3	0.00	0.13	0.10	0.00	0.13	0.11	0.01	0.04	0.41	0.10	0.00	0.00	0.00	0.14
MgO	2.31	2.28	2.36	2.28	2.26	2.23	2.26	2.19	2.18	2.08	2.02	1.69	1.87	1.78
CaO	1.17	1.21	1.19	1.25	1.15	1.24	1.26	1.20	1.21	1.21	1.22	1.27	1.24	1.22
MnO	6.92	6.91	7.18	7.00	7.25	7.07	7.50	7.64	7.57	7.97	7.87	7.89	8.05	8.19
FeO	30.82	31.52	30.91	30.72	31.17	31.19	30.85	30.77	30.84	30.34	30.40	31.21	30.44	30.73
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.49	99.73	99.10	98.74	99.52	99.26	99.58	99.32	99.42	98.84	98.85	99.50	98.68	99.33
Cations														
Si	3.005	2.993	2.989	2.998	3.000	2.999	2.998	2.992	2.983	2.998	3.007	2.993	2.988	3.002
Ti	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.002
Al	2.002	1.998	2.007	2.016	1.992	1.993	2.001	2.005	1.993	1.994	1.996	2.007	2.015	1.987
Cr	0.002	0.001	0.000	0.001	0.000	0.001	0.001	0.002	0.001	0.002	0.002	0.002	0.003	0.001
Fe^{3+}	0.000	0.008	0.006	0.000	0.008	0.007	0.001	0.003	0.025	0.006	0.000	0.000	0.000	0.008
Mg	0.283	0.277	0.288	0.279	0.275	0.272	0.275	0.267	0.265	0.255	0.247	0.206	0.229	0.217
Ca	0.103	0.105	0.104	0.110	0.101	0.108	0.110	0.105	0.106	0.106	0.107	0.111	0.109	0.107
Mn	0.482	0.476	0.497	0.486	0.500	0.489	0.517	0.528	0.524	0.555	0.547	0.547	0.562	0.568
Fe^{2+}	2.118	2.144	2.114	2.105	2.124	2.131	2.099	2.102	2.108	2.084	2.086	2.135	2.097	2.105
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.994	8.002	8.005	7.993	8.000	8.000	8.001	8.003	8.007	8.001	7.993	8.002	8.003	7.998
Endmember														
Pyrope	9.5	9.2	9.6	9.4	9.2	9.1	9.2	8.9	8.8	8.5	8.3	6.9	7.7	7.2
Almandine	70.9	71.4	70.4	70.7	70.8	71.0	70.0	70.0	70.2	69.5	69.8	71.2	70.0	70.2
Spessartine	16.1	15.9	16.6	16.3	16.7	16.3	17.2	17.6	17.5	18.5	18.3	18.2	18.7	19.0
Grossular	3.4	3.5	3.5	3.7	3.4	3.6	3.7	3.5	3.5	3.5	3.6	3.7	3.6	3.6

	75248C F3 Grt L1	75248C F3 Grt L2	75248C F3 Grt L3	75248C F3 Grt L4	75248C F3 Grt L5	75248C F3 Grt L6	75248C F3 Grt L7	75248C F3 Grt L8	75248C F3 Grt L9	75248C F3 Grt L10	75248C F3 Grt L11	75248C F3 Grt L12	75248C F3 Grt L13	75248C F3 Grt L14
Analysis														
SiO_2	36.50	36.55	36.63	36.43	36.51	36.41	36.65	36.78	36.57	36.64	36.67	36.87	36.50	36.73
TiO_2	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.01
Al_2O_3	20.98	20.87	20.74	20.90	20.84	20.72	20.72	20.72	20.60	20.52	20.64	20.71	20.80	20.91
Cr_2O_3	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.04	0.05	0.04	0.04	0.02	0.02	0.00
Fe_2O_3	0.00	0.22	0.19	0.16	0.01	0.41	0.22	0.07	0.25	0.32	0.27	0.17	0.12	0.19
MgO	2.25	2.26	2.25	2.26	2.34	2.28	2.28	2.28	2.23	2.27	2.22	2.25	2.22	2.24
CaO	1.21	1.20	1.20	1.19	1.20	1.20	1.19	1.19	1.23	1.26	1.21	1.23	1.25	1.17
MnO	7.85	7.81	7.79	7.66	7.69	7.65	7.68	7.44	7.50	7.53	7.80	7.66	7.35	7.66
FeO	29.86	30.57	30.49	30.62	30.34	30.56	30.61	30.85	30.69	30.53	30.53	30.70	30.87	30.92
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.65	99.48	99.30	99.22	98.93	99.23	99.39	99.41	99.12	99.10	99.38	99.60	99.14	99.82
Cations														
Si	2.992	2.982	2.992	2.979	2.990	2.980	2.992	3.000	2.994	2.999	2.995	3.002	2.987	2.986
Ti	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001
Al	2.027	2.007	1.997	2.014	2.012	1.999	1.993	1.991	1.988	1.979	1.987	1.987	2.007	2.003
Cr	0.000	0.001	0.000	0.000	0.000	0.000	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.000
Fe^{3+}	0.000	0.013	0.012	0.010	0.000	0.025	0.014	0.005	0.015	0.020	0.016	0.010	0.007	0.012
Mg	0.275	0.275	0.274	0.276	0.286	0.279	0.277	0.278	0.273	0.277	0.270	0.273	0.271	0.271
Ca	0.107	0.105	0.105	0.104	0.105	0.105	0.104	0.104	0.107	0.111	0.106	0.107	0.110	0.102
Mn	0.545	0.540	0.539	0.531	0.533	0.530	0.531	0.514	0.520	0.522	0.540	0.529	0.510	0.528
Fe^{2+}	2.048	2.086	2.083	2.094	2.078	2.092	2.090	2.104	2.101	2.090	2.085	2.090	2.113	2.103
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.994	8.007	8.003	8.009	8.004	8.009	8.003	7.999	8.002	8.000	8.002	7.999	8.005	8.005
Endmember														
Pyrope	9.2	9.1	9.1	9.2	9.5	9.3	9.2	9.3	9.1	9.2	9.0	9.1	9.0	9.0
Almandine	68.8	69.4	69.4	69.7	69.2	69.6	69.6	70.1	70.0	69.7	69.5	69.7	70.4	70.0
Spessartine	18.3	18.0	18.0	17.7	17.8	17.6	17.7	17.1	17.3	17.4	18.0	17.6	17.0	17.6
Grossular	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.7	3.5	3.6	3.7	3.4

	75248C F3 Grt L15	75248C F3 Grt L16	75248C F3 Grt L17	75248C F3 Grt L18	75248C F3 Grt L19	75248C F3 Grt L20	75251E F2 Grt2	75251E F2 Grt3	75251E F2 Grt4	75251E F2 Grt5	75251E F2 Grt6	75251E F2 Grt7	75251E F2 Grt8	75251E F2 Grt9
Analysis														
SiO_2	36.68	36.57	36.48	36.75	36.32	36.46	36.74	36.52	36.46	36.61	36.66	36.30	36.56	36.43
TiO_2	0.00	0.01	0.01	0.01	0.01	0.03	0.00	0.02	0.00	0.02	0.01	0.02	0.00	0.00
Al_2O_3	20.73	20.88	20.73	20.79	20.73	20.62	20.66	20.43	20.65	20.76	20.66	20.68	20.71	20.71
Cr_2O_3	0.01	0.02	0.00	0.02	0.03	0.02	0.00	0.01	0.02	0.00	0.01	0.01	0.01	0.00
Fe_2O_3	0.18	0.18	0.15	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00
MgO	2.25	2.17	2.20	2.18	2.17	2.17	1.63	1.80	1.88	1.91	1.99	2.00	2.05	2.11
CaO	1.21	1.25	1.17	1.25	1.21	1.28	1.27	1.35	1.32	1.31	1.30	1.32	1.29	1.30
MnO	7.62	8.00	7.85	7.95	8.08	7.84	6.74	6.23	5.81	6.93	6.58	5.88	5.93	5.80
FeO	30.67	30.47	30.44	30.27	30.09	29.61	29.58	29.75	29.18	31.13	31.74	31.22	30.70	30.53
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.05	0.01	0.02	0.01
Total	99.35	99.54	99.01	99.23	98.73	98.02	96.60	96.14	95.32	98.66	99.56	97.44	97.27	96.89
Cations														
Si	2.995	2.983	2.990	3.001	2.986	3.008	3.057	3.054	3.060	3.007	2.992	3.010	3.028	3.026
Ti	0.000	0.000	0.000	0.001	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000
Al	1.994	2.007	2.002	2.001	2.009	2.005	2.026	2.013	2.042	2.010	1.988	2.022	2.021	2.028
Cr	0.001	0.001	0.000	0.001	0.002	0.001	0.000	0.001	0.002	0.000	0.000	0.001	0.001	0.000
Fe^{3+}	0.011	0.011	0.009	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000
Mg	0.274	0.264	0.268	0.266	0.266	0.267	0.202	0.224	0.235	0.234	0.242	0.247	0.253	0.261
Ca	0.105	0.109	0.102	0.109	0.107	0.113	0.113	0.121	0.119	0.115	0.113	0.117	0.114	0.116
Mn	0.527	0.553	0.545	0.550	0.562	0.548	0.475	0.441	0.413	0.482	0.455	0.413	0.416	0.408
Fe^{2+}	2.094	2.079	2.087	2.068	2.069	2.043	2.059	2.080	2.048	2.138	2.167	2.166	2.126	2.120
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.008	0.002	0.004	0.001
Total	8.002	8.007	8.004	7.997	8.006	7.987	7.930	7.941	7.919	7.987	8.000	7.978	7.963	7.961
Endmember														
Pyrope	9.1	8.8	8.9	8.9	8.8	9.0	7.1	7.8	8.3	7.9	8.1	8.4	8.7	9.0
Almandine	69.8	69.2	69.5	69.1	68.9	68.8	72.3	72.6	72.8	72.0	72.8	73.6	73.1	73.0
Spessartine	17.6	18.4	18.1	18.4	18.7	18.5	16.7	15.4	14.7	16.2	15.3	14.0	14.3	14.0
Grossular	3.5	3.6	3.4	3.7	3.5	3.8	4.0	4.2	4.2	3.9	3.8	4.0	3.9	4.0

	75251E F2 Grt10	75251E F2 Grt11	75251E F2 Grt12	75251E F2 Grt13	75251E F2 Grt16	75251E F2 Grt17	75251E F2 Grt18	75251E F2 Grt19	75251E F2 Grt20	75251E F2 Grt21	75251E F2 Grt22	75251E F2 Grt23	75251E F2 Grt24	75251E F2 Grt25
Analysis														
SiO_2	36.67	36.78	36.81	36.75	36.49	36.60	36.42	35.19	36.49	34.64	36.25	36.38	36.79	36.56
TiO_2	0.01	0.02	0.02	0.03	0.03	0.02	0.01	0.00	0.00	0.03	0.02	0.02	0.03	0.02
Al_2O_3	20.76	20.81	20.75	20.82	20.70	20.77	20.81	19.90	20.68	19.72	20.67	20.78	20.52	20.60
Cr_2O_3	0.01	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.02	0.01	0.00	0.02	0.00	0.01
Fe_2O_3	0.07	1.18	0.59	0.00	0.23	0.00	0.00	0.00	0.00	0.56	0.35	0.00	0.00	0.00
MgO	2.13	2.13	2.09	1.98	1.96	2.04	2.03	1.99	2.09	1.99	2.04	1.97	1.93	1.89
CaO	1.20	1.26	1.29	1.27	1.30	1.32	1.32	1.29	1.24	1.24	1.35	1.36	1.43	1.32
MnO	6.71	6.73	6.59	5.87	6.49	6.40	5.92	5.47	6.57	6.16	6.46	6.20	6.29	5.81
FeO	31.72	31.74	31.86	30.76	31.92	30.66	31.12	29.27	30.53	30.07	31.30	30.80	30.53	29.67
Na_2O	0.00	0.01	0.03	0.01	0.00	0.01	0.01	0.03	0.02	0.00	0.03	0.03	0.04	0.02
Total	99.27	100.66	100.03	97.52	99.15	97.81	97.68	93.13	97.63	94.42	98.48	97.54	97.56	95.90
Cations														
Si	2.997	2.972	2.990	3.033	2.990	3.020	3.010	3.037	3.017	2.980	2.987	3.011	3.040	3.056
Ti	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.000	0.000	0.002	0.001	0.001	0.002	0.001
Al	2.000	1.982	1.986	2.025	1.999	2.019	2.028	2.024	2.015	1.999	2.007	2.027	1.999	2.030
Cr	0.001	0.000	0.000	0.002	0.002	0.000	0.002	0.000	0.002	0.001	0.000	0.001	0.000	0.001
Fe^{3+}	0.004	0.072	0.036	0.000	0.014	0.000	0.000	0.000	0.000	0.036	0.022	0.000	0.000	0.000
Mg	0.259	0.256	0.253	0.244	0.240	0.251	0.250	0.256	0.257	0.255	0.251	0.243	0.238	0.235
Ca	0.105	0.109	0.112	0.113	0.114	0.117	0.117	0.119	0.110	0.114	0.119	0.120	0.127	0.118
Mn	0.464	0.460	0.453	0.410	0.451	0.447	0.414	0.400	0.460	0.449	0.451	0.435	0.440	0.411
Fe^{2+}	2.168	2.145	2.164	2.123	2.188	2.115	2.151	2.113	2.111	2.163	2.157	2.132	2.110	2.074
Na	0.000	0.001	0.004	0.001	0.000	0.001	0.001	0.004	0.003	0.000	0.005	0.004	0.007	0.003
Total	8.000	8.000	8.000	7.952	8.000	7.970	7.974	7.953	7.975	8.000	8.000	7.975	7.962	7.929
Endmember														
Pyrope	8.7	8.6	8.5	8.4	8.0	8.6	8.5	8.9	8.7	8.6	8.4	8.3	8.2	8.3
Almandine	72.3	72.2	72.6	73.5	73.1	72.2	73.4	73.2	71.8	72.6	72.4	72.8	72.4	73.1
Spessartine	15.5	15.5	15.2	14.2	15.1	15.3	14.1	13.8	15.7	15.1	15.1	14.8	15.1	14.5
Grossular	3.5	3.7	3.8	3.9	3.8	4.0	4.0	4.1	3.7	3.8	4.0	4.1	4.3	4.2

	75251E F2 Grt26	75251E F2 Grt27	75251E F2 Grt28	75251E F5 Grt2	75251E F5 Grt3	75251E F5 Grt4	75251E F5 Grt5	75251E F5 Grt6	75251E F5 Grt7	75251E F5 Grt8	75251E F5 Grt9	75251E F5 Grt10	75251E F5 Grt11	75251E F5 Grt12
Analysis														
SiO_2	36.19	36.20	36.33	36.25	36.38	36.18	36.40	36.57	36.24	36.34	36.90	36.23	36.67	36.40
TiO_2	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.02
Al_2O_3	20.58	20.91	20.47	20.64	20.50	20.70	20.40	20.57	20.77	20.65	20.76	20.82	20.64	20.64
Cr_2O_3	0.02	0.00	0.01	0.01	0.03	0.00	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.01
Fe_2O_3	0.00	0.00	0.00	0.00	0.82	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.83	1.72	1.34	1.88	1.97	2.01	2.02	2.11	2.13	2.17	2.08	2.18	2.16	2.18
CaO	1.24	1.37	1.31	1.32	1.27	1.33	1.33	1.42	1.38	1.42	1.42	1.34	1.42	1.34
MnO	6.85	7.24	7.91	7.74	7.44	7.26	6.23	6.07	6.00	6.46	6.23	6.47	6.07	5.79
FeO	31.16	31.31	29.73	30.32	30.73	30.52	30.18	29.67	29.55	30.88	31.04	31.26	30.57	29.59
Na_2O	0.00	0.04	0.02	0.00	0.02	0.02	0.03	0.04	0.04	0.00	0.02	0.02	0.01	0.01
Total	97.87	98.81	97.13	98.17	99.16	98.58	96.59	96.48	96.16	97.93	98.44	98.32	97.54	95.98
Cations														
Si	3.001	2.980	3.031	2.997	2.984	2.980	3.036	3.044	3.025	3.002	3.025	2.986	3.029	3.040
Ti	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.001
Al	2.011	2.029	2.012	2.011	1.981	2.009	2.006	2.017	2.043	2.011	2.006	2.023	2.009	2.031
Cr	0.001	0.000	0.001	0.000	0.002	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.051	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.226	0.211	0.166	0.232	0.241	0.247	0.251	0.261	0.265	0.267	0.254	0.268	0.266	0.272
Ca	0.110	0.121	0.117	0.117	0.111	0.118	0.119	0.127	0.123	0.125	0.124	0.119	0.125	0.120
Mn	0.481	0.505	0.559	0.542	0.517	0.506	0.440	0.428	0.424	0.452	0.432	0.452	0.425	0.410
Fe^{2+}	2.161	2.156	2.074	2.096	2.108	2.102	2.105	2.065	2.063	2.134	2.128	2.155	2.111	2.067
Na	0.000	0.007	0.003	0.000	0.004	0.004	0.005	0.007	0.007	0.000	0.003	0.003	0.001	0.002
Total	7.993	8.009	7.964	7.997	8.000	8.000	7.963	7.950	7.954	7.992	7.974	8.004	7.967	7.944
Endmember														
Pyrope	7.6	7.1	5.7	7.8	8.1	8.3	8.6	9.1	9.2	9.0	8.7	8.9	9.1	9.5
Almandine	72.5	72.0	71.1	70.2	70.8	70.7	72.2	71.7	71.7	71.6	72.4	72.0	72.1	72.1
Spessartine	16.2	16.9	19.2	18.1	17.4	17.0	15.1	14.8	14.8	15.2	14.7	15.1	14.5	14.3
Grossular	3.7	4.0	4.0	3.9	3.7	4.0	4.1	4.4	4.3	4.2	4.2	4.0	4.3	4.2

	75251E F5 Grt13	75251E F5 Grt14	75251E F5 Grt15	75251E F5 Grt16	75251E F5 Grt17	75251E F5 Grt18	75251E F5 Grt19	75251E F5 Grt20	75251E F5 Grt21	75251E F5 Grt22	75251E F5 Grt23	75251E F5 Grt24	75251E F5 Grt25	75251E F5 Grt26
Analysis														
SiO_2	36.34	36.44	36.42	36.34	36.10	36.17	36.28	36.24	36.49	36.18	36.29	36.41	36.61	36.39
TiO_2	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.00	0.02	0.00	0.00	0.01
Al_2O_3	20.79	20.81	20.87	20.49	20.66	20.62	20.41	20.52	20.64	20.55	20.57	20.74	20.51	20.75
Cr_2O_3	0.01	0.00	0.01	0.01	0.01	0.00	0.03	0.01	0.00	0.00	0.02	0.00	0.02	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.15	2.18	2.16	2.19	2.20	2.19	2.17	2.19	2.13	2.20	2.18	2.17	2.16	2.23
CaO	1.42	1.42	1.39	1.37	1.39	1.32	1.43	1.34	1.41	1.40	1.41	1.39	1.44	1.41
MnO	6.01	6.41	6.28	6.27	5.65	6.28	6.60	6.77	5.76	5.62	6.28	6.55	6.09	6.59
FeO	31.46	30.73	31.32	30.51	29.88	31.35	30.99	30.76	30.07	29.72	28.96	31.23	29.38	30.91
Na_2O	0.03	0.01	0.01	0.00	0.01	0.00	0.01	0.03	0.00	0.04	0.00	0.00	0.02	0.00
Total	98.22	98.01	98.46	97.18	95.90	97.95	98.25	97.90	96.50	95.70	95.71	98.50	96.23	98.28
Cations														
Si	2.995	3.003	2.994	3.018	3.024	2.993	2.996	2.999	3.037	3.033	3.039	2.995	3.051	2.996
Ti	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000
Al	2.020	2.021	2.022	2.005	2.039	2.011	1.986	2.001	2.025	2.031	2.030	2.010	2.014	2.013
Cr	0.001	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.265	0.268	0.264	0.271	0.274	0.271	0.267	0.271	0.265	0.275	0.272	0.267	0.268	0.274
Ca	0.125	0.126	0.122	0.122	0.125	0.117	0.127	0.119	0.125	0.126	0.127	0.123	0.128	0.124
Mn	0.420	0.447	0.437	0.441	0.401	0.440	0.461	0.475	0.406	0.399	0.445	0.457	0.430	0.460
Fe^{2+}	2.168	2.118	2.153	2.119	2.093	2.169	2.140	2.129	2.093	2.084	2.028	2.148	2.047	2.129
Na	0.004	0.002	0.001	0.000	0.002	0.000	0.001	0.005	0.000	0.007	0.000	0.000	0.003	0.000
Total	7.997	7.986	7.995	7.978	7.958	8.001	8.000	8.001	7.951	7.955	7.944	8.000	7.943	7.997
Endmember														
Pyrope	8.9	9.0	8.9	9.2	9.5	9.0	8.9	9.0	9.2	9.5	9.5	8.9	9.3	9.2
Almandine	72.8	71.6	72.3	71.8	72.4	72.4	71.5	71.1	72.4	72.3	70.6	71.7	71.2	71.3
Spessartine	14.1	15.1	14.7	14.9	13.9	14.7	15.4	15.9	14.1	13.8	15.5	15.3	15.0	15.4
Grossular	4.2	4.3	4.1	4.1	4.3	3.9	4.2	4.0	4.3	4.4	4.4	4.1	4.5	4.2

	75251E F5 Grt27	75251E F5 Grt28	75251E F5 Grt29	75251E F5 Grt30	75251E F5 Grt31	75251E F5 Grt32	75251E F5 Grt33	75251E F5 Grt34	75254A F4 Grt L1	75254A F4 Grt L2	75254A F4 Grt L3	75254A F4 Grt L4	75254A F4 Grt L5	75254A F4 Grt L6
Analysis														
SiO_2	36.58	36.18	36.44	36.52	36.48	36.53	36.70	36.37	36.40	37.22	37.14	37.23	37.50	37.19
TiO_2	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.04	0.00	0.00	0.00	0.01
Al_2O_3	20.65	20.60	20.85	20.54	20.71	20.48	20.83	20.47	20.88	21.28	21.21	21.23	21.28	21.08
Cr_2O_3	0.00	0.00	0.01	0.00	0.01	0.02	0.00	0.01	0.03	0.05	0.02	0.06	0.05	0.05
Fe_2O_3	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.45	0.32	0.31	0.46	0.75	0.51
MgO	2.16	2.20	2.19	2.10	2.09	2.08	2.07	2.03	2.97	4.07	4.35	4.68	4.88	4.82
CaO	1.33	1.39	1.38	1.39	1.38	1.36	1.35	1.32	3.02	3.00	2.98	3.00	2.97	2.87
MnO	5.55	5.05	5.95	6.77	6.55	6.34	6.39	6.43	6.55	5.13	4.49	4.41	4.06	3.73
FeO	29.11	28.95	30.44	31.24	30.10	30.67	29.69	30.14	28.31	28.67	28.69	28.36	28.78	28.83
Na_2O	0.04	0.00	0.00	0.01	0.01	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Total	95.44	94.38	97.26	98.76	97.33	97.47	97.09	96.82	98.61	99.77	99.18	99.44	100.26	99.08
Cations														
Si	3.060	3.056	3.016	3.000	3.021	3.026	3.036	3.029	2.968	2.975	2.979	2.974	2.971	2.979
Ti	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.001
Al	2.036	2.051	2.034	1.989	2.021	1.999	2.030	2.009	2.007	2.004	2.005	1.999	1.986	1.990
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.002	0.003	0.001	0.004	0.003	0.003
Fe^{3+}	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.028	0.019	0.019	0.028	0.045	0.031
Mg	0.270	0.277	0.270	0.257	0.258	0.257	0.255	0.252	0.361	0.485	0.520	0.557	0.577	0.575
Ca	0.119	0.126	0.123	0.122	0.123	0.120	0.120	0.117	0.264	0.257	0.256	0.256	0.252	0.246
Mn	0.393	0.362	0.417	0.471	0.459	0.445	0.448	0.454	0.452	0.348	0.305	0.298	0.272	0.253
Fe^{2+}	2.036	2.045	2.107	2.147	2.084	2.125	2.054	2.099	1.931	1.916	1.925	1.895	1.907	1.931
Na	0.006	0.000	0.000	0.002	0.002	0.000	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.923	7.918	7.967	8.000	7.969	7.974	7.952	7.969	8.013	8.010	8.009	8.011	8.012	8.008
Endmember														
Pyrope	9.6	9.9	9.3	8.6	8.8	8.7	8.9	8.6	12.0	16.1	17.3	18.5	19.2	19.1
Almandine	72.2	72.8	72.2	71.6	71.3	72.1	71.4	71.8	64.2	63.8	64.0	63.0	63.4	64.3
Spessartine	13.9	12.9	14.3	15.7	15.7	15.1	15.6	15.5	15.0	11.6	10.1	9.9	9.1	8.4
Grossular	4.2	4.5	4.2	4.1	4.2	4.1	4.2	4.0	8.8	8.6	8.5	8.5	8.4	8.2

	75254A F4 Grt L7	75254A F4 Grt L8	75254A F4 Grt L9	75254A F4 Grt L10	75254A F4 Grt L11	75254A F4 Grt L12	75254A F4 Grt L13	75254A F4 Grt L14	75254A F4 Grt L15	75254A F4 Grt L16	75254A F4 Grt L17	75254A F4 Grt L18	75254A F4 Grt L20	75254A F4 Grt L21
Analysis														
SiO_2	37.59	37.20	37.68	37.00	37.24	37.49	37.45	37.35	37.37	37.32	37.20	37.49	37.30	37.14
TiO_2	0.00	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.02	0.01	0.03	0.00	0.01	0.32
Al_2O_3	21.48	21.22	21.33	21.25	21.23	21.11	21.32	21.30	21.41	21.30	21.30	21.29	21.30	21.03
Cr_2O_3	0.05	0.04	0.03	0.01	0.01	0.03	0.01	0.00	0.03	0.01	0.03	0.04	0.02	0.07
Fe_2O_3	0.35	0.70	0.68	0.85	0.69	0.59	0.52	0.57	0.56	0.61	0.76	0.44	0.80	1.13
MgO	4.99	5.05	5.25	5.26	5.47	5.40	5.41	5.55	5.50	5.61	5.59	5.57	5.73	5.71
CaO	2.83	2.58	2.49	2.37	2.27	2.27	2.39	2.35	2.33	2.38	2.45	2.35	2.34	2.40
MnO	3.80	3.82	3.72	3.60	3.61	3.59	3.58	3.51	3.46	3.45	3.62	3.37	3.33	3.56
FeO	29.04	28.93	29.20	29.03	28.82	28.95	28.93	28.74	29.03	28.65	28.46	28.86	28.72	28.46
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.12	99.56	100.39	99.37	99.35	99.43	99.63	99.39	99.71	99.34	99.43	99.40	99.53	99.83
Cations														
Si	2.976	2.966	2.976	2.955	2.968	2.984	2.975	2.972	2.966	2.970	2.960	2.980	2.963	2.947
Ti	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.002	0.001	0.001	0.002	0.000	0.000	0.019
Al	2.004	1.994	1.985	2.001	1.994	1.980	1.996	1.997	2.003	1.997	1.997	1.994	1.994	1.966
Cr	0.003	0.003	0.002	0.001	0.001	0.002	0.001	0.000	0.002	0.001	0.002	0.002	0.001	0.005
Fe^{3+}	0.021	0.042	0.041	0.051	0.042	0.035	0.031	0.034	0.033	0.037	0.045	0.026	0.048	0.068
Mg	0.589	0.601	0.618	0.626	0.649	0.641	0.640	0.658	0.651	0.665	0.663	0.660	0.679	0.676
Ca	0.240	0.221	0.211	0.203	0.194	0.194	0.203	0.200	0.198	0.203	0.208	0.200	0.199	0.204
Mn	0.254	0.258	0.249	0.244	0.243	0.242	0.241	0.236	0.233	0.232	0.244	0.227	0.224	0.240
Fe^{2+}	1.922	1.929	1.928	1.939	1.921	1.927	1.922	1.912	1.927	1.907	1.894	1.918	1.908	1.889
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.010	8.014	8.010	8.019	8.013	8.006	8.010	8.011	8.014	8.012	8.016	8.008	8.015	8.014
Endmember														
Pyrope	19.6	20.0	20.6	20.8	21.6	21.3	21.3	21.9	21.6	22.1	22.0	22.0	22.6	22.5
Almandine	64.0	64.1	64.2	64.4	63.9	64.2	63.9	63.6	64.1	63.4	62.9	63.8	63.4	62.8
Spessartine	8.5	8.6	8.3	8.1	8.1	8.1	8.0	7.9	7.7	7.7	8.1	7.5	7.4	8.0
Grossular	8.0	7.3	7.0	6.7	6.5	6.4	6.8	6.7	6.6	6.8	6.9	6.7	6.6	6.8

	75254A F4 Grt L22	75254A F4 Grt L23	75254A F4 Grt L24	75254A F4 Grt L25	75254A F4 Grt L26	75254A F4 Grt L27	75254A F4 Grt L28	75254A F4 Grt L29	75254A F4 Grt L32	75254A F4 Grt L33	75254A F4 Grt L34	75254A F4 Grt L35	75254A F4 Grt L36	75254A F4 Grt L37
Analysis														
SiO_2	37.38	37.20	37.43	37.51	37.54	37.57	37.30	37.60	37.32	37.20	37.63	37.80	37.52	37.66
TiO_2	0.02	0.00	0.03	0.01	0.00	0.01	0.02	0.00	0.03	0.01	0.01	0.00	0.00	0.01
Al_2O_3	21.22	21.25	21.24	21.14	21.23	21.20	21.16	21.22	21.31	21.24	21.31	21.32	21.35	21.27
Cr_2O_3	0.03	0.02	0.01	0.06	0.08	0.06	0.07	0.03	0.03	0.02	0.02	0.00	0.01	0.00
Fe_2O_3	0.77	0.87	0.81	0.95	0.86	0.57	0.76	0.81	0.39	1.15	0.72	0.43	0.68	0.99
MgO	5.69	5.66	5.67	5.73	5.74	5.66	5.71	5.82	5.61	5.73	5.75	5.64	5.75	5.82
CaO	2.45	2.42	2.46	2.48	2.52	2.53	2.56	2.53	2.53	2.61	2.54	2.48	2.50	2.59
MnO	3.36	3.44	3.38	3.36	3.33	3.21	3.21	3.36	3.13	3.39	3.26	3.21	3.13	3.36
FeO	28.58	28.56	28.66	28.61	28.63	28.69	28.48	28.42	28.68	28.41	28.67	28.93	28.78	28.51
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.50	99.42	99.68	99.84	99.93	99.50	99.27	99.78	99.02	99.75	99.91	99.81	99.72	100.22
Cations														
Si	2.969	2.960	2.969	2.971	2.970	2.982	2.969	2.975	2.975	2.952	2.974	2.989	2.971	2.969
Ti	0.001	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.000	0.001
Al	1.987	1.993	1.986	1.973	1.979	1.983	1.985	1.979	2.002	1.986	1.985	1.987	1.993	1.977
Cr	0.002	0.001	0.001	0.004	0.005	0.004	0.004	0.002	0.002	0.001	0.001	0.000	0.000	0.000
Fe^{3+}	0.046	0.052	0.048	0.056	0.051	0.034	0.045	0.048	0.023	0.069	0.043	0.026	0.041	0.059
Mg	0.674	0.671	0.670	0.676	0.677	0.670	0.678	0.686	0.667	0.678	0.678	0.665	0.679	0.684
Ca	0.209	0.206	0.209	0.210	0.214	0.215	0.218	0.214	0.216	0.222	0.215	0.210	0.212	0.219
Mn	0.226	0.232	0.227	0.226	0.223	0.216	0.216	0.225	0.211	0.228	0.218	0.215	0.210	0.225
Fe^{2+}	1.899	1.901	1.901	1.895	1.894	1.904	1.895	1.881	1.912	1.885	1.895	1.913	1.906	1.880
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.012	8.017	8.012	8.012	8.013	8.008	8.012	8.010	8.010	8.020	8.010	8.005	8.012	8.013
Endmember														
Pyrope	22.4	22.3	22.3	22.5	22.5	22.3	22.5	22.8	22.2	22.5	22.5	22.1	22.6	22.8
Almandine	63.1	63.1	63.2	63.0	63.0	63.4	63.0	62.6	63.6	62.6	63.0	63.7	63.4	62.5
Spessartine	7.5	7.7	7.6	7.5	7.4	7.2	7.2	7.5	7.0	7.6	7.3	7.2	7.0	7.5
Grossular	6.9	6.9	6.9	7.0	7.1	7.1	7.2	7.1	7.2	7.4	7.1	7.0	7.1	7.3

	75254A F4 Grt L38	75254A F4 Grt L39	75254A F4 Grt L40	75254A F4 Grt L41	75254A F4 Grt L43	75254A F4 Grt L44	75254A F4 Grt L45	75254A F4 Grt L46	75254A F4 Grt L47	75254A F4 Grt L48	75254A F4 Grt L49	75254A F4 Grt L50	75254A F4 Grt L51	75254A F4 Grt L52
Analysis														
SiO_2	37.41	37.64	37.47	37.52	37.43	37.49	37.34	37.39	37.25	37.14	37.25	37.28	37.37	37.41
TiO_2	0.01	0.04	0.00	0.04	0.04	0.05	0.09	0.17	0.10	0.05	0.06	0.02	0.02	0.02
Al_2O_3	20.98	21.30	21.32	21.34	21.43	21.37	21.32	21.14	21.16	21.38	21.33	21.09	21.30	21.33
Cr_2O_3	0.02	0.00	0.02	0.07	0.00	0.01	0.03	0.02	0.02	0.00	0.02	0.03	0.05	0.07
Fe_2O_3	1.12	0.76	0.79	0.78	0.81	0.70	0.77	1.01	0.80	0.73	0.67	0.67	0.51	0.85
MgO	5.71	5.72	5.70	5.70	5.60	5.55	5.60	5.62	5.36	5.46	5.52	5.39	5.44	5.50
CaO	2.50	2.54	2.68	2.55	2.50	2.55	2.70	2.54	2.62	2.69	2.71	2.63	2.54	2.46
MnO	3.36	3.29	3.20	3.27	3.38	3.30	3.31	3.42	3.57	3.40	3.50	3.54	3.40	3.43
FeO	28.48	28.71	28.60	28.78	28.91	28.94	28.59	28.68	28.66	28.61	28.40	28.46	28.81	29.05
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.60	99.98	99.78	100.03	100.09	99.95	99.74	100.00	99.52	99.45	99.44	99.11	99.44	100.11
Cations														
Si	2.972	2.974	2.967	2.965	2.959	2.967	2.961	2.960	2.965	2.955	2.962	2.976	2.973	2.960
Ti	0.000	0.002	0.000	0.002	0.002	0.003	0.005	0.010	0.006	0.003	0.003	0.001	0.001	0.001
Al	1.964	1.983	1.990	1.987	1.997	1.993	1.992	1.973	1.985	2.005	1.999	1.984	1.997	1.990
Cr	0.002	0.000	0.001	0.004	0.000	0.001	0.002	0.001	0.001	0.000	0.001	0.002	0.003	0.004
Fe^{3+}	0.067	0.045	0.047	0.047	0.048	0.042	0.046	0.060	0.048	0.043	0.040	0.040	0.030	0.050
Mg	0.676	0.674	0.673	0.672	0.660	0.655	0.662	0.663	0.635	0.648	0.654	0.641	0.645	0.648
Ca	0.213	0.215	0.227	0.216	0.212	0.217	0.229	0.215	0.223	0.230	0.231	0.225	0.216	0.209
Mn	0.226	0.220	0.214	0.219	0.226	0.221	0.222	0.230	0.241	0.229	0.235	0.239	0.229	0.230
Fe^{2+}	1.892	1.897	1.894	1.902	1.912	1.915	1.895	1.899	1.908	1.904	1.888	1.900	1.917	1.923
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.012	8.010	8.014	8.014	8.016	8.013	8.014	8.012	8.012	8.017	8.014	8.009	8.011	8.016
Endmember														
Pyrope	22.5	22.4	22.4	22.3	21.9	21.8	22.0	22.1	21.1	21.5	21.7	21.3	21.5	21.5
Almandine	62.9	63.1	63.0	63.2	63.5	63.7	63.0	63.1	63.4	63.2	62.8	63.2	63.7	63.9
Spessartine	7.5	7.3	7.1	7.3	7.5	7.4	7.4	7.6	8.0	7.6	7.8	8.0	7.6	7.6
Grossular	7.1	7.2	7.5	7.2	7.0	7.2	7.6	7.2	7.4	7.6	7.7	7.5	7.2	6.9

	75254A F4 Grt L53	75254A F4 Grt L54	75254A F4 Grt L55	75254A F4 Grt L56	75254A F4 Grt L57	75254A F4 Grt L58	75254A F4 Grt L59	75254A F4 Grt L60	75254A F4 Grt L61	75254A F4 Grt L62	75254A F4 Grt L63	75254A F4 Grt L64	75254A F4 Grt L65	75254A F4 Grt L66
Analysis														
SiO_2	37.30	37.42	37.44	37.24	37.21	37.20	37.44	37.40	37.28	37.43	37.24	37.22	37.05	37.11
TiO_2	0.00	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.02	0.00	0.00
Al_2O_3	21.37	21.36	21.22	21.33	21.25	21.19	21.13	21.31	21.38	21.28	21.13	21.27	21.39	21.11
Cr_2O_3	0.01	0.00	0.02	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.03	0.04	0.05
Fe_2O_3	0.75	0.91	0.55	0.80	0.75	1.12	1.09	0.85	0.41	0.41	0.59	0.41	0.93	0.45
MgO	5.54	5.51	5.43	5.43	5.42	5.44	5.42	5.36	5.24	5.04	4.98	4.89	4.81	4.68
CaO	2.50	2.45	2.33	2.32	2.21	2.15	2.18	2.11	2.31	2.45	2.56	2.73	3.00	2.95
MnO	3.65	3.60	3.38	3.46	3.59	3.81	3.80	3.82	3.85	3.89	3.93	4.07	4.09	4.12
FeO	28.56	28.89	29.08	29.16	29.05	29.03	29.13	29.29	28.93	29.07	28.84	28.66	28.75	28.51
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.67	100.15	99.45	99.80	99.52	99.99	100.25	100.18	99.43	99.61	99.28	99.29	100.06	98.96
Cations														
Si	2.962	2.960	2.979	2.958	2.964	2.954	2.965	2.963	2.970	2.980	2.977	2.973	2.946	2.978
Ti	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000
Al	2.000	1.991	1.990	1.997	1.994	1.983	1.972	1.990	2.007	1.997	1.990	2.003	2.004	1.996
Cr	0.001	0.000	0.002	0.003	0.003	0.003	0.003	0.002	0.002	0.001	0.002	0.002	0.002	0.003
Fe^{3+}	0.045	0.054	0.033	0.048	0.045	0.067	0.065	0.051	0.025	0.025	0.036	0.025	0.056	0.027
Mg	0.655	0.649	0.644	0.643	0.643	0.644	0.640	0.633	0.623	0.598	0.593	0.582	0.570	0.560
Ca	0.213	0.208	0.198	0.198	0.188	0.183	0.185	0.179	0.197	0.209	0.219	0.234	0.256	0.253
Mn	0.245	0.241	0.228	0.232	0.242	0.256	0.255	0.256	0.260	0.262	0.266	0.275	0.276	0.280
Fe^{2+}	1.896	1.911	1.935	1.937	1.935	1.928	1.929	1.941	1.927	1.936	1.928	1.915	1.912	1.913
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.016	8.016	8.009	8.017	8.015	8.019	8.014	8.015	8.012	8.008	8.010	8.010	8.022	8.009
Endmember														
Pyrope	21.8	21.6	21.4	21.4	21.4	21.4	21.3	21.0	20.7	19.9	19.7	19.4	18.9	18.6
Almandine	63.0	63.5	64.4	64.4	64.3	64.0	64.1	64.5	64.1	64.4	64.1	63.7	63.4	63.6
Spessartine	8.1	8.0	7.6	7.7	8.1	8.5	8.5	8.5	8.6	8.7	8.8	9.2	9.1	9.3
Grossular	7.1	6.9	6.6	6.6	6.3	6.1	6.1	5.9	6.6	6.9	7.3	7.8	8.5	8.4

	75254A F4 Grt L67	75254A F4 Grt L69	75261C F2 Grt L1	75261C F2 Grt L2	75261C F2 Grt L3	75261C F2 Grt L4	75261C F2 Grt L5	75261C F2 Grt L6	75261C F2 Grt L8	75261C F2 Grt L9	75261C F2 Grt L10	75261C F2 Grt L11	75261C F2 Grt L12	75261C F2 Grt L13
Analysis														
SiO_2	40.43	36.91	37.16	37.22	37.00	36.93	37.02	36.93	37.07	36.87	37.04	36.86	36.98	36.67
TiO_2	0.00	0.03	0.04	0.04	0.04	0.02	0.06	0.04	0.02	0.03	0.01	0.02	0.00	0.05
Al_2O_3	21.46	21.07	20.88	20.88	20.83	20.61	20.63	20.54	20.55	20.47	20.68	20.47	20.48	20.48
Cr_2O_3	0.00	0.05	0.01	0.01	0.00	0.04	0.04	0.02	0.02	0.01	0.04	0.00	0.03	0.04
Fe_2O_3	0.00	0.28	0.32	0.25	0.13	0.21	0.15	0.45	0.00	0.34	0.16	0.26	0.22	0.08
MgO	4.18	3.89	2.86	2.93	2.78	2.65	2.55	2.60	3.12	3.12	3.09	2.94	2.86	2.70
CaO	2.70	3.08	4.48	4.68	4.62	4.76	4.68	4.89	2.25	2.64	2.58	2.76	2.94	2.93
MnO	4.20	5.15	0.91	1.08	1.20	1.46	1.79	1.89	1.75	1.55	1.82	2.04	2.44	3.00
FeO	26.65	28.45	32.76	32.19	32.16	31.63	31.60	31.29	33.19	33.28	33.34	32.82	32.32	31.90
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.62	98.91	99.42	99.28	98.77	98.31	98.51	98.64	97.98	98.32	98.75	98.17	98.26	97.85
Cations														
Si	3.155	2.978	2.994	2.999	2.999	3.008	3.011	3.002	3.030	3.010	3.010	3.014	3.020	3.011
Ti	0.000	0.002	0.002	0.002	0.002	0.001	0.004	0.002	0.001	0.002	0.001	0.001	0.000	0.003
Al	1.973	2.003	1.984	1.983	1.990	1.978	1.977	1.967	1.980	1.970	1.981	1.973	1.972	1.982
Cr	0.000	0.003	0.001	0.001	0.000	0.002	0.003	0.001	0.001	0.001	0.002	0.000	0.002	0.003
Fe^{3+}	0.000	0.017	0.020	0.015	0.008	0.013	0.009	0.028	0.000	0.021	0.010	0.016	0.014	0.005
Mg	0.487	0.467	0.344	0.352	0.336	0.322	0.309	0.315	0.380	0.380	0.375	0.359	0.348	0.331
Ca	0.225	0.266	0.387	0.404	0.401	0.415	0.407	0.426	0.197	0.231	0.225	0.241	0.257	0.258
Mn	0.277	0.352	0.062	0.074	0.082	0.101	0.123	0.130	0.121	0.107	0.125	0.141	0.168	0.209
Fe^{2+}	1.740	1.920	2.208	2.170	2.180	2.154	2.149	2.127	2.268	2.272	2.266	2.244	2.207	2.191
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.858	8.009	8.001	7.999	7.999	7.994	7.991	7.998	7.978	7.993	7.993	7.990	7.987	7.991
Endmember														
Pyrope	17.8	15.6	11.5	11.7	11.2	10.8	10.3	10.5	12.8	12.7	12.5	12.0	11.7	11.1
Almandine	63.7	63.9	73.6	72.3	72.7	72.0	71.9	70.9	76.5	76.0	75.8	75.2	74.1	73.3
Spessartine	10.2	11.7	2.1	2.5	2.7	3.4	4.1	4.3	4.1	3.6	4.2	4.7	5.7	7.0
Grossular	8.3	8.9	12.9	13.5	13.4	13.9	13.6	14.2	6.7	7.7	7.5	8.1	8.6	8.6

	75261C F2 Grt L14	75261C F2 Grt L15	75261C F2 Grt L16	75261C F2 Grt L17	75261C F2 Grt L18	75261C F2 Grt L19	75261C F2 Grt L20	75261C F2 Grt L24	75261C F2 Grt L26	75261C F2 Grt L27	75261C F2 Grt L29	75261C F2 Grt L30	75261C F2 Grt L31	75261C F2 Grt L32
Analysis														
SiO_2	36.81	36.80	36.95	37.05	36.77	36.66	37.20	36.83	36.46	36.64	36.82	37.07	36.92	37.01
TiO_2	0.05	0.03	0.09	0.08	0.04	0.03	0.06	0.22	0.08	0.05	0.03	0.00	0.00	0.02
Al_2O_3	20.62	20.49	20.61	20.58	20.49	20.53	20.62	20.70	20.47	20.41	20.66	20.64	20.46	20.76
Cr_2O_3	0.01	0.03	0.03	0.01	0.04	0.01	0.02	0.01	0.06	0.01	0.02	0.00	0.02	0.03
Fe_2O_3	0.21	0.27	0.00	0.03	0.00	0.18	0.35	0.26	0.09	0.07	0.04	0.25	0.30	0.13
MgO	2.60	2.47	2.38	2.29	2.22	2.14	2.16	2.21	2.15	2.20	2.25	2.28	2.26	2.22
CaO	3.04	3.25	3.12	3.25	3.28	3.36	3.23	3.12	3.07	2.98	2.79	2.64	2.59	2.72
MnO	3.63	4.17	4.55	4.89	5.25	5.88	6.14	6.36	6.36	6.36	6.58	6.60	6.35	6.51
FeO	31.74	30.96	30.63	30.47	29.85	29.62	29.97	29.81	29.38	29.14	29.55	29.84	29.91	30.10
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.71	98.47	98.36	98.65	97.94	98.41	99.74	99.52	98.11	97.86	98.74	99.33	98.81	99.49
Cations														
Si	3.002	3.008	3.019	3.021	3.020	3.004	3.010	2.990	3.000	3.016	3.008	3.012	3.015	3.004
Ti	0.003	0.002	0.005	0.005	0.002	0.002	0.004	0.013	0.005	0.003	0.002	0.000	0.000	0.001
Al	1.982	1.974	1.985	1.977	1.984	1.983	1.966	1.980	1.985	1.981	1.989	1.976	1.970	1.986
Cr	0.000	0.002	0.002	0.001	0.003	0.001	0.001	0.000	0.004	0.000	0.001	0.000	0.001	0.002
Fe^{3+}	0.013	0.017	0.000	0.002	0.000	0.011	0.021	0.016	0.006	0.004	0.003	0.016	0.019	0.008
Mg	0.316	0.301	0.290	0.278	0.272	0.261	0.260	0.267	0.263	0.270	0.273	0.276	0.276	0.269
Ca	0.266	0.285	0.274	0.284	0.289	0.295	0.280	0.271	0.271	0.263	0.244	0.230	0.227	0.236
Mn	0.251	0.289	0.315	0.338	0.365	0.408	0.421	0.438	0.443	0.444	0.455	0.454	0.439	0.447
Fe^{2+}	2.164	2.117	2.093	2.078	2.050	2.030	2.028	2.023	2.022	2.006	2.019	2.028	2.043	2.043
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.997	7.994	7.982	7.984	7.984	7.996	7.992	7.999	7.998	7.988	7.994	7.992	7.990	7.997
Endmember														
Pyrope	10.6	10.1	9.8	9.3	9.1	8.7	8.7	8.9	8.8	9.1	9.1	9.2	9.2	9.0
Almandine	72.2	70.8	70.4	69.8	68.9	67.8	67.9	67.5	67.4	67.3	67.5	67.9	68.4	68.2
Spessartine	8.4	9.7	10.6	11.3	12.3	13.6	14.1	14.6	14.8	14.9	15.2	15.2	14.7	14.9
Grossular	8.9	9.5	9.2	9.5	9.7	9.9	9.4	9.0	9.0	8.8	8.2	7.7	7.6	7.9

	75261C F2 Grt L33	75261C F2 Grt L34	75261C F2 Grt L36	75261C F2 Grt L37	75261C F2 Grt L38	75261C F2 Grt L39	75261C F2 Grt L40	75261C F2 Grt L41	75261C F2 Grt L42	75261C F2 Grt L43	75261C F2 Grt L44	75261C F2 Grt L45	75261C F2 Grt L46	75261C F2 Grt L47
Analysis														
SiO_2	36.60	36.87	36.52	36.97	36.64	36.70	36.69	36.90	36.82	36.68	36.62	36.75	36.71	37.09
TiO_2	0.01	0.10	0.02	0.10	0.07	0.06	0.04	0.04	0.05	0.05	0.03	0.04	0.02	0.01
Al_2O_3	20.42	20.44	20.14	20.54	20.50	20.53	20.44	20.55	20.50	20.70	20.68	20.72	20.65	20.80
Cr_2O_3	0.05	0.02	0.02	0.00	0.04	0.03	0.01	0.01	0.03	0.01	0.01	0.02	0.00	0.01
Fe_2O_3	0.04	0.00	0.00	0.12	0.15	0.13	0.45	0.22	0.33	0.05	0.00	0.22	0.00	0.00
MgO	2.29	2.32	2.44	2.20	2.27	2.38	2.49	2.52	2.64	2.77	2.87	3.02	3.06	3.12
CaO	2.72	2.82	2.69	3.61	3.64	3.68	3.45	3.37	3.21	3.06	2.98	2.88	2.83	2.64
MnO	6.32	6.04	5.25	5.71	5.30	5.25	4.69	4.47	4.14	3.25	3.04	2.49	2.02	1.86
FeO	29.35	29.31	29.25	29.40	29.61	29.43	30.26	30.46	30.87	31.73	31.69	32.45	32.51	32.87
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	97.80	97.92	96.34	98.66	98.22	98.19	98.51	98.54	98.58	98.29	97.93	98.59	97.79	98.39
Cations														
Si	3.015	3.027	3.041	3.016	3.004	3.006	3.000	3.011	3.004	2.999	3.002	2.994	3.008	3.017
Ti	0.001	0.006	0.002	0.006	0.004	0.004	0.002	0.003	0.003	0.003	0.002	0.002	0.001	0.000
Al	1.983	1.978	1.976	1.974	1.981	1.982	1.969	1.976	1.972	1.994	1.997	1.990	1.994	1.995
Cr	0.003	0.001	0.001	0.000	0.003	0.002	0.001	0.001	0.002	0.000	0.001	0.001	0.000	0.000
Fe^{3+}	0.003	0.000	0.000	0.008	0.009	0.008	0.027	0.013	0.020	0.003	0.000	0.014	0.000	0.000
Mg	0.281	0.284	0.303	0.268	0.277	0.290	0.303	0.306	0.321	0.338	0.350	0.367	0.373	0.379
Ca	0.240	0.248	0.240	0.315	0.320	0.323	0.303	0.295	0.281	0.268	0.262	0.251	0.248	0.230
Mn	0.441	0.420	0.370	0.394	0.368	0.364	0.325	0.309	0.286	0.225	0.211	0.171	0.140	0.128
Fe^{2+}	2.022	2.013	2.036	2.005	2.030	2.016	2.069	2.079	2.107	2.169	2.172	2.211	2.228	2.236
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.989	7.977	7.969	7.987	7.996	7.994	7.999	7.992	7.996	7.999	7.997	8.002	7.993	7.985
Endmember														
Pyrope	9.4	9.6	10.3	9.0	9.3	9.7	10.1	10.2	10.7	11.3	11.7	12.2	12.5	12.7
Almandine	67.8	67.9	69.0	67.2	67.8	67.4	69.0	69.5	70.3	72.3	72.5	73.7	74.5	75.2
Spessartine	14.8	14.2	12.5	13.2	12.3	12.2	10.8	10.3	9.5	7.5	7.1	5.7	4.7	4.3
Grossular	8.1	8.4	8.1	10.6	10.7	10.8	10.1	9.9	9.4	8.9	8.7	8.4	8.3	7.7

	75261C F2 Grt L49	75261C F2 Grt L51	75261C F2 Grt L52	75261C F6 Grt L2	75261C F6 Grt L3	75261C F6 Grt L4	75261C F6 Grt L5	75261C F6 Grt L6	75261C F6 Grt L7	75261C F6 Grt L10	75261C F6 Grt L11	75261C F6 Grt L12	75261C F6 Grt L13	75261C F6 Grt L14
Analysis														
SiO_2	36.96	37.04	37.27	37.39	37.36	37.62	37.33	37.47	37.26	37.42	37.27	36.73	37.02	37.16
TiO_2	0.01	0.01	0.03	0.05	0.02	0.05	0.00	0.03	0.01	0.02	0.04	0.03	0.00	0.03
Al_2O_3	20.78	20.78	21.02	20.99	21.03	20.98	20.71	20.72	20.95	20.87	21.23	20.99	20.94	20.89
Cr_2O_3	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.02	0.03	0.05	0.02	0.02	0.02	0.00
Fe_2O_3	0.00	0.20	0.00	0.25	0.84	0.31	0.35	0.50	0.13	0.28	0.00	0.00	0.29	0.58
MgO	3.27	2.82	2.94	2.97	2.98	2.92	3.30	3.23	3.17	3.17	3.15	2.85	2.89	2.95
CaO	2.33	4.97	3.66	3.86	4.31	4.35	2.20	2.36	2.36	2.61	2.56	2.70	2.90	3.05
MnO	1.51	1.39	1.03	1.49	1.84	1.71	1.64	1.71	1.63	1.80	1.95	2.45	2.58	3.04
FeO	33.60	31.41	32.47	33.00	32.38	32.35	33.89	34.04	34.21	33.76	33.87	33.13	32.98	32.44
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.48	98.62	98.42	100.02	100.76	100.30	99.43	100.07	99.75	99.98	100.09	98.89	99.63	100.14
Cations														
Si	3.008	3.002	3.020	2.997	2.977	3.004	3.013	3.009	3.001	3.005	2.990	2.987	2.989	2.986
Ti	0.000	0.001	0.002	0.003	0.001	0.003	0.000	0.002	0.001	0.001	0.002	0.002	0.000	0.002
Al	1.993	1.985	2.008	1.983	1.975	1.974	1.969	1.961	1.989	1.975	2.008	2.012	1.993	1.979
Cr	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.003	0.001	0.001	0.001	0.000
Fe^{3+}	0.000	0.012	0.000	0.015	0.050	0.018	0.021	0.030	0.008	0.017	0.000	0.000	0.018	0.035
Mg	0.397	0.341	0.355	0.354	0.355	0.348	0.398	0.386	0.380	0.379	0.377	0.345	0.348	0.354
Ca	0.203	0.432	0.318	0.332	0.368	0.372	0.190	0.203	0.203	0.225	0.220	0.235	0.250	0.262
Mn	0.104	0.095	0.071	0.101	0.124	0.116	0.112	0.116	0.111	0.123	0.133	0.168	0.177	0.207
Fe^{2+}	2.287	2.129	2.201	2.212	2.158	2.160	2.287	2.286	2.304	2.268	2.273	2.253	2.227	2.180
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.994	7.998	7.974	8.000	8.009	7.996	7.991	7.994	7.999	7.996	8.003	8.004	8.004	8.005
Endmember														
Pyrope	13.3	11.4	12.1	11.8	11.8	11.6	13.3	12.9	12.7	12.7	12.6	11.5	11.6	11.8
Almandine	76.4	71.0	74.7	73.7	71.8	72.1	76.6	76.4	76.8	75.7	75.7	75.1	74.2	72.6
Spessartine	3.5	3.2	2.4	3.4	4.1	3.9	3.8	3.9	3.7	4.1	4.4	5.6	5.9	6.9
Grossular	6.8	14.4	10.8	11.1	12.3	12.4	6.4	6.8	6.8	7.5	7.3	7.8	8.3	8.7

	75261C F6 Grt L15	75261C F6 Grt L16	75261C F6 Grt L17	75261C F6 Grt L18	75261C F6 Grt L19	75261C F6 Grt L20	75261C F6 Grt L21	75261C F6 Grt L22	75261C F6 Grt L23	75261C F6 Grt L24	75261C F6 Grt L25	75261C F6 Grt L26	75261C F6 Grt L27	75261C F6 Grt L28
Analysis														
SiO_2	37.38	37.28	37.20	36.72	36.69	36.94	36.60	36.89	36.91	37.04	37.11	37.02	36.99	36.56
TiO_2	0.03	0.04	0.03	0.02	0.05	0.06	0.05	0.05	0.09	0.07	0.06	0.06	0.04	0.06
Al_2O_3	20.88	20.77	20.75	20.89	20.75	20.96	20.81	20.82	20.82	20.84	20.79	20.92	20.80	20.50
Cr_2O_3	0.02	0.01	0.02	0.04	0.02	0.04	0.01	0.03	0.01	0.01	0.00	0.00	0.03	0.03
Fe_2O_3	0.31	0.28	0.63	0.24	0.56	0.32	1.01	0.48	0.42	0.59	0.41	0.34	0.35	0.58
MgO	2.73	2.69	2.60	2.51	2.47	2.31	2.50	2.34	2.36	2.27	2.30	2.26	2.30	2.44
CaO	3.15	2.98	3.21	3.21	3.24	3.41	3.03	2.99	3.11	3.22	3.36	3.18	3.14	3.08
MnO	3.41	3.72	4.09	4.51	4.80	4.91	5.14	5.61	5.48	5.84	5.63	5.78	5.69	5.46
FeO	32.27	31.96	31.73	31.05	30.84	31.02	30.97	30.73	30.66	30.51	30.36	30.53	30.49	30.13
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.18	99.73	100.26	99.20	99.41	99.95	100.12	99.93	99.85	100.40	100.03	100.09	99.83	98.84
Cations														
Si	3.002	3.007	2.993	2.983	2.979	2.983	2.959	2.983	2.985	2.983	2.994	2.988	2.992	2.987
Ti	0.002	0.002	0.002	0.001	0.003	0.003	0.003	0.003	0.005	0.004	0.004	0.002	0.002	0.004
Al	1.977	1.975	1.967	2.000	1.986	1.995	1.983	1.985	1.985	1.978	1.977	1.989	1.983	1.974
Cr	0.001	0.001	0.001	0.003	0.002	0.002	0.000	0.002	0.001	0.001	0.000	0.000	0.002	0.002
Fe^{3+}	0.019	0.017	0.038	0.015	0.034	0.019	0.061	0.029	0.026	0.036	0.025	0.021	0.021	0.036
Mg	0.327	0.323	0.312	0.304	0.299	0.278	0.301	0.282	0.285	0.273	0.277	0.272	0.277	0.297
Ca	0.271	0.258	0.277	0.279	0.282	0.295	0.262	0.259	0.269	0.278	0.290	0.275	0.272	0.270
Mn	0.232	0.254	0.279	0.311	0.330	0.336	0.352	0.385	0.375	0.398	0.385	0.395	0.390	0.377
Fe^{2+}	2.167	2.157	2.134	2.110	2.094	2.095	2.094	2.078	2.074	2.055	2.049	2.060	2.062	2.058
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.998	7.994	8.002	8.006	8.008	8.006	8.016	8.006	8.004	8.005	8.001	8.004	8.002	8.004
Endmember														
Pyrope	10.9	10.8	10.4	10.1	9.9	9.3	10.0	9.4	9.5	9.1	9.2	9.1	9.2	9.9
Almandine	72.3	72.1	71.1	70.2	69.7	69.8	69.6	69.2	69.1	68.4	68.3	68.6	68.7	68.6
Spessartine	7.7	8.5	9.3	10.3	11.0	11.2	11.7	12.8	12.5	13.3	12.8	13.2	13.0	12.6
Grossular	9.1	8.6	9.2	9.3	9.4	9.8	8.7	8.6	9.0	9.2	9.7	9.1	9.1	9.0

	75261C F6 Grt L29	75261C F6 Grt L30	75261C F6 Grt L31	75261C F6 Grt L32	75261C F6 Grt L33	75261C F6 Grt L34	75261C F6 Grt L36	75261C F6 Grt L37	75261C F6 Grt L38	75261C F6 Grt L39	75261C F6 Grt L40	75261C F6 Grt L41	75261C F6 Grt L42	75261C F6 Grt L43
Analysis														
SiO_2	37.00	37.16	37.01	37.07	37.13	37.15	37.23	37.10	37.19	37.04	37.05	37.28	37.35	37.34
TiO_2	0.02	0.04	0.04	0.05	0.05	0.06	0.03	0.06	0.04	0.00	0.03	0.04	0.03	0.02
Al_2O_3	20.78	20.99	20.82	20.99	20.96	20.91	20.92	21.00	21.12	21.06	21.05	21.04	21.07	21.10
Cr_2O_3	0.03	0.02	0.01	0.01	0.02	0.00	0.03	0.02	0.02	0.02	0.01	0.03	0.02	0.02
Fe_2O_3	0.15	0.04	0.44	0.51	0.28	0.65	0.02	0.13	0.00	0.18	0.48	0.03	0.17	0.00
MgO	2.41	2.31	2.43	2.42	2.44	2.58	2.71	2.75	2.75	2.92	3.11	3.23	3.31	3.32
CaO	2.74	3.06	3.08	3.19	3.20	3.17	3.06	3.02	3.12	3.24	2.85	2.73	2.77	2.56
MnO	5.52	5.33	5.43	5.49	5.28	4.85	4.02	3.84	3.58	2.95	2.76	2.23	1.91	1.67
FeO	30.80	31.03	30.66	30.74	30.77	31.17	31.53	31.82	31.94	32.16	32.72	33.08	33.35	33.62
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.45	99.98	99.93	100.47	100.12	100.53	99.54	99.73	99.76	99.56	100.06	99.69	99.98	99.65
Cations														
Si	3.002	2.998	2.989	2.980	2.991	2.982	3.006	2.992	2.995	2.988	2.978	2.999	2.996	3.002
Ti	0.001	0.003	0.003	0.003	0.003	0.004	0.002	0.004	0.002	0.000	0.002	0.002	0.002	0.001
Al	1.986	1.996	1.982	1.988	1.989	1.978	1.991	1.996	2.005	2.002	1.994	1.995	1.992	1.999
Cr	0.002	0.001	0.001	0.001	0.001	0.000	0.002	0.001	0.001	0.001	0.000	0.002	0.001	0.001
Fe^{3+}	0.009	0.002	0.027	0.031	0.017	0.039	0.001	0.008	0.000	0.011	0.029	0.002	0.010	0.000
Mg	0.292	0.278	0.293	0.290	0.293	0.309	0.326	0.331	0.330	0.352	0.372	0.387	0.395	0.398
Ca	0.238	0.264	0.267	0.275	0.276	0.272	0.264	0.261	0.270	0.280	0.246	0.236	0.238	0.221
Mn	0.379	0.364	0.372	0.374	0.360	0.330	0.275	0.262	0.244	0.202	0.188	0.152	0.130	0.114
Fe^{2+}	2.089	2.094	2.071	2.066	2.072	2.093	2.129	2.146	2.151	2.170	2.199	2.225	2.237	2.260
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.998	8.000	8.003	8.007	8.003	8.006	7.995	8.002	7.999	8.005	8.008	7.999	8.001	7.997
Endmember														
Pyrope	9.7	9.3	9.8	9.6	9.8	10.3	10.9	11.0	11.0	11.7	12.4	12.9	13.2	13.3
Almandine	69.7	69.8	69.0	68.8	69.0	69.7	71.1	71.5	71.8	72.2	73.2	74.2	74.6	75.5
Spessartine	12.7	12.1	12.4	12.4	12.0	11.0	9.2	8.7	8.2	6.7	6.3	5.1	4.3	3.8
Grossular	7.9	8.8	8.9	9.1	9.2	9.1	8.8	8.7	9.0	9.3	8.2	7.9	7.9	7.4

	75261C F6 Grt L44	75261C F6 Grt L45	75271A F3 Grt L3	75271A F3 Grt L4	75271A F3 Grt L5	75271A F3 Grt L6	75271A F3 Grt L7	75271A F3 Grt L8	75271A F3 Grt L9	75271A F3 Grt L10	75271A F3 Grt L11	75271A F3 Grt L12	75271A F3 Grt L13	75271A F3 Grt L14
Analysis														
SiO_2	37.43	37.12	37.19	37.24	37.20	37.39	37.48	37.32	37.18	37.31	37.30	37.25	37.15	37.05
TiO_2	0.02	0.01	0.04	0.01	0.05	0.02	0.03	0.02	0.02	0.00	0.00	0.06	0.03	0.02
Al_2O_3	21.17	20.92	20.89	21.07	20.79	20.86	20.91	20.98	21.08	20.85	20.97	20.87	20.81	20.74
Cr_2O_3	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.02	0.03	0.00
Fe_2O_3	0.42	0.05	0.80	0.65	0.61	0.86	0.58	0.69	0.66	0.88	0.85	0.74	0.72	1.09
MgO	3.48	3.39	2.42	2.55	2.59	2.70	2.59	2.72	2.62	2.65	2.67	2.58	2.57	2.47
CaO	2.41	2.24	6.66	7.14	7.18	7.34	7.51	7.78	7.71	7.54	7.35	7.39	7.29	7.95
MnO	1.75	1.52	3.69	2.91	2.96	2.78	2.83	2.82	2.82	2.85	2.93	3.00	3.12	3.05
FeO	33.97	33.85	28.25	28.30	27.83	27.93	27.81	27.28	27.52	27.64	27.86	27.73	27.61	27.09
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.68	99.10	99.96	99.86	99.20	99.89	99.75	99.63	99.60	99.73	99.95	99.64	99.34	99.45
Cations														
Si	2.985	3.003	2.980	2.978	2.991	2.986	2.994	2.982	2.975	2.984	2.978	2.983	2.985	2.975
Ti	0.001	0.001	0.003	0.000	0.003	0.001	0.002	0.001	0.001	0.000	0.000	0.003	0.002	0.001
Al	1.990	1.994	1.973	1.986	1.970	1.964	1.969	1.976	1.988	1.965	1.973	1.970	1.971	1.963
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.000
Fe^{3+}	0.025	0.003	0.048	0.039	0.037	0.052	0.035	0.042	0.040	0.053	0.051	0.045	0.044	0.066
Mg	0.414	0.409	0.289	0.304	0.310	0.322	0.308	0.324	0.313	0.316	0.318	0.308	0.308	0.296
Ca	0.206	0.194	0.572	0.612	0.619	0.628	0.643	0.666	0.661	0.646	0.629	0.634	0.628	0.684
Mn	0.118	0.104	0.251	0.197	0.201	0.188	0.192	0.191	0.191	0.193	0.198	0.203	0.213	0.207
Fe^{2+}	2.265	2.290	1.893	1.893	1.871	1.865	1.858	1.823	1.842	1.849	1.860	1.857	1.855	1.819
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.006	7.998	8.007	8.009	8.002	8.005	8.001	8.007	8.010	8.007	8.009	8.006	8.006	8.010
Endmember														
Pyrope	13.8	13.7	9.6	10.1	10.3	10.7	10.3	10.8	10.4	10.5	10.6	10.3	10.3	9.8
Almandine	75.4	76.4	63.0	63.0	62.3	62.1	61.9	60.7	61.3	61.5	61.9	61.8	61.8	60.5
Spessartine	3.9	3.5	8.3	6.6	6.7	6.3	6.4	6.4	6.3	6.4	6.6	6.8	7.1	6.9
Grossular	6.9	6.5	19.0	20.4	20.6	20.9	21.4	22.2	22.0	21.5	20.9	21.1	20.9	22.8

	75271A F3 Grt L15	75271A F3 Grt L16	75271A F3 Grt L17	75271A F3 Grt L18	75271A F3 Grt L19	75271A F3 Grt L21	75271A F3 Grt L22	75271A F3 Grt L23	75271A F3 Grt L24	75271A F3 Grt L25	75271A F3 Grt L26	75271A F9 Grt L1	75271A F9 Grt L2	75271A F9 Grt L3
Analysis														
SiO_2	37.24	37.26	37.23	37.37	37.11	37.33	37.01	37.42	37.15	37.51	37.11	37.16	37.44	37.14
TiO_2	0.03	0.02	0.05	0.03	0.01	0.01	0.03	0.00	0.01	0.01	0.03	0.00	0.00	0.02
Al_2O_3	20.88	20.66	20.86	20.80	20.82	20.91	20.79	20.90	20.92	20.76	20.83	20.97	20.81	20.92
Cr_2O_3	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.02	0.04	0.03	0.02	0.03	0.00	0.04
Fe_2O_3	0.67	1.17	0.87	1.01	0.91	0.80	1.03	0.61	1.30	0.87	0.69	1.10	1.27	0.97
MgO	2.33	2.30	2.50	2.49	2.27	1.90	2.13	2.22	2.13	2.20	2.35	2.55	2.62	2.67
CaO	7.30	7.33	7.44	7.44	7.14	6.96	6.99	7.66	8.19	7.60	6.94	7.03	7.57	7.48
MnO	3.58	3.62	3.09	3.38	3.87	4.79	4.32	3.84	3.89	3.70	3.58	3.17	2.86	2.79
FeO	27.64	27.73	27.77	27.62	27.66	27.78	27.64	27.20	26.94	27.57	27.96	28.33	27.94	27.78
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.67	100.10	99.80	100.12	99.81	100.49	99.94	99.88	100.55	100.24	99.50	100.34	100.49	99.82
Cations														
Si	2.987	2.982	2.980	2.983	2.978	2.984	2.972	2.993	2.961	2.994	2.984	2.965	2.977	2.971
Ti	0.002	0.001	0.003	0.002	0.001	0.001	0.002	0.000	0.001	0.001	0.002	0.000	0.000	0.001
Al	1.974	1.949	1.967	1.957	1.969	1.970	1.968	1.970	1.965	1.953	1.974	1.973	1.950	1.972
Cr	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.002	0.002	0.001	0.002	0.000	0.003
Fe^{3+}	0.040	0.071	0.053	0.061	0.055	0.048	0.062	0.037	0.078	0.052	0.042	0.066	0.076	0.058
Mg	0.279	0.275	0.298	0.296	0.272	0.226	0.255	0.265	0.253	0.262	0.282	0.303	0.310	0.318
Ca	0.627	0.628	0.638	0.636	0.614	0.596	0.601	0.657	0.699	0.650	0.598	0.601	0.645	0.641
Mn	0.243	0.245	0.210	0.228	0.263	0.324	0.294	0.260	0.262	0.250	0.244	0.214	0.192	0.189
Fe^{2+}	1.854	1.856	1.859	1.844	1.857	1.857	1.857	1.820	1.796	1.840	1.881	1.890	1.858	1.858
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.005	8.007	8.007	8.006	8.009	8.006	8.011	8.003	8.016	8.002	8.006	8.015	8.009	8.012
Endmember														
Pyrope	9.3	9.1	9.9	9.8	9.0	7.5	8.5	8.8	8.4	8.7	9.4	10.1	10.3	10.6
Almandine	61.7	61.8	61.9	61.4	61.8	61.8	61.8	60.6	59.7	61.3	62.6	62.8	61.8	61.8
Spessartine	8.1	8.2	7.0	7.6	8.8	10.8	9.8	8.7	8.7	8.3	8.1	7.1	6.4	6.3
Grossular	20.9	20.9	21.2	21.2	20.4	19.9	20.0	21.9	23.2	21.6	19.9	20.0	21.5	21.3

	75271A F9 Grt L4	75271A F9 Grt L5	75271A F9 Grt L6	75271A F9 Grt L7	75271A F9 Grt L8	75271A F9 Grt L9	75271A F9 Grt L10	75271A F9 Grt L12	75271A F9 Grt L13	75271A F9 Grt L15	75271A F9 Grt L16	75271A F9 Grt L17	75271A F9 Grt L18	75271A F9 Grt L19
Analysis														
SiO_2	37.61	37.72	37.33	37.42	37.49	37.55	37.54	37.49	37.59	37.56	37.24	37.35	37.53	37.39
TiO_2	0.01	0.02	0.02	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.04	0.06	0.01	0.00
Al_2O_3	20.94	20.99	20.90	20.74	20.88	20.93	20.94	20.92	20.75	20.96	20.65	20.80	21.00	20.93
Cr_2O_3	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.03	0.03	0.00
Fe_2O_3	1.08	0.80	0.91	1.16	0.79	0.70	0.82	1.16	1.06	0.72	1.65	1.13	0.63	0.98
MgO	2.69	2.68	2.59	2.53	2.59	2.54	2.66	2.87	2.63	2.73	2.91	2.69	2.63	2.69
CaO	7.31	7.48	7.34	7.39	7.26	7.88	7.42	7.76	7.31	7.21	7.43	7.51	7.31	7.60
MnO	2.70	2.72	3.10	3.11	2.98	2.99	2.94	3.07	2.73	2.81	2.80	2.85	2.82	2.73
FeO	28.45	28.17	27.84	27.95	28.10	27.40	27.89	27.11	28.31	28.13	27.62	27.79	28.16	27.80
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.79	100.59	100.05	100.32	100.11	100.01	100.23	100.39	100.38	100.12	100.35	100.20	100.12	100.13
Cations														
Si	2.981	2.990	2.980	2.983	2.989	2.992	2.988	2.976	2.991	2.991	2.966	2.976	2.990	2.979
Ti	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.002	0.003	0.000	0.000
Al	1.956	1.961	1.966	1.949	1.963	1.965	1.965	1.958	1.946	1.967	1.938	1.954	1.972	1.965
Cr	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.002	0.000
Fe^{3+}	0.064	0.047	0.055	0.070	0.047	0.042	0.049	0.069	0.064	0.043	0.099	0.068	0.038	0.059
Mg	0.317	0.317	0.309	0.300	0.307	0.302	0.315	0.340	0.312	0.324	0.346	0.319	0.312	0.320
Ca	0.620	0.635	0.628	0.631	0.620	0.672	0.633	0.660	0.623	0.615	0.634	0.641	0.624	0.649
Mn	0.181	0.182	0.209	0.210	0.201	0.202	0.198	0.206	0.184	0.190	0.189	0.192	0.190	0.184
Fe^{2+}	1.886	1.868	1.859	1.863	1.874	1.826	1.857	1.800	1.884	1.873	1.840	1.853	1.876	1.853
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.008	8.004	8.008	8.007	8.004	8.003	8.005	8.010	8.003	8.004	8.013	8.008	8.004	8.009
Endmember														
Pyrope	10.6	10.6	10.3	10.0	10.2	10.1	10.5	11.3	10.4	10.8	11.5	10.6	10.4	10.6
Almandine	62.8	62.2	61.9	62.0	62.4	60.8	61.8	59.9	62.7	62.4	61.2	61.6	62.5	61.6
Spessartine	6.0	6.1	7.0	7.0	6.7	6.7	6.6	6.9	6.1	6.3	6.3	6.4	6.3	6.1
Grossular	20.6	21.1	20.9	21.0	20.6	22.4	21.1	22.0	20.7	20.5	21.1	21.3	20.8	21.6

	75271A F9 Grt L21	75271A F9 Grt L22	75271A F9 Grt L23	75271A F9 Grt L24	75302A F3 Grt1	75302A F3 Grt2	75302A F3 Grt3	75302A F3 Grt4	75302A F3 Grt5	75302A F3 Grt6	75302A F3 Grt7	75302A F3 Grt8	75302A F3 Grt9	75302A F3 Grt10
Analysis														
SiO_2	37.66	37.48	37.35	37.30	37.40	37.63	37.72	37.81	37.74	37.65	37.88	37.74	35.73	37.56
TiO_2	0.02	0.00	0.00	0.03	0.01	0.04	0.02	0.04	0.06	0.02	0.01	0.00	0.00	0.00
Al_2O_3	20.91	20.92	21.04	21.03	21.28	20.58	21.16	21.16	21.08	20.99	21.07	21.33	20.16	21.26
Cr_2O_3	0.00	0.02	0.00	0.02	0.05	0.04	0.03	0.00	0.02	0.02	0.06	0.04	0.02	0.00
Fe_2O_3	0.81	0.62	0.91	0.48	0.37	0.99	0.46	0.30	0.73	0.87	0.59	0.25	0.66	0.10
MgO	2.72	2.74	2.77	2.59	3.53	3.46	3.44	3.48	3.52	3.52	3.50	3.88	3.91	4.13
CaO	6.94	6.91	6.75	6.62	6.85	7.52	7.34	7.50	7.23	7.09	6.77	4.54	2.93	2.89
MnO	2.72	2.85	2.88	3.12	2.38	2.34	2.25	2.26	2.37	2.71	2.87	3.73	3.67	4.11
FeO	28.66	28.33	28.63	28.58	27.62	26.79	27.41	27.09	27.42	27.17	27.53	28.78	28.65	29.75
Na_2O	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.03	0.02	0.01	0.04
Total	100.44	99.87	100.33	99.78	99.48	99.41	99.85	99.66	100.18	100.02	100.30	100.29	95.75	99.84
Cations														
Si	2.993	2.993	2.974	2.986	2.980	3.000	2.992	3.000	2.987	2.986	2.996	2.991	2.979	2.996
Ti	0.001	0.000	0.000	0.002	0.000	0.003	0.001	0.002	0.003	0.001	0.000	0.000	0.000	0.000
Al	1.958	1.969	1.975	1.984	1.998	1.934	1.978	1.979	1.967	1.962	1.965	1.993	1.981	1.998
Cr	0.000	0.001	0.000	0.001	0.003	0.003	0.002	0.000	0.002	0.001	0.004	0.002	0.001	0.000
Fe^{3+}	0.048	0.038	0.055	0.029	0.022	0.060	0.027	0.018	0.044	0.052	0.035	0.015	0.042	0.006
Mg	0.322	0.326	0.329	0.309	0.420	0.412	0.407	0.411	0.416	0.417	0.413	0.458	0.486	0.491
Ca	0.591	0.591	0.576	0.568	0.584	0.643	0.624	0.637	0.613	0.602	0.574	0.385	0.262	0.247
Mn	0.183	0.193	0.194	0.212	0.161	0.158	0.151	0.152	0.159	0.182	0.192	0.250	0.259	0.277
Fe^{2+}	1.905	1.892	1.907	1.914	1.840	1.787	1.819	1.798	1.815	1.802	1.821	1.908	1.998	1.984
Na	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.004	0.000	0.000	0.004	0.003	0.002	0.006
Total	8.002	8.003	8.011	8.005	8.009	8.000	8.004	8.001	8.004	8.005	8.004	8.005	8.010	8.005
Endmember														
Pyrope	10.7	10.9	10.9	10.3	14.0	13.7	13.6	13.7	13.8	13.9	13.8	15.3	16.2	16.4
Almandine	63.5	63.0	63.4	63.7	61.2	59.6	60.6	60.0	60.4	60.0	60.7	63.6	66.5	66.1
Spessartine	6.1	6.4	6.5	7.0	5.4	5.3	5.0	5.1	5.3	6.1	6.4	8.3	8.6	9.2
Grossular	19.7	19.7	19.2	18.9	19.4	21.4	20.8	21.3	20.4	20.1	19.1	12.8	8.7	8.2

	75302A F3 Grt11	75302A F3 Grt12	75302A F3 Grt13	75302A F3 Grt14	75302A F3 Grt15	75302A F3 Grt16	75302A F3 Grt17	75302A F3 Grt18	75302A F3 Grt19	75302A F3 Grt20	75302A F3 Grt21	75302A F3 Grt22	75302A F3 Grt24	75302A F3 Grt25
Analysis														
SiO_2	37.67	37.60	37.60	37.65	37.60	37.44	37.73	37.44	37.36	37.34	37.46	37.57	37.60	37.32
TiO_2	0.02	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.00	0.03
Al_2O_3	21.00	20.66	21.23	20.66	21.30	21.17	21.34	21.35	21.21	21.30	21.19	21.21	21.32	20.99
Cr_2O_3	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.03	0.02	0.02	0.03	0.05	0.00	0.00
Fe_2O_3	0.55	0.58	0.00	0.71	0.02	0.31	0.12	0.21	0.35	0.19	0.18	0.35	0.23	0.16
MgO	4.18	3.98	4.12	3.77	3.88	3.92	3.83	3.87	4.29	4.34	4.31	4.44	4.29	4.29
CaO	3.08	3.74	2.78	4.93	4.23	4.04	4.58	4.33	2.22	2.09	2.08	2.10	2.19	2.22
MnO	3.91	3.90	3.76	3.86	3.75	3.78	3.54	3.70	3.85	3.81	3.93	3.83	3.78	3.76
FeO	29.74	28.68	30.06	27.70	28.87	28.94	28.90	28.89	30.58	30.68	30.60	30.64	30.86	30.31
Na_2O	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.00	0.03	0.03	0.01	0.03	0.03	0.05
Total	100.19	99.19	99.59	99.32	99.70	99.63	100.06	99.83	99.91	99.79	99.80	100.23	100.30	99.12
Cations														
Si	2.996	3.014	3.004	3.012	2.996	2.990	2.996	2.983	2.983	2.983	2.992	2.988	2.990	2.999
Ti	0.001	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.002
Al	1.969	1.952	1.999	1.948	2.000	1.992	1.997	2.005	1.996	2.006	1.995	1.988	1.997	1.988
Cr	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.002	0.001	0.001	0.002	0.003	0.000	0.000
Fe^{3+}	0.033	0.035	0.000	0.043	0.001	0.019	0.007	0.013	0.021	0.011	0.011	0.021	0.014	0.010
Mg	0.495	0.476	0.491	0.450	0.461	0.467	0.454	0.460	0.511	0.517	0.513	0.526	0.508	0.514
Ca	0.263	0.321	0.238	0.422	0.361	0.346	0.389	0.370	0.190	0.179	0.178	0.179	0.186	0.191
Mn	0.263	0.265	0.254	0.261	0.253	0.256	0.238	0.250	0.260	0.258	0.266	0.258	0.254	0.256
Fe^{2+}	1.978	1.923	2.008	1.853	1.924	1.933	1.919	1.925	2.042	2.050	2.044	2.038	2.052	2.037
Na	0.004	0.001	0.002	0.005	0.005	0.004	0.002	0.000	0.004	0.004	0.001	0.005	0.005	0.007
Total	8.004	7.990	7.997	7.995	8.004	8.006	8.003	8.007	8.009	8.010	8.003	8.007	8.007	8.004
Endmember														
Pyrope	16.5	16.0	16.4	15.1	15.4	15.6	15.1	15.3	17.0	17.2	17.1	17.5	16.9	17.2
Almandine	66.0	64.4	67.2	62.0	64.2	64.4	64.0	64.1	68.0	68.3	68.1	67.9	68.4	67.9
Spessartine	8.8	8.9	8.5	8.8	8.4	8.5	7.9	8.3	8.7	8.6	8.9	8.6	8.5	8.5
Grossular	8.8	10.8	8.0	14.1	12.1	11.5	13.0	12.3	6.3	6.0	5.9	6.0	6.2	6.4

	75302A F3 Grt26	75302A F3 Grt27	75302A F3 Grt28	75302A F3 Grt29	75302A F3 Grt30	75302A F3 Grt31	75302A F3 Grt32	75302A F3 Grt33	75302A F3 Grt34	75302A F6 Grt1	75302A F6 Grt2	75302A F6 Grt3	75302A F6 Grt5	75302A F6 Grt8
Analysis														
SiO_2	37.30	37.36	37.64	45.96	37.57	37.51	37.93	37.88	37.51	37.65	37.83	37.44	37.64	37.45
TiO_2	0.05	0.01	0.00	0.03	0.05	0.07	0.07	0.01	0.00	0.04	0.01	0.03	0.00	0.01
Al_2O_3	21.15	21.22	21.27	19.13	20.95	21.12	21.21	21.08	21.15	21.17	21.06	20.93	20.98	21.30
Cr_2O_3	0.04	0.02	0.01	0.04	0.03	0.04	0.00	0.05	0.01	0.01	0.00	0.01	0.00	0.02
Fe_2O_3	0.16	0.32	0.20	0.91	0.60	0.69	0.63	0.44	0.52	0.69	0.65	1.02	0.38	0.00
MgO	4.30	4.33	4.08	3.40	3.63	3.73	3.62	3.57	3.49	3.46	3.39	3.55	3.75	4.23
CaO	2.39	2.59	3.67	5.65	6.19	6.03	6.59	6.43	6.59	6.88	6.98	6.57	5.14	2.85
MnO	3.63	3.62	3.33	2.75	2.88	2.81	2.60	2.48	2.41	2.46	2.55	2.68	2.86	3.43
FeO	30.39	30.28	29.78	25.68	27.73	28.01	28.00	28.11	27.99	27.87	27.73	27.71	28.70	29.92
Na_2O	0.02	0.02	0.02	0.00	0.02	0.02	0.02	0.03	0.03	0.02	0.03	0.01	0.01	0.02
Total	99.44	99.78	99.98	103.54	99.66	100.03	100.66	100.07	99.70	100.23	100.22	99.97	99.45	99.22
Cations														
Si	2.988	2.983	2.994	3.409	2.993	2.978	2.989	3.002	2.986	2.982	2.995	2.977	3.005	2.998
Ti	0.003	0.001	0.000	0.002	0.003	0.004	0.004	0.000	0.000	0.002	0.001	0.002	0.000	0.000
Al	1.997	1.997	1.994	1.673	1.966	1.976	1.970	1.969	1.984	1.976	1.966	1.962	1.974	2.010
Cr	0.003	0.001	0.001	0.002	0.002	0.003	0.000	0.003	0.001	0.000	0.000	0.001	0.000	0.002
Fe^{3+}	0.009	0.019	0.012	0.051	0.036	0.041	0.037	0.026	0.031	0.041	0.039	0.061	0.023	0.000
Mg	0.514	0.515	0.483	0.376	0.430	0.441	0.425	0.422	0.414	0.408	0.401	0.421	0.446	0.505
Ca	0.205	0.222	0.312	0.449	0.528	0.513	0.557	0.546	0.562	0.584	0.592	0.560	0.439	0.244
Mn	0.247	0.245	0.224	0.173	0.195	0.189	0.174	0.167	0.163	0.165	0.171	0.181	0.193	0.233
Fe^{2+}	2.036	2.022	1.981	1.593	1.847	1.860	1.845	1.863	1.863	1.846	1.836	1.843	1.916	2.003
Na	0.003	0.004	0.003	0.000	0.003	0.004	0.003	0.004	0.004	0.003	0.004	0.002	0.001	0.002
Total	8.005	8.009	8.004	7.727	8.004	8.009	8.004	8.001	8.008	8.008	8.004	8.010	7.997	7.997
Endmember														
Pyrope	17.1	17.1	16.1	14.5	14.3	14.7	14.2	14.1	13.8	13.6	13.4	14.0	14.9	16.9
Almandine	67.8	67.3	66.0	61.5	61.6	61.9	61.5	62.1	62.1	61.5	61.2	61.3	64.0	67.1
Spessartine	8.2	8.1	7.5	6.7	6.5	6.3	5.8	5.6	5.4	5.5	5.7	6.0	6.5	7.8
Grossular	6.8	7.4	10.4	17.3	17.6	17.1	18.6	18.2	18.7	19.4	19.7	18.6	14.7	8.2

	75302A F6 Grt9	75302A F6 Grt10	75302A F6 Grt11	75302A F6 Grt12	75302A F6 Grt13	75302A F6 Grt14	75302A F6 Grt15	75302A F6 Grt16	75302A F6 Grt17	75302A F6 Grt18	75302A F6 Grt19	75302A F6 Grt20	75302A F6 Grt21	75302A F6 Grt22
Analysis														
SiO_2	37.82	37.70	37.33	37.22	37.46	37.27	37.41	37.28	37.28	37.24	37.27	37.71	37.49	37.39
TiO_2	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.02	0.03	0.01
Al_2O_3	21.14	21.31	21.24	21.05	21.17	21.14	21.18	21.11	21.18	20.97	21.01	21.32	21.23	21.35
Cr_2O_3	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.05
Fe_2O_3	0.74	0.42	0.10	0.48	0.19	0.20	0.11	0.35	0.29	0.48	0.33	0.11	0.16	0.00
MgO	3.98	4.02	4.38	4.30	4.33	4.22	3.96	4.30	4.26	4.25	4.18	4.22	4.23	4.15
CaO	4.45	3.75	2.06	2.33	1.93	2.33	3.65	2.04	1.93	1.99	2.08	1.98	2.10	2.19
MnO	3.38	3.76	3.86	3.87	4.15	3.92	3.98	4.10	4.13	4.43	4.25	4.24	4.13	4.20
FeO	29.22	29.53	30.47	30.26	30.50	30.25	29.06	30.39	30.61	30.13	30.28	30.80	30.54	30.36
Na_2O	0.02	0.03	0.00	0.02	0.04	0.04	0.03	0.04	0.05	0.04	0.03	0.02	0.02	0.04
Total	100.76	100.53	99.43	99.56	99.80	99.37	99.37	99.61	99.77	99.56	99.43	100.41	99.93	99.74
Cations														
Si	2.988	2.987	2.990	2.982	2.993	2.990	2.995	2.987	2.984	2.987	2.992	2.996	2.992	2.989
Ti	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.002	0.000
Al	1.969	1.989	2.005	1.988	1.994	1.999	1.999	1.993	1.998	1.983	1.988	1.996	1.996	2.012
Cr	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.003
Fe^{3+}	0.044	0.025	0.006	0.029	0.012	0.012	0.007	0.021	0.018	0.029	0.020	0.007	0.009	0.000
Mg	0.468	0.475	0.523	0.513	0.516	0.505	0.472	0.514	0.509	0.508	0.500	0.500	0.503	0.494
Ca	0.377	0.318	0.177	0.200	0.165	0.200	0.313	0.175	0.165	0.171	0.179	0.168	0.180	0.188
Mn	0.226	0.252	0.262	0.263	0.281	0.266	0.270	0.278	0.280	0.301	0.289	0.285	0.279	0.285
Fe^{2+}	1.931	1.957	2.041	2.028	2.038	2.030	1.945	2.036	2.048	2.022	2.033	2.047	2.038	2.030
Na	0.003	0.005	0.000	0.003	0.006	0.007	0.005	0.006	0.008	0.006	0.005	0.003	0.004	0.007
Total	8.007	8.008	8.004	8.009	8.006	8.008	8.005	8.009	8.011	8.009	8.006	8.003	8.004	8.007
Endmember														
Pyrope	15.6	15.8	17.4	17.1	17.2	16.8	15.7	17.1	16.9	16.9	16.7	16.7	16.8	16.5
Almandine	64.3	65.2	68.0	67.5	67.9	67.6	64.8	67.8	68.2	67.4	67.8	68.2	67.9	67.7
Spessartine	7.5	8.4	8.7	8.7	9.4	8.9	9.0	9.3	9.3	10.0	9.6	9.5	9.3	9.5
Grossular	12.6	10.6	5.9	6.7	5.5	6.7	10.4	5.8	5.5	5.7	6.0	5.6	6.0	6.3

	75302A F6 Grt23	75302A F6 Grt24	75302A F6 Grt25	75302A F6 Grt26	75302A F6 Grt27	75302A F6 Grt28	75302A F6 Grt29	75302A F6 Grt30	75302A F6 Grt31	75302A F6 Grt32	76017A F2 Grt1	76017A F2 Grt2	76017A F2 Grt3	76017A F2 Grt4
Analysis														
SiO_2	37.51	37.31	37.36	37.29	37.40	37.91	37.59	37.65	37.48	37.85	37.34	37.45	37.59	37.42
TiO_2	0.00	0.00	0.08	0.00	0.03	0.02	0.13	0.12	0.06	0.02	0.04	0.07	0.03	0.12
Al_2O_3	21.22	21.19	21.16	21.20	21.30	21.14	21.21	21.27	21.31	21.49	20.75	20.62	20.92	20.78
Cr_2O_3	0.01	0.03	0.05	0.00	0.01	0.04	0.02	0.03	0.04	0.02	0.00	0.00	0.00	0.02
Fe_2O_3	0.01	0.04	0.45	0.07	0.48	0.35	0.51	0.26	0.42	0.31	0.00	0.00	0.00	0.00
MgO	4.13	4.08	4.07	4.06	3.79	3.44	3.43	3.40	3.45	3.45	0.64	0.69	0.67	0.65
CaO	2.41	2.32	2.62	2.71	4.49	6.35	6.90	7.06	7.08	6.62	9.52	9.33	9.10	9.63
MnO	4.25	4.11	4.38	4.06	3.91	3.10	2.98	2.65	2.63	2.42	2.97	2.99	2.67	2.72
FeO	30.11	30.32	29.98	29.92	28.70	27.84	27.31	27.43	27.36	28.47	27.96	28.49	28.77	27.97
Na_2O	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.66	99.41	100.15	99.32	100.12	100.20	100.09	99.90	99.83	100.65	99.21	99.64	99.75	99.30
Cations														
Si	2.999	2.993	2.979	2.992	2.976	3.002	2.980	2.987	2.977	2.985	3.018	3.019	3.022	3.019
Ti	0.000	0.000	0.005	0.000	0.002	0.001	0.008	0.007	0.004	0.001	0.003	0.004	0.002	0.007
Al	1.999	2.003	1.989	2.004	1.997	1.973	1.982	1.989	1.995	1.997	1.976	1.960	1.982	1.975
Cr	0.001	0.002	0.003	0.000	0.000	0.002	0.001	0.002	0.002	0.001	0.000	0.000	0.000	0.001
Fe^{3+}	0.000	0.002	0.027	0.004	0.029	0.021	0.030	0.016	0.025	0.018	0.000	0.000	0.000	0.000
Mg	0.493	0.488	0.484	0.485	0.449	0.406	0.405	0.402	0.408	0.406	0.077	0.083	0.080	0.078
Ca	0.206	0.200	0.224	0.233	0.383	0.539	0.586	0.600	0.603	0.559	0.824	0.806	0.784	0.833
Mn	0.288	0.279	0.296	0.276	0.263	0.208	0.200	0.178	0.177	0.162	0.203	0.204	0.182	0.186
Fe^{2+}	2.013	2.034	1.999	2.008	1.910	1.844	1.811	1.820	1.817	1.877	1.890	1.921	1.934	1.887
Na	0.002	0.003	0.003	0.003	0.002	0.001	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.002	8.004	8.008	8.005	8.011	7.999	8.006	8.005	8.008	8.006	7.991	7.996	7.985	7.986
Endmember														
Pyrope	16.4	16.3	16.1	16.2	14.9	13.6	13.5	13.4	13.6	13.5	2.6	2.7	2.7	2.6
Almandine	67.1	67.8	66.6	66.9	63.5	61.5	60.3	60.7	60.5	62.5	63.1	63.7	64.9	63.3
Spessartine	9.6	9.3	9.9	9.2	8.8	6.9	6.7	5.9	5.9	5.4	6.8	6.8	6.1	6.2
Grossular	6.9	6.7	7.5	7.8	12.7	18.0	19.5	20.0	20.1	18.6	27.5	26.7	26.3	27.9

	76017A F2 Grt5	76017A F2 Grt6	76017A F2 Grt7	76017A F2 Grt8	76017A F2 Grt9	76017A F2 Grt10	76017A F2 Grt12	76017A F2 Grt13	76017A F2 Grt14	76017A F2 Grt15	76017A F2 Grt16	76017A F2 Grt17	76017A F2 Grt18	76017A F2 Grt19
Analysis														
SiO_2	36.81	37.44	37.13	37.38	37.63	37.39	36.78	37.12	37.48	37.43	37.35	37.28	37.21	37.38
TiO_2	0.08	0.14	0.10	0.10	0.04	0.04	0.13	0.08	0.21	0.20	0.17	0.07	0.14	0.04
Al_2O_3	20.65	20.69	20.57	20.74	20.69	21.05	20.62	20.56	20.47	20.61	20.58	20.55	20.53	20.51
Cr_2O_3	0.00	0.02	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.01	0.02	0.03	0.01
Fe_2O_3	0.24	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.62	0.58	0.62	0.64	0.63	0.68	0.48	0.50	0.47	0.45	0.47	0.49	0.44	0.47
CaO	9.58	10.44	9.14	9.25	9.48	9.70	9.30	9.14	9.77	9.77	9.91	9.63	10.01	9.24
MnO	2.65	2.72	2.61	2.82	2.70	2.82	5.44	5.51	5.94	5.92	6.02	5.66	6.08	5.98
FeO	28.02	27.75	28.96	28.43	28.12	28.15	25.82	26.11	25.04	25.22	24.46	25.63	24.84	25.59
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.65	99.78	99.16	99.35	99.29	99.81	98.71	99.01	99.38	99.61	98.97	99.33	99.27	99.22
Cations														
Si	2.997	3.011	3.011	3.018	3.035	3.004	2.997	3.015	3.026	3.017	3.024	3.016	3.012	3.028
Ti	0.005	0.009	0.006	0.006	0.002	0.003	0.008	0.005	0.012	0.012	0.010	0.004	0.008	0.002
Al	1.982	1.960	1.966	1.974	1.966	1.993	1.980	1.969	1.948	1.958	1.964	1.960	1.959	1.957
Cr	0.000	0.001	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.002	0.001
Fe^{3+}	0.015	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.076	0.069	0.075	0.077	0.076	0.081	0.058	0.060	0.057	0.054	0.057	0.059	0.053	0.057
Ca	0.836	0.900	0.795	0.801	0.819	0.835	0.812	0.796	0.845	0.844	0.860	0.835	0.868	0.802
Mn	0.183	0.185	0.179	0.193	0.184	0.192	0.376	0.379	0.406	0.405	0.413	0.388	0.417	0.410
Fe^{2+}	1.908	1.866	1.964	1.920	1.896	1.891	1.760	1.773	1.691	1.700	1.656	1.735	1.681	1.733
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	7.999	7.989	7.980	7.997	8.000	7.996	7.987	7.991	7.984	7.999	8.000	7.991
Endmember														
Pyrope	2.5	2.3	2.5	2.6	2.6	2.7	1.9	2.0	1.9	1.8	1.9	2.0	1.8	1.9
Almandine	63.5	61.8	65.2	64.2	63.7	63.1	58.6	58.9	56.4	56.6	55.5	57.5	55.7	57.7
Spessartine	6.1	6.1	6.0	6.4	6.2	6.4	12.5	12.6	13.5	13.5	13.8	12.9	13.8	13.7
Grossular	27.8	29.8	26.4	26.8	27.5	27.8	27.0	26.5	28.2	28.1	28.8	27.7	28.8	26.7

	76017A F2 Grt20	76017A F2 Grt21	76017A F2 Grt22	76017A F2 Grt23	76017A F2 Grt24	76017A F2 Grt25	76017A F2 Grt26	76017A F2 Grt27	76017A F2 Grt28	76017A F2 Grt29	76017A F2 Grt30	76017A F2 Grt32	76017A F2 Grt33	76017A F2 Grt34
Analysis														
SiO_2	37.07	37.42	39.70	37.31	37.11	37.14	37.36	37.23	37.27	37.28	37.17	37.31	37.59	37.40
TiO_2	0.21	0.19	0.12	0.07	0.05	0.09	0.19	0.15	0.16	0.18	0.19	0.10	0.28	0.17
Al_2O_3	20.45	20.50	19.84	20.71	20.64	20.67	19.97	20.34	20.43	20.60	20.55	20.50	20.82	20.56
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.01
Fe_2O_3	0.42	0.00	0.00	0.00	0.00	0.35	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.42	0.45	0.49	0.54	0.58	0.52	0.44	0.45	0.45	0.48	0.48	0.48	0.50	0.46
CaO	10.16	9.93	9.57	9.74	9.70	10.44	9.48	10.48	9.63	9.60	10.15	9.98	9.18	10.17
MnO	6.15	5.95	5.23	4.63	4.51	5.21	5.82	5.66	6.32	6.08	5.89	5.33	5.46	5.18
FeO	24.52	24.91	24.82	26.08	25.87	24.91	24.76	24.69	24.99	25.04	24.82	25.51	26.31	25.36
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.40	99.34	99.77	99.07	98.45	99.33	98.02	99.08	99.25	99.26	99.28	99.21	100.13	99.32
Cations														
Si	2.999	3.023	3.158	3.019	3.019	3.000	3.055	3.017	3.019	3.016	3.007	3.019	3.015	3.020
Ti	0.013	0.012	0.007	0.004	0.003	0.005	0.012	0.009	0.010	0.011	0.012	0.006	0.017	0.010
Al	1.950	1.952	1.861	1.975	1.979	1.967	1.925	1.943	1.951	1.964	1.959	1.956	1.968	1.957
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.001
Fe^{3+}	0.026	0.000	0.000	0.000	0.000	0.021	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.051	0.054	0.058	0.065	0.070	0.063	0.053	0.055	0.054	0.057	0.057	0.058	0.060	0.055
Ca	0.881	0.859	0.816	0.844	0.846	0.904	0.831	0.910	0.835	0.832	0.880	0.865	0.789	0.880
Mn	0.421	0.407	0.353	0.318	0.311	0.357	0.403	0.388	0.434	0.417	0.404	0.365	0.371	0.355
Fe^{2+}	1.659	1.683	1.651	1.765	1.760	1.683	1.693	1.673	1.693	1.694	1.680	1.727	1.765	1.713
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.990	7.904	7.989	7.988	8.000	7.971	8.000	7.996	7.991	8.001	7.997	7.984	7.991
Endmember														
Pyrope	1.7	1.8	2.0	2.2	2.3	2.1	1.8	1.8	1.8	1.9	1.9	1.9	2.0	1.8
Almandine	55.1	56.0	57.4	59.0	58.9	56.0	56.8	55.3	56.1	56.5	55.6	57.3	59.1	57.0
Spessartine	14.0	13.6	12.3	10.6	10.4	11.9	13.5	12.8	14.4	13.9	13.4	12.1	12.4	11.8
Grossular	29.2	28.6	28.4	28.2	28.3	30.1	27.9	30.1	27.7	27.7	29.1	28.7	26.4	29.3

	76017A F2 Grt35	76017A F2 Grt36	76017A F2 Grt37	76017A F2 Grt38	76017A F2 Grt39	76017A F2 Grt40	76017A F2 Grt41	76017A F2 Grt42	76017A F2 Grt43	76017A F2 Grt44	76017A F2 Grt45	76017A F2 Grt46	76017A F2 Grt47	76017A F2 Grt48
Analysis														
SiO_2	37.07	37.23	37.42	37.39	37.37	37.52	37.53	37.29	37.31	37.46	37.37	37.30	37.61	37.48
TiO_2	0.11	0.06	0.14	0.24	0.21	0.19	0.12	0.12	0.10	0.09	0.09	0.10	0.06	0.08
Al_2O_3	20.50	20.74	20.71	20.56	20.55	20.31	20.62	20.72	20.57	20.83	20.73	20.79	20.30	20.82
Cr_2O_3	0.00	0.00	0.01	0.01	0.02	0.03	0.00	0.04	0.01	0.00	0.00	0.01	0.00	0.00
Fe_2O_3	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.47	0.52	0.52	0.48	0.53	0.54	0.59	0.54	0.64	0.55	0.63	0.64	0.68	0.67
CaO	9.52	9.08	9.75	9.70	9.40	9.77	9.74	9.95	9.40	9.69	9.31	9.43	9.21	9.81
MnO	4.93	4.58	4.59	4.51	4.26	4.17	3.78	3.29	3.04	2.59	2.51	2.78	2.78	2.69
FeO	26.41	27.12	26.86	26.25	26.80	26.63	27.32	27.46	28.26	28.13	28.78	28.23	28.55	27.77
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.45	99.33	100.01	99.14	99.15	99.15	99.70	99.42	99.34	99.34	99.42	99.29	99.19	99.31
Cations														
Si	3.002	3.013	3.009	3.023	3.024	3.035	3.021	3.010	3.017	3.021	3.017	3.013	3.043	3.021
Ti	0.007	0.004	0.009	0.015	0.013	0.012	0.007	0.008	0.006	0.005	0.005	0.006	0.004	0.005
Al	1.956	1.978	1.963	1.960	1.960	1.936	1.957	1.971	1.960	1.979	1.973	1.979	1.935	1.978
Cr	0.000	0.000	0.001	0.001	0.001	0.002	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000
Fe^{3+}	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.057	0.062	0.062	0.058	0.064	0.065	0.071	0.065	0.077	0.066	0.076	0.078	0.083	0.080
Ca	0.826	0.787	0.839	0.841	0.815	0.847	0.840	0.861	0.815	0.837	0.806	0.816	0.798	0.847
Mn	0.338	0.314	0.312	0.309	0.292	0.286	0.258	0.225	0.208	0.177	0.172	0.190	0.190	0.184
Fe^{2+}	1.788	1.836	1.806	1.775	1.814	1.802	1.839	1.854	1.912	1.897	1.943	1.907	1.932	1.872
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.994	8.001	7.982	7.983	7.984	7.993	7.996	7.996	7.984	7.991	7.990	7.985	7.986
Endmember														
Pyrope	1.9	2.1	2.1	2.0	2.1	2.2	2.3	2.2	2.6	2.2	2.5	2.6	2.7	2.7
Almandine	59.4	61.2	59.8	59.5	60.8	60.1	61.1	61.7	63.5	63.7	64.9	63.8	64.3	62.8
Spessartine	11.2	10.5	10.3	10.3	9.8	9.5	8.6	7.5	6.9	5.9	5.7	6.4	6.3	6.2
Grossular	27.4	26.2	27.8	28.2	27.3	28.2	27.9	28.6	27.1	28.1	26.9	27.3	26.6	28.4

	811103C F1 Grt1	811103C F1 Grt2	811103C F1 Grt3	811103C F1 Grt4	811103C F1 Grt5	811103C F1 Grt6	811103C F1 Grt7	811103C F2 Grt1	811103C F2 Grt2	811103C F2 Grt3	811103C F2 Grt4	811103C F2 Grt5	811103C F2 Grt6	76017B F4 Grt1
Analysis														
SiO_2	37.23	37.59	37.47	37.29	37.18	37.23	36.97	37.20	37.52	37.76	37.11	37.13	37.43	37.72
TiO_2	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.03	0.03	0.02	0.00	0.02	0.01	0.11
Al_2O_3	20.74	20.95	20.98	20.83	20.84	20.58	20.71	20.57	20.94	21.03	20.72	20.70	20.63	20.77
Cr_2O_3	0.06	0.00	0.03	0.02	0.05	0.02	0.02	0.03	0.05	0.03	0.05	0.04	0.03	0.05
Fe_2O_3	0.10	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.13	0.00	0.55	0.31	0.00	0.00
MgO	2.56	2.64	2.70	2.57	2.52	2.22	1.78	1.97	2.90	2.93	2.63	2.64	2.45	1.12
CaO	3.84	3.77	3.73	3.66	3.51	3.54	3.44	4.30	3.78	3.90	4.14	3.95	4.02	9.86
MnO	7.70	7.05	7.02	7.25	8.03	8.97	10.35	8.95	6.31	6.21	7.11	7.11	7.72	2.19
FeO	27.26	27.83	28.01	27.78	27.39	26.57	25.77	25.84	28.50	28.57	27.18	27.42	26.96	27.90
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.48	99.84	99.95	99.42	99.81	99.14	99.02	98.88	100.15	100.43	99.49	99.32	99.24	99.72
Cations														
Si	3.007	3.018	3.008	3.011	2.998	3.023	3.013	3.025	3.005	3.012	2.996	3.003	3.026	3.021
Ti	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.002	0.002	0.001	0.000	0.001	0.000	0.007
Al	1.974	1.983	1.985	1.983	1.980	1.969	1.989	1.971	1.976	1.977	1.971	1.973	1.965	1.961
Cr	0.004	0.000	0.002	0.001	0.003	0.001	0.001	0.002	0.003	0.002	0.003	0.002	0.002	0.003
Fe^{3+}	0.006	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.008	0.000	0.033	0.019	0.000	0.000
Mg	0.308	0.316	0.323	0.310	0.302	0.269	0.216	0.238	0.346	0.349	0.316	0.319	0.295	0.134
Ca	0.332	0.324	0.321	0.317	0.303	0.308	0.300	0.375	0.324	0.333	0.358	0.342	0.348	0.847
Mn	0.526	0.479	0.478	0.496	0.549	0.617	0.714	0.617	0.428	0.420	0.486	0.487	0.529	0.149
Fe^{2+}	1.841	1.869	1.881	1.876	1.847	1.804	1.756	1.758	1.909	1.906	1.835	1.855	1.823	1.869
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.990	7.998	7.995	8.001	7.992	7.991	7.987	8.000	7.998	8.000	8.000	7.990	7.990
Endmember														
Pyrope	10.2	10.6	10.8	10.3	10.1	9.0	7.2	8.0	11.5	11.6	10.6	10.6	9.9	4.5
Almandine	61.2	62.5	62.6	62.6	61.5	60.2	58.8	58.8	63.5	63.4	61.3	61.8	60.9	62.3
Spessartine	17.5	16.0	15.9	16.5	18.3	20.6	23.9	20.6	14.2	14.0	16.2	16.2	17.6	5.0
Grossular	11.0	10.8	10.7	10.6	10.1	10.3	10.1	12.5	10.8	11.1	12.0	11.4	11.6	28.2

	76017B F4 Grt2	76017B F4 Grt3	76017B F4 Grt4	76017B F4 Grt5	76017B F4 Grt9	76017B F4 Grt13	76017B F4 Grt14	76017B F4 Grt15	76017B F4 Grt16	76017B F4 Grt17	76017B F4 Grt18	76017B F4 Grt19	76017B F4 Grt20	76017B F4 Grt21
Analysis														
SiO_2	37.75	37.70	37.51	37.58	37.26	37.55	37.76	37.56	37.24	37.62	37.70	37.54	37.44	37.72
TiO_2	0.07	0.11	0.07	0.11	0.26	0.19	0.13	0.15	0.08	0.13	0.16	0.11	0.19	0.16
Al_2O_3	20.81	20.92	20.79	20.78	20.70	20.69	20.66	20.71	20.63	20.89	20.83	20.70	20.82	20.74
Cr_2O_3	0.02	0.02	0.00	0.03	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	0.05	0.01
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.11	0.00	0.00	0.00	0.06	0.00
MgO	1.10	1.08	1.05	0.97	0.90	0.72	0.72	0.72	0.67	0.71	0.65	0.62	0.60	0.66
CaO	9.78	9.61	9.31	9.85	10.46	10.35	10.16	10.66	9.67	10.71	10.84	10.14	11.06	10.69
MnO	2.40	2.60	2.89	3.35	3.72	6.15	6.42	6.53	6.85	6.80	6.74	7.06	7.17	7.50
FeO	27.24	27.57	27.69	26.92	25.98	24.31	24.37	23.49	24.08	23.15	22.61	22.99	22.43	22.53
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.16	99.61	99.30	99.58	99.30	99.95	100.22	100.05	99.33	100.00	99.55	99.17	99.82	100.02
Cations														
Si	3.034	3.021	3.021	3.017	3.002	3.011	3.020	3.007	3.009	3.010	3.022	3.027	3.001	3.018
Ti	0.004	0.006	0.004	0.006	0.016	0.012	0.008	0.009	0.005	0.008	0.010	0.006	0.012	0.010
Al	1.971	1.976	1.973	1.967	1.966	1.955	1.948	1.954	1.964	1.969	1.968	1.967	1.967	1.956
Cr	0.001	0.001	0.000	0.002	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.003	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.007	0.000	0.000	0.000	0.004	0.000
Mg	0.131	0.129	0.126	0.116	0.108	0.086	0.086	0.086	0.081	0.084	0.078	0.074	0.072	0.079
Ca	0.842	0.826	0.803	0.848	0.903	0.889	0.871	0.915	0.837	0.918	0.931	0.876	0.950	0.917
Mn	0.163	0.177	0.197	0.228	0.253	0.417	0.435	0.443	0.469	0.461	0.458	0.482	0.487	0.508
Fe^{2+}	1.831	1.848	1.865	1.808	1.751	1.630	1.630	1.572	1.627	1.549	1.516	1.550	1.504	1.507
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.976	7.984	7.989	7.992	7.999	8.000	7.998	8.000	8.000	7.998	7.984	7.983	8.000	7.995
Endmember														
Pyrope	4.4	4.3	4.2	3.9	3.6	2.8	2.8	2.9	2.7	2.8	2.6	2.5	2.4	2.6
Almandine	61.7	62.0	62.4	60.3	58.1	53.9	53.9	52.1	54.0	51.4	50.8	52.0	49.9	50.1
Spessartine	5.5	5.9	6.6	7.6	8.4	13.8	14.4	14.7	15.5	15.3	15.3	16.2	16.2	16.9
Grossular	28.4	27.7	26.8	28.3	30.0	29.4	28.8	30.3	27.8	30.5	31.2	29.4	31.5	30.4

	76017B F4 Grt22	76017B F4 Grt23	76017B F4 Grt24	76017B F4 Grt26	76017B F4 Grt27	76017B F4 Grt28	76017B F4 Grt30	76017B F4 Grt32	76017B F4 Grt33	76017B F4 Grt34	76017B F4 Grt35	76017B F4 Grt36	76017B F4 Grt37	76017B F4 Grt38
Analysis														
SiO_2	37.46	37.44	37.67	37.58	37.37	37.67	37.40	37.79	37.66	37.57	37.25	37.76	37.24	37.76
TiO_2	0.20	0.22	0.18	0.21	0.13	0.15	0.19	0.15	0.20	0.20	0.20	0.17	0.17	0.20
Al_2O_3	20.70	20.63	20.55	20.63	20.74	20.79	20.64	20.77	20.65	20.85	20.47	20.56	20.68	20.74
Cr_2O_3	0.03	0.03	0.00	0.05	0.03	0.00	0.00	0.04	0.01	0.07	0.03	0.04	0.03	0.02
Fe_2O_3	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00
MgO	0.58	0.59	0.60	0.56	0.59	0.62	0.56	0.64	0.62	0.63	0.61	0.65	0.69	0.66
CaO	11.48	10.87	10.84	11.41	10.31	11.19	11.28	10.71	10.61	10.57	11.12	10.64	9.99	10.11
MnO	7.27	7.57	7.45	7.85	7.84	7.31	7.59	7.62	7.47	7.64	7.18	7.45	7.19	7.24
FeO	21.87	22.09	22.29	21.54	22.45	21.82	21.57	22.39	22.53	22.68	22.11	22.67	23.23	23.18
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.69	99.43	99.60	99.82	99.45	99.54	99.22	100.11	99.75	100.20	99.21	99.94	99.22	99.90
Cations														
Si	3.005	3.013	3.025	3.012	3.010	3.020	3.013	3.019	3.021	3.004	3.007	3.025	3.008	3.024
Ti	0.012	0.013	0.011	0.012	0.008	0.009	0.011	0.009	0.012	0.012	0.012	0.010	0.010	0.012
Al	1.957	1.957	1.945	1.949	1.969	1.964	1.960	1.956	1.952	1.965	1.947	1.941	1.969	1.958
Cr	0.002	0.002	0.000	0.003	0.002	0.000	0.000	0.002	0.001	0.004	0.002	0.003	0.002	0.001
Fe^{3+}	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000
Mg	0.069	0.070	0.072	0.067	0.071	0.074	0.067	0.076	0.074	0.075	0.074	0.077	0.083	0.079
Ca	0.987	0.937	0.933	0.980	0.890	0.961	0.974	0.917	0.912	0.905	0.961	0.913	0.865	0.868
Mn	0.494	0.516	0.507	0.533	0.535	0.496	0.518	0.516	0.508	0.517	0.491	0.505	0.492	0.491
Fe^{2+}	1.467	1.487	1.497	1.444	1.512	1.463	1.453	1.496	1.511	1.517	1.492	1.518	1.569	1.553
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.995	7.991	8.000	7.997	7.988	7.996	7.992	7.990	8.000	8.000	7.993	7.997	7.985
Endmember														
Pyrope	2.3	2.3	2.4	2.2	2.4	2.5	2.2	2.5	2.5	2.5	2.4	2.6	2.7	2.6
Almandine	48.6	49.4	49.8	47.8	50.3	48.9	48.2	49.8	50.3	50.3	49.4	50.4	52.2	51.9
Spessartine	16.4	17.1	16.8	17.6	17.8	16.6	17.2	17.2	16.9	17.2	16.3	16.8	16.3	16.4
Grossular	32.7	31.1	31.0	32.4	29.6	32.1	32.3	30.5	30.3	30.0	31.8	30.3	28.7	29.0

	76017B F4 Grt39	76017B F4 Grt41	76017B F4 Grt42	76017B F4 Grt43	76017B F4 Grt44	76017B F4 Grt46	76017B F4 Grt47	76017B F4 Grt48	76017B F4 Grt49	76017B F4 Grt50	76017B F4 Grt51	76017B F4 Grt52	76017B F4 Grt53	76017B F4 Grt54
Analysis														
SiO_2	38.06	37.62	37.54	37.36	37.62	37.83	37.51	37.79	37.38	37.76	37.59	37.63	37.49	38.01
TiO_2	0.07	0.12	0.15	0.09	0.12	0.15	0.14	0.14	0.15	0.08	0.09	0.19	0.15	0.10
Al_2O_3	20.87	20.79	20.79	20.71	20.83	20.83	20.90	20.80	20.74	20.97	20.99	20.83	20.76	20.99
Cr_2O_3	0.00	0.00	0.04	0.05	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.00	0.04	0.03
Fe_2O_3	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
MgO	0.71	0.74	0.71	0.78	0.75	0.75	0.78	0.82	0.85	0.88	1.00	0.93	0.97	1.00
CaO	9.47	10.09	10.46	9.89	10.20	10.35	10.16	10.23	10.17	9.97	9.66	9.92	9.89	9.86
MnO	6.83	6.68	6.46	6.25	6.12	5.53	5.28	5.05	4.89	4.70	4.11	4.07	3.40	3.32
FeO	23.88	23.70	23.47	24.37	24.10	24.30	24.85	25.10	25.32	25.93	26.70	25.87	26.56	26.45
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.88	99.73	99.60	99.69	99.76	99.75	99.63	99.95	99.62	100.30	100.13	99.44	99.26	99.76
Cations														
Si	3.043	3.019	3.014	3.006	3.016	3.027	3.011	3.023	3.005	3.013	3.006	3.021	3.017	3.034
Ti	0.004	0.007	0.009	0.006	0.007	0.009	0.009	0.008	0.009	0.005	0.005	0.011	0.009	0.006
Al	1.967	1.966	1.967	1.964	1.969	1.965	1.977	1.961	1.965	1.972	1.978	1.971	1.970	1.975
Cr	0.000	0.000	0.002	0.003	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.002	0.002
Fe^{3+}	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000
Mg	0.085	0.088	0.085	0.093	0.089	0.089	0.093	0.098	0.102	0.104	0.119	0.111	0.117	0.119
Ca	0.812	0.867	0.900	0.853	0.876	0.888	0.873	0.877	0.876	0.853	0.828	0.853	0.852	0.843
Mn	0.462	0.454	0.439	0.426	0.416	0.375	0.359	0.342	0.333	0.318	0.278	0.277	0.232	0.224
Fe^{2+}	1.597	1.590	1.576	1.639	1.616	1.626	1.668	1.679	1.702	1.730	1.785	1.737	1.788	1.766
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.970	7.991	7.992	8.000	7.991	7.980	7.991	7.988	8.000	7.996	8.000	7.982	7.988	7.971
Endmember														
Pyrope	2.9	2.9	2.8	3.1	3.0	3.0	3.1	3.3	3.4	3.5	4.0	3.7	3.9	4.0
Almandine	54.0	53.0	52.5	54.4	53.9	54.6	55.7	56.0	56.5	57.6	59.3	58.3	59.8	59.8
Spessartine	15.6	15.1	14.6	14.1	13.9	12.6	12.0	11.4	11.1	10.6	9.2	9.3	7.8	7.6
Grossular	27.5	28.9	30.0	28.3	29.2	29.8	29.2	29.3	29.1	28.4	27.5	28.6	28.5	28.6

	76017B F4 Grt55	76017B F4 Grt56	76017B F4 Grt57	76017B F4 Grt58	76017B F4 Grt59	76017B F4 Grt60	76032C F3 Grt1	76032C F3 Grt2	76032C F3 Grt3	76032C F3 Grt4	76032C F3 Grt5	76032C F3 Grt6	76032C F3 Grt7	76032C F3 Grt8
Analysis														
SiO_2	37.60	37.65	37.23	37.58	37.54	37.58	37.66	37.32	37.64	38.07	37.79	36.68	37.59	37.48
TiO_2	0.07	0.09	0.12	0.09	0.13	0.11	0.10	0.15	0.12	0.17	0.17	0.19	0.14	0.17
Al_2O_3	21.02	20.69	20.75	20.72	20.83	21.08	20.71	20.59	20.57	20.76	20.87	20.28	20.60	20.58
Cr_2O_3	0.01	0.03	0.00	0.02	0.01	0.02	0.02	0.00	0.03	0.01	0.00	0.03	0.01	0.00
Fe_2O_3	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.15	1.15	1.16	1.17	1.17	1.21	0.44	0.43	0.45	0.43	0.43	0.44	0.40	0.40
CaO	9.58	9.54	9.46	9.41	9.82	9.51	11.51	11.61	11.20	11.23	11.49	10.74	10.36	11.14
MnO	3.08	2.93	2.83	2.55	2.31	2.28	5.83	6.09	6.16	6.65	6.96	7.30	8.14	8.17
FeO	27.34	27.69	27.58	27.76	27.83	27.93	23.36	22.95	22.89	22.65	22.54	21.87	21.89	21.27
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.86	99.76	99.75	99.31	99.64	99.72	99.62	99.48	99.05	99.97	100.25	97.53	99.14	99.20
Cations														
Si	3.009	3.020	2.992	3.023	3.011	3.009	3.022	3.004	3.033	3.038	3.014	3.011	3.033	3.022
Ti	0.004	0.005	0.007	0.005	0.008	0.007	0.006	0.009	0.007	0.010	0.010	0.012	0.008	0.010
Al	1.983	1.956	1.965	1.964	1.969	1.989	1.958	1.953	1.954	1.952	1.962	1.963	1.959	1.955
Cr	0.001	0.002	0.000	0.002	0.001	0.002	0.001	0.000	0.002	0.000	0.000	0.002	0.001	0.000
Fe^{3+}	0.000	0.000	0.038	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.137	0.138	0.138	0.141	0.140	0.144	0.053	0.052	0.054	0.052	0.051	0.053	0.048	0.048
Ca	0.821	0.820	0.815	0.811	0.844	0.816	0.989	1.002	0.967	0.960	0.982	0.945	0.896	0.962
Mn	0.209	0.199	0.193	0.174	0.157	0.155	0.396	0.415	0.420	0.450	0.470	0.508	0.556	0.558
Fe^{2+}	1.830	1.857	1.853	1.868	1.867	1.870	1.568	1.545	1.543	1.512	1.504	1.501	1.477	1.434
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.995	7.996	8.000	7.988	7.996	7.990	7.993	8.000	7.981	7.975	7.994	7.995	7.979	7.990
Endmember														
Pyrope	4.6	4.6	4.6	4.7	4.6	4.8	1.8	1.7	1.8	1.7	1.7	1.8	1.6	1.6
Almandine	61.0	61.6	61.8	62.4	62.1	62.7	52.2	51.3	51.7	50.8	50.0	49.9	49.6	47.8
Spessartine	7.0	6.6	6.4	5.8	5.2	5.2	13.2	13.8	14.1	15.1	15.6	16.9	18.7	18.6
Grossular	27.4	27.2	27.2	27.1	28.1	27.3	32.9	33.2	32.4	32.3	32.7	31.4	30.1	32.0

	76032C F3 Grt9	76032C F3 Grt10	76032C F3 Grt11	76032C F3 Grt13	76032C F3 Grt14	76032C F3 Grt15	76032C F3 Grt16	76032C F3 Grt18	76032C F3 Grt19	76032C F3 Grt20	76032C F3 Grt21	76032C F3 Grt22	76032C F3 Grt23	76032C F3 Grt24
Analysis														
SiO_2	37.81	37.70	37.85	37.39	37.60	37.54	37.54	37.47	38.06	37.62	37.23	37.42	37.53	37.52
TiO_2	0.20	0.15	0.19	0.18	0.14	0.17	0.15	0.18	0.09	0.13	0.16	0.16	0.15	0.14
Al_2O_3	20.79	20.55	20.66	20.49	20.74	20.56	20.58	20.61	20.65	20.43	20.37	20.60	20.60	20.65
Cr_2O_3	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.02	0.00	0.02	0.01
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.41	0.39	0.38	0.41	0.40	0.41	0.41	0.37	0.39	0.35	0.39	0.39	0.41	0.45
CaO	10.28	10.39	10.36	10.38	10.39	10.30	10.45	11.11	10.11	10.52	10.43	10.52	10.96	10.17
MnO	8.89	8.95	9.45	8.80	8.88	8.96	9.15	8.71	9.07	9.33	9.07	8.83	8.35	8.20
FeO	22.19	21.77	21.37	21.56	21.25	21.36	21.45	20.52	21.56	21.24	20.97	21.52	21.61	22.68
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.57	99.93	100.24	99.21	99.41	99.29	99.74	98.98	99.96	99.63	98.63	99.43	99.62	99.82
Cations														
Si	3.017	3.026	3.027	3.022	3.026	3.028	3.019	3.025	3.046	3.029	3.025	3.018	3.018	3.017
Ti	0.012	0.009	0.011	0.011	0.009	0.010	0.009	0.011	0.006	0.008	0.010	0.010	0.009	0.008
Al	1.955	1.944	1.947	1.951	1.967	1.954	1.951	1.960	1.948	1.939	1.950	1.958	1.953	1.957
Cr	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.001	0.000	0.001	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.048	0.047	0.045	0.050	0.048	0.050	0.050	0.044	0.047	0.041	0.047	0.046	0.049	0.054
Ca	0.879	0.894	0.887	0.899	0.896	0.890	0.900	0.961	0.867	0.908	0.908	0.908	0.944	0.877
Mn	0.601	0.609	0.640	0.603	0.605	0.612	0.623	0.595	0.615	0.636	0.624	0.603	0.569	0.559
Fe^{2+}	1.481	1.461	1.430	1.457	1.430	1.441	1.443	1.385	1.443	1.431	1.425	1.451	1.453	1.525
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.993	7.992	7.988	7.992	7.982	7.985	7.996	7.983	7.973	7.993	7.990	7.994	7.996	7.997
Endmember														
Pyrope	1.6	1.5	1.5	1.6	1.6	1.7	1.6	1.5	1.6	1.4	1.6	1.5	1.6	1.8
Almandine	49.2	48.5	47.6	48.4	48.0	48.1	47.8	46.4	48.6	47.4	47.4	48.2	48.2	50.6
Spessartine	20.0	20.2	21.3	20.0	20.3	20.4	20.7	19.9	20.7	21.1	20.8	20.0	18.9	18.5
Grossular	29.2	29.7	29.6	29.9	30.1	29.8	29.9	32.2	29.2	30.1	30.2	30.2	31.3	29.1

	76032C F3 Grt26	76032C F3 Grt27	76032C F3 Grt28	76032C F3 Grt29	76046A F3 Grt1	76046A F3 Grt3	76046A F3 Grt4	76046A F3 Grt5	76046A F3 Grt6	76046A F3 Grt7	76046A F3 Grt8	76046A F3 Grt9	76046A F3 Grt10	76046A F3 Grt11
Analysis														
SiO_2	37.62	36.27	37.36	37.32	37.72	37.47	37.81	37.48	37.84	37.40	37.34	37.43	37.54	37.53
TiO_2	0.14	0.13	0.12	0.15	0.11	0.16	0.15	0.36	0.27	0.09	0.14	0.19	0.18	0.21
Al_2O_3	20.69	20.07	20.45	20.85	20.66	20.63	20.96	20.52	20.59	20.80	20.46	20.49	20.48	20.59
Cr_2O_3	0.01	0.01	0.00	0.03	0.00	0.00	0.03	0.02	0.00	0.02	0.02	0.01	0.03	0.00
Fe_2O_3	0.00	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.16	0.00
MgO	0.42	0.42	0.44	0.46	1.74	1.42	1.34	1.25	1.12	0.89	0.64	0.68	0.87	0.88
CaO	10.73	11.12	10.83	11.39	8.56	9.40	10.39	10.32	9.86	9.96	9.72	9.78	10.44	10.22
MnO	7.31	6.93	6.23	6.21	3.24	4.15	3.99	4.18	4.68	5.18	5.92	5.76	5.56	5.66
FeO	22.60	21.46	22.75	22.96	26.95	26.05	24.58	25.15	25.16	24.91	25.18	24.58	24.50	24.46
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.51	97.63	98.18	99.37	98.99	99.28	99.24	99.29	99.53	99.24	99.57	98.92	99.74	99.55
Cations														
Si	3.025	2.982	3.037	3.004	3.034	3.015	3.025	3.013	3.033	3.013	3.013	3.029	3.014	3.017
Ti	0.008	0.008	0.007	0.009	0.007	0.010	0.009	0.022	0.016	0.005	0.009	0.011	0.011	0.012
Al	1.960	1.944	1.960	1.978	1.958	1.957	1.976	1.943	1.945	1.975	1.946	1.954	1.938	1.951
Cr	0.000	0.001	0.000	0.002	0.000	0.000	0.002	0.001	0.000	0.001	0.001	0.001	0.002	0.000
Fe^{3+}	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.010	0.000
Mg	0.051	0.052	0.053	0.055	0.209	0.170	0.159	0.150	0.134	0.106	0.077	0.083	0.104	0.105
Ca	0.924	0.980	0.943	0.982	0.738	0.810	0.891	0.889	0.846	0.860	0.841	0.847	0.898	0.880
Mn	0.498	0.483	0.429	0.423	0.221	0.283	0.270	0.284	0.318	0.353	0.405	0.395	0.378	0.386
Fe^{2+}	1.520	1.476	1.547	1.545	1.813	1.753	1.645	1.691	1.686	1.679	1.700	1.663	1.645	1.644
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.986	8.000	7.976	7.998	7.980	7.997	7.977	7.993	7.978	7.993	8.000	7.983	8.000	7.995
Endmember														
Pyrope	1.7	1.7	1.8	1.8	7.0	5.6	5.4	5.0	4.5	3.5	2.5	2.8	3.4	3.5
Almandine	50.8	49.4	52.1	51.4	60.8	58.1	55.5	56.1	56.5	56.0	56.2	55.7	54.4	54.5
Spessartine	16.6	16.1	14.4	14.1	7.4	9.4	9.1	9.4	10.6	11.8	13.4	13.2	12.5	12.8
Grossular	30.9	32.8	31.7	32.7	24.8	26.9	30.0	29.5	28.4	28.7	27.8	28.4	29.7	29.2

	76046A F3 Grt12	76046A F3 Grt13	76046A F3 Grt14	76046A F3 Grt15	76046A F3 Grt16	76046A F3 Grt17	76046A F3 Grt18	76046A F3 Grt19	76046A F3 Grt20	76046A F3 Grt21	76046A F3 Grt22	76046A F3 Grt23	76046A F3 Grt24	76046A F3 Grt25
Analysis														
SiO_2	37.40	37.44	37.75	37.81	37.50	37.45	37.73	37.61	37.37	37.48	37.46	37.68	37.46	37.76
TiO_2	0.22	0.05	0.23	0.10	0.09	0.21	0.07	0.14	0.20	0.23	0.24	0.36	0.27	0.23
Al_2O_3	20.66	20.25	20.39	20.46	20.94	20.49	20.78	20.53	20.54	20.36	20.45	20.63	20.43	20.65
Cr_2O_3	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.01	0.00
Fe_2O_3	0.17	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.25	1.31	1.28	1.29	1.32	1.34	1.26	0.99	0.89	0.68	0.68	0.64	0.61	0.63
CaO	9.99	9.46	10.13	9.65	9.48	9.88	9.81	9.73	9.91	9.88	10.15	10.28	10.13	10.47
MnO	5.12	4.48	4.59	4.69	4.68	4.84	4.90	5.91	6.25	6.87	6.44	6.78	6.89	6.83
FeO	24.71	25.36	24.94	25.45	25.21	25.03	25.32	24.17	24.29	24.06	23.26	23.38	23.20	23.25
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.52	98.34	99.32	99.45	99.22	99.75	99.88	99.09	99.44	99.56	98.70	99.76	99.00	99.83
Cations														
Si	3.004	3.039	3.032	3.035	3.013	3.003	3.018	3.032	3.012	3.022	3.032	3.021	3.028	3.025
Ti	0.014	0.003	0.014	0.006	0.005	0.012	0.004	0.008	0.012	0.014	0.015	0.022	0.017	0.014
Al	1.955	1.937	1.930	1.936	1.983	1.937	1.959	1.951	1.951	1.934	1.951	1.950	1.946	1.950
Cr	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000
Fe^{3+}	0.010	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.149	0.159	0.153	0.154	0.158	0.160	0.150	0.119	0.107	0.082	0.082	0.077	0.073	0.076
Ca	0.860	0.823	0.872	0.830	0.816	0.849	0.841	0.840	0.855	0.853	0.881	0.883	0.877	0.899
Mn	0.348	0.308	0.312	0.319	0.318	0.328	0.332	0.404	0.427	0.469	0.441	0.460	0.472	0.464
Fe^{2+}	1.660	1.721	1.675	1.709	1.694	1.678	1.694	1.630	1.637	1.622	1.575	1.568	1.568	1.558
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.990	7.988	7.990	7.989	8.000	7.998	7.984	8.001	7.997	7.978	7.982	7.982	7.986
Endmember														
Pyrope	4.9	5.3	5.1	5.1	5.3	5.3	5.0	4.0	3.5	2.7	2.8	2.6	2.4	2.5
Almandine	55.0	57.2	55.6	56.7	56.7	55.7	56.1	54.4	54.1	53.6	52.9	52.5	52.4	52.0
Spessartine	11.5	10.2	10.4	10.6	10.7	10.9	11.0	13.5	14.1	15.5	14.8	15.4	15.8	15.5
Grossular	28.5	27.3	28.9	27.6	27.3	28.1	27.9	28.1	28.3	28.2	29.6	29.5	29.3	30.0

	76046A F3 Grt26	76046A F3 Grt27	76046A F3 Grt28	76046A F3 Grt29	76046A F3 Grt30	76046A F3 Grt31	76046A F3 Grt32	76046A F3 Grt33	76046A F3 Grt34	76046A F3 Grt35	76046A F3 Grt36	76046A F3 Grt37	76046A F3 Grt38	76046A F3 Grt39
Analysis														
SiO_2	37.14	37.27	37.04	37.80	37.56	37.22	37.77	37.38	37.71	37.28	37.64	37.58	37.27	37.58
TiO_2	0.13	0.41	0.19	0.12	0.14	0.13	0.23	0.11	0.16	0.05	0.20	0.11	0.03	0.40
Al_2O_3	20.67	20.23	20.61	20.50	20.43	20.43	20.35	20.40	20.64	20.22	20.58	20.62	20.36	20.72
Cr_2O_3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.02	0.00	0.00	0.03	0.00
Fe_2O_3	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.40	0.00	0.00	0.00	0.00
MgO	0.64	0.60	0.63	0.59	0.58	0.57	0.60	0.54	0.64	0.64	0.69	0.67	0.69	0.69
CaO	9.99	10.29	9.78	9.90	10.07	9.79	9.76	10.32	10.31	10.62	10.27	9.69	10.51	10.33
MnO	7.08	6.74	6.73	6.86	6.95	6.87	6.99	7.05	5.46	5.36	5.25	5.38	4.85	4.73
FeO	23.40	23.30	23.36	23.69	23.53	23.85	24.29	23.47	24.71	24.45	25.09	25.10	24.89	25.36
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.32	98.84	98.33	99.47	99.27	98.85	99.97	99.46	99.64	99.04	99.71	99.14	98.62	99.80
Cations														
Si	3.000	3.021	3.015	3.041	3.032	3.021	3.033	3.017	3.028	3.019	3.023	3.033	3.025	3.013
Ti	0.008	0.025	0.011	0.007	0.009	0.008	0.014	0.006	0.009	0.003	0.012	0.007	0.002	0.024
Al	1.968	1.933	1.977	1.944	1.943	1.954	1.926	1.940	1.953	1.930	1.948	1.961	1.948	1.957
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.002	0.000
Fe^{3+}	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.025	0.000	0.000	0.000	0.000
Mg	0.077	0.073	0.076	0.071	0.070	0.069	0.072	0.065	0.077	0.077	0.082	0.081	0.084	0.082
Ca	0.865	0.894	0.853	0.853	0.871	0.851	0.839	0.892	0.887	0.922	0.884	0.838	0.914	0.887
Mn	0.484	0.463	0.464	0.468	0.475	0.472	0.476	0.482	0.371	0.367	0.357	0.367	0.333	0.321
Fe^{2+}	1.581	1.579	1.590	1.594	1.588	1.619	1.631	1.584	1.659	1.656	1.685	1.694	1.690	1.700
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.999	7.988	7.986	7.979	7.988	7.994	7.990	8.000	7.985	8.000	7.991	7.980	7.998	7.985
Endmember														
Pyrope	2.5	2.4	2.6	2.4	2.3	2.3	2.4	2.2	2.6	2.6	2.7	2.7	2.8	2.8
Almandine	52.6	52.5	53.3	53.4	52.9	53.8	54.1	52.4	55.4	54.8	56.0	56.8	55.9	56.9
Spessartine	16.1	15.4	15.6	15.7	15.8	15.7	15.8	15.9	12.4	12.2	11.9	12.3	11.0	10.7
Grossular	28.8	29.7	28.6	28.6	29.0	28.3	27.8	29.5	29.6	30.5	29.4	28.1	30.3	29.7

	76046A F3 Grt40	76046A F3 Grt41	76046A F3 Grt42	76046A F3 Grt43	76046A F3 Grt44	76046A F3 Grt45	76046A F3 Grt46	76046A F3 Grt49	76046A F3 Grt50	76046A F3 Grt51	76111A F6 Grt1	76111A F6 Grt2	76111A F6 Grt3	76111A F6 Grt4
Analysis														
SiO_2	37.33	37.39	37.57	37.88	37.52	37.50	37.43	37.77	37.90	37.88	37.45	36.46	36.79	36.80
TiO_2	0.09	0.11	0.04	0.01	0.08	0.15	0.10	0.10	0.06	0.07	0.09	0.09	0.14	0.09
Al_2O_3	20.64	20.46	20.63	20.50	20.40	20.61	20.43	20.68	20.64	20.81	19.88	20.94	21.10	21.13
Cr_2O_3	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.03	0.06
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	2.94	1.14	1.62
MgO	0.74	0.89	1.05	1.10	1.15	1.34	1.53	1.89	2.35	2.40	2.33	1.98	0.98	0.94
CaO	10.16	10.08	9.54	10.31	9.09	8.29	8.63	8.79	9.19	8.92	8.04	9.01	9.97	10.16
MnO	4.49	3.52	2.99	2.63	2.68	2.68	2.27	1.71	1.11	1.42	3.16	3.71	4.77	4.81
FeO	25.71	26.66	27.57	27.27	27.87	29.03	28.58	28.65	28.18	28.19	26.88	24.73	24.49	24.24
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.03	0.06	0.06
Total	99.18	99.11	99.39	99.72	98.77	99.61	98.98	99.60	99.44	99.69	98.68	99.88	99.47	99.92
Cations														
Si	3.015	3.021	3.025	3.036	3.037	3.018	3.025	3.024	3.027	3.019	3.029	2.920	2.960	2.950
Ti	0.005	0.007	0.002	0.000	0.005	0.009	0.006	0.006	0.004	0.004	0.005	0.006	0.009	0.005
Al	1.964	1.948	1.958	1.935	1.946	1.955	1.946	1.951	1.943	1.954	1.895	1.976	2.001	1.997
Cr	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.004
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.177	0.069	0.098
Mg	0.089	0.107	0.126	0.132	0.139	0.161	0.184	0.226	0.280	0.285	0.281	0.237	0.118	0.113
Ca	0.879	0.873	0.823	0.885	0.788	0.715	0.747	0.754	0.787	0.762	0.696	0.773	0.860	0.873
Mn	0.307	0.241	0.204	0.178	0.183	0.183	0.156	0.116	0.075	0.096	0.216	0.252	0.325	0.327
Fe^{2+}	1.737	1.802	1.856	1.828	1.887	1.954	1.932	1.918	1.882	1.879	1.818	1.656	1.648	1.625
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.005	0.009	0.009
Total	7.997	7.998	7.994	7.996	7.985	7.995	7.996	7.995	7.998	7.999	8.000	8.000	8.000	8.000
Endmember														
Pyrope	3.0	3.5	4.2	4.4	4.6	5.3	6.1	7.5	9.3	9.4	9.3	8.1	4.0	3.8
Almandine	57.7	59.6	61.7	60.5	63.0	64.9	64.0	63.6	62.3	62.2	60.4	56.8	55.8	55.3
Spessartine	10.2	8.0	6.8	5.9	6.1	6.1	5.2	3.9	2.5	3.2	7.2	8.6	11.0	11.1
Grossular	29.2	28.9	27.3	29.3	26.3	23.7	24.8	25.0	26.0	25.2	23.1	26.5	29.1	29.7

	76111A F6 Grt5	76111A F6 Grt6	76111A F6 Grt7	76111A F6 Grt8	76111A F6 Grt9	76111A F6 Grt10	76111A F6 Grt11	76111A F6 Grt12	76111A F6 Grt13	76111A F6 Grt14	76111A F6 Grt15	76111A F6 Grt16	76111A F6 Grt17	76111A F6 Grt18
Analysis														
SiO_2	19.31	36.54	95.34	36.84	36.65	36.48	36.84	57.71	36.79	36.37	36.70	36.28	36.19	36.34
TiO_2	62.61	0.14	0.01	0.03	0.16	0.10	0.13	0.02	0.06	0.14	0.10	0.03	0.07	0.10
Al_2O_3	1.09	21.26	0.07	21.30	21.11	21.19	20.79	13.75	21.08	21.12	21.23	21.48	21.10	21.03
Cr_2O_3	0.00	0.01	0.03	0.03	0.01	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Fe_2O_3	0.00	1.88	0.00	2.12	2.19	2.26	1.55	0.00	1.81	2.08	1.74	2.79	2.66	2.22
MgO	0.00	1.15	0.02	1.18	1.09	1.02	1.14	0.84	1.16	1.16	1.21	1.33	1.22	1.23
CaO	17.46	9.69	0.07	9.47	10.00	10.11	9.81	6.56	9.62	9.77	9.72	9.74	9.76	9.68
MnO	0.06	4.22	0.09	4.73	5.61	5.73	5.19	3.98	5.00	4.67	4.40	3.95	4.01	3.96
FeO	1.23	24.94	0.70	24.89	23.27	22.96	24.18	19.25	24.52	24.09	24.74	24.53	24.35	24.70
Na_2O	0.03	0.03	0.00	0.04	0.06	0.04	0.03	0.03	0.02	0.05	0.03	0.01	0.06	0.05
Total	101.78	99.86	96.32	100.63	100.14	99.93	99.66	102.13	100.06	99.44	99.88	100.14	99.40	99.33
Cations														
Si	1.499	2.932	5.971	2.936	2.933	2.926	2.962	4.134	2.948	2.929	2.941	2.902	2.917	2.931
Ti	3.657	0.008	0.001	0.002	0.009	0.006	0.008	0.001	0.003	0.009	0.006	0.002	0.004	0.006
Al	0.100	2.011	0.005	2.001	1.991	2.003	1.971	1.161	1.991	2.005	2.005	2.025	2.004	1.999
Cr	0.000	0.000	0.001	0.002	0.001	0.002	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001
Fe^{3+}	0.000	0.113	0.000	0.127	0.132	0.137	0.094	0.000	0.109	0.126	0.105	0.168	0.161	0.134
Mg	0.000	0.137	0.001	0.140	0.130	0.122	0.137	0.089	0.138	0.139	0.145	0.158	0.147	0.148
Ca	1.452	0.833	0.004	0.809	0.858	0.869	0.845	0.503	0.826	0.844	0.835	0.835	0.843	0.836
Mn	0.004	0.287	0.005	0.319	0.380	0.389	0.353	0.241	0.339	0.318	0.299	0.267	0.274	0.271
Fe^{2+}	0.080	1.673	0.037	1.659	1.557	1.540	1.626	1.153	1.643	1.622	1.658	1.641	1.641	1.666
Na	0.004	0.005	0.000	0.005	0.009	0.006	0.005	0.004	0.002	0.007	0.005	0.002	0.009	0.008
Total	6.796	8.000	6.025	8.000	8.000	8.000	8.000	7.287	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	0.0	4.7	3.0	4.8	4.4	4.2	4.6	4.5	4.7	4.8	4.9	5.5	5.0	5.1
Almandine	5.2	57.1	77.7	56.7	53.2	52.7	54.9	58.0	55.8	55.5	56.5	56.6	56.5	57.0
Spessartine	0.3	9.8	10.2	10.9	13.0	13.3	11.9	12.2	11.5	10.9	10.2	9.2	9.4	9.3
Grossular	94.6	28.4	9.2	27.6	29.3	29.8	28.5	25.3	28.0	28.9	28.4	28.8	29.0	28.6

	76111A F6 Grt19	76111A F6 Grt20	76111A F6 Grt21	76111A F6 Grt22	76111A F6 Grt23	76111A F6 Grt24	76111A F6 Grt25	76111A F6 Grt26	76111A F6 Grt27	76111A F6 Grt28	76111A F6 Grt29	76111A F6 Grt30	76111A F6 Grt31	76111A F6 Grt32
Analysis														
SiO_2	36.66	36.86	36.49	36.84	36.66	36.94	95.23	36.90	36.49	36.69	36.80	36.62	36.57	36.59
TiO_2	0.13	0.07	0.09	0.12	0.09	0.14	0.00	0.11	0.16	0.16	0.16	0.14	0.15	0.10
Al_2O_3	21.32	21.18	21.15	21.26	21.04	21.24	0.17	21.12	21.14	20.94	20.93	21.06	21.14	20.91
Cr_2O_3	0.02	0.00	0.04	0.02	0.01	0.03	0.02	0.05	0.02	0.00	0.05	0.06	0.01	0.01
Fe_2O_3	2.78	2.05	1.76	1.69	1.26	1.35	0.00	1.69	2.30	1.46	1.69	1.87	2.54	2.18
MgO	1.28	1.34	1.41	1.53	1.69	1.74	0.02	1.34	1.17	0.88	0.73	0.72	1.02	0.76
CaO	9.89	9.75	9.45	9.69	9.13	9.34	0.09	10.14	10.27	10.32	10.36	10.23	10.23	10.37
MnO	3.75	3.50	3.00	2.66	2.16	1.82	0.06	4.85	5.49	7.30	8.76	9.14	8.49	8.87
FeO	25.08	25.60	25.92	26.21	26.83	27.30	0.81	23.84	22.89	21.66	20.55	20.13	20.19	20.08
Na_2O	0.03	0.03	0.03	0.03	0.04	0.02	0.01	0.02	0.02	0.04	0.03	0.03	0.04	0.03
Total	100.94	100.38	99.34	100.04	98.91	99.91	96.39	100.06	99.95	99.46	100.06	100.00	100.37	99.90
Cations														
Si	2.913	2.940	2.939	2.943	2.958	2.952	5.964	2.948	2.924	2.955	2.952	2.939	2.922	2.940
Ti	0.008	0.004	0.005	0.007	0.005	0.008	0.000	0.007	0.010	0.010	0.009	0.008	0.009	0.006
Al	1.996	1.992	2.007	2.001	2.001	2.000	0.012	1.989	1.996	1.988	1.978	1.992	1.990	1.981
Cr	0.001	0.000	0.003	0.001	0.001	0.002	0.001	0.003	0.001	0.000	0.003	0.004	0.001	0.000
Fe^{3+}	0.166	0.123	0.107	0.101	0.077	0.081	0.000	0.102	0.139	0.089	0.102	0.113	0.152	0.132
Mg	0.152	0.159	0.169	0.182	0.204	0.207	0.001	0.159	0.140	0.106	0.087	0.087	0.122	0.091
Ca	0.841	0.834	0.815	0.830	0.790	0.799	0.006	0.868	0.882	0.891	0.890	0.879	0.876	0.893
Mn	0.252	0.236	0.205	0.180	0.148	0.123	0.003	0.328	0.372	0.498	0.595	0.621	0.574	0.603
Fe^{2+}	1.666	1.708	1.746	1.751	1.811	1.824	0.042	1.593	1.534	1.459	1.378	1.351	1.349	1.349
Na	0.005	0.004	0.005	0.004	0.006	0.003	0.001	0.003	0.003	0.005	0.005	0.005	0.006	0.005
Total	8.000	8.000	8.000	8.000	8.000	8.000	6.030	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	5.2	5.4	5.8	6.2	6.9	7.0	2.7	5.4	4.8	3.6	3.0	2.9	4.2	3.1
Almandine	57.2	58.1	59.5	59.5	61.3	61.8	80.5	54.0	52.4	49.4	46.7	46.0	46.2	46.0
Spessartine	8.7	8.1	7.0	6.1	5.0	4.2	5.5	11.1	12.7	16.9	20.2	21.1	19.7	20.5
Grossular	28.9	28.4	27.8	28.2	26.8	27.1	11.3	29.4	30.1	30.2	30.2	29.9	30.0	30.4

	76111A F6 Grt33	76111A F6 Grt34	76111A F6 Grt35	76111A F6 Grt36	76111A F6 Grt37	76111A F6 Grt38	76111A F6 Grt39	76111A F6 Grt40	76111A F6 Grt41	76111A F6 Grt42	76111A F6 Grt43	76111A F6 Grt44	76111A F7 Grt1	76111A F7 Grt2
Analysis														
SiO_2	36.78	87.17	36.82	35.36	36.47	36.74	36.67	36.65	36.53	36.61	36.47	36.59	36.30	36.39
TiO_2	0.13	0.02	0.13	0.08	0.14	0.12	0.17	0.09	0.11	0.07	0.08	0.10	0.14	0.10
Al_2O_3	21.10	3.48	20.96	20.70	20.98	21.02	21.00	21.07	21.18	21.21	21.27	21.16	21.02	20.92
Cr_2O_3	0.01	0.01	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00
Fe_2O_3	2.38	0.00	1.81	3.91	1.99	2.18	1.81	1.67	2.20	1.57	1.18	2.33	2.49	1.92
MgO	0.66	0.17	0.65	1.97	0.84	0.82	0.85	0.87	0.91	1.00	1.11	1.10	0.91	0.85
CaO	10.80	2.26	10.50	8.53	10.36	10.27	10.27	10.10	10.25	10.04	9.63	9.88	10.22	10.10
MnO	9.62	1.46	9.28	7.76	7.53	7.77	6.27	5.97	5.64	5.20	4.96	4.77	7.49	8.06
FeO	19.35	4.32	20.01	19.82	21.24	21.40	22.80	23.17	23.16	23.80	24.19	24.35	21.05	20.85
Na_2O	0.00	0.00	0.03	0.05	0.02	0.03	0.04	0.05	0.04	0.03	0.03	0.01	0.05	0.03
Total	100.81	98.89	100.18	98.20	99.57	100.35	99.87	99.63	100.01	99.52	98.93	100.30	99.66	99.22
Cations														
Si	2.930	5.563	2.950	2.883	2.937	2.939	2.945	2.949	2.929	2.945	2.948	2.927	2.922	2.941
Ti	0.008	0.001	0.008	0.005	0.009	0.007	0.010	0.006	0.007	0.004	0.005	0.006	0.009	0.006
Al	1.981	0.262	1.979	1.990	1.991	1.982	1.987	1.998	2.001	2.011	2.026	1.995	1.994	1.993
Cr	0.001	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Fe^{3+}	0.143	0.000	0.109	0.240	0.120	0.131	0.109	0.101	0.133	0.095	0.072	0.140	0.151	0.117
Mg	0.078	0.016	0.077	0.240	0.100	0.098	0.102	0.104	0.108	0.120	0.134	0.131	0.109	0.102
Ca	0.922	0.154	0.901	0.745	0.894	0.881	0.883	0.871	0.881	0.865	0.834	0.847	0.881	0.875
Mn	0.649	0.079	0.630	0.536	0.514	0.527	0.426	0.406	0.383	0.354	0.340	0.323	0.511	0.552
Fe^{2+}	1.289	0.231	1.341	1.352	1.431	1.432	1.531	1.558	1.553	1.601	1.635	1.629	1.417	1.410
Na	0.000	0.000	0.004	0.008	0.004	0.005	0.007	0.007	0.005	0.005	0.005	0.002	0.007	0.005
Total	8.000	6.305	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	2.7	3.4	2.6	8.4	3.4	3.3	3.5	3.5	3.7	4.1	4.6	4.5	3.7	3.5
Almandine	43.9	48.1	45.5	47.1	48.7	48.8	52.0	53.0	53.1	54.5	55.6	55.6	48.6	48.0
Spessartine	22.1	16.4	21.4	18.6	17.5	17.9	14.5	13.8	13.1	12.0	11.5	11.0	17.5	18.8
Grossular	31.4	32.2	30.6	25.9	30.4	30.0	30.0	29.6	30.1	29.4	28.3	28.9	30.2	29.8

	76111A F7 Grt3	76111A F7 Grt4	76111A F7 Grt5	76111A F7 Grt6	76111A F7 Grt7	76111A F7 Grt8	76111A F7 Grt9	76111A F7 Grt10	76111A F7 Grt11	76111A F7 Grt12	76111A F7 Grt13	76111A F7 Grt14	76111A F7 Grt15	76111A F7 Grt16
Analysis														
SiO_2	94.16	36.48	39.38	36.29	36.46	36.51	36.55	36.65	46.80	36.86	36.61	37.04	36.73	36.97
TiO_2	0.00	0.20	0.11	0.19	0.17	0.15	0.17	0.12	0.17	0.16	0.16	0.16	0.21	0.19
Al_2O_3	0.41	21.14	19.96	21.14	20.88	20.77	20.73	20.73	16.84	20.87	20.74	20.94	20.69	20.81
Cr_2O_3	0.01	0.02	0.02	0.02	0.04	0.02	0.05	0.00	0.01	0.03	0.01	0.00	0.01	0.00
Fe_2O_3	0.00	2.07	0.00	2.58	1.18	2.42	2.11	2.55	0.00	2.07	2.78	1.53	1.90	1.39
MgO	0.02	0.75	0.64	0.64	0.63	0.59	0.51	0.54	0.51	0.56	0.57	0.57	0.62	0.66
CaO	0.21	10.57	10.03	10.82	10.61	10.96	10.94	11.26	8.92	10.84	11.01	11.09	11.05	10.46
MnO	0.20	9.29	9.72	10.78	10.45	11.78	11.89	11.81	10.14	11.46	11.48	11.14	10.83	10.70
FeO	0.96	19.39	19.42	17.48	18.28	16.71	16.66	16.30	16.10	17.64	17.01	17.80	17.80	18.86
Na_2O	0.00	0.03	0.06	0.04	0.04	0.01	0.05	0.06	0.02	0.02	0.04	0.03	0.02	0.02
Total	95.97	99.93	99.34	99.97	98.74	99.93	99.65	100.01	99.51	100.50	100.41	100.29	99.86	100.05
Cations														
Si	5.938	2.927	3.140	2.913	2.957	2.934	2.944	2.941	3.599	2.946	2.931	2.960	2.952	2.965
Ti	0.000	0.012	0.007	0.012	0.011	0.009	0.010	0.007	0.010	0.009	0.010	0.010	0.013	0.011
Al	0.031	2.000	1.876	2.000	1.996	1.967	1.968	1.960	1.527	1.966	1.957	1.972	1.959	1.967
Cr	0.000	0.001	0.001	0.001	0.003	0.001	0.003	0.000	0.001	0.002	0.001	0.000	0.000	0.000
Fe^{3+}	0.000	0.125	0.000	0.156	0.072	0.146	0.128	0.154	0.000	0.125	0.167	0.092	0.115	0.084
Mg	0.002	0.089	0.076	0.076	0.077	0.071	0.061	0.064	0.058	0.066	0.068	0.068	0.074	0.078
Ca	0.014	0.909	0.857	0.931	0.922	0.944	0.944	0.968	0.735	0.928	0.944	0.950	0.951	0.899
Mn	0.011	0.631	0.656	0.733	0.718	0.802	0.811	0.802	0.661	0.776	0.778	0.754	0.737	0.727
Fe^{2+}	0.051	1.301	1.296	1.173	1.240	1.123	1.122	1.094	1.036	1.179	1.139	1.190	1.196	1.265
Na	0.000	0.005	0.009	0.006	0.006	0.002	0.008	0.010	0.002	0.003	0.006	0.004	0.003	0.004
Total	6.047	8.000	7.919	8.000	8.000	8.000	8.000	8.000	7.629	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	2.1	3.0	2.6	2.6	2.6	2.4	2.1	2.2	2.3	2.3	2.3	2.3	2.5	2.6
Almandine	65.5	44.4	44.9	40.3	41.9	38.2	38.2	37.4	41.6	40.0	38.9	40.2	40.4	42.6
Spessartine	13.9	21.5	22.7	25.2	24.3	27.3	27.6	27.4	26.5	26.3	26.6	25.5	24.9	24.5
Grossular	18.5	31.0	29.7	31.9	31.2	32.1	32.1	33.0	29.5	31.5	32.2	32.1	32.2	30.3

	76111A F7 Grt17	76111A F7 Grt18	76111A F7 Grt19	76111A F7 Grt20	76111A F7 Grt21	76111A F7 Grt22	76111A F7 Grt23	76111A F7 Grt24	76111A F7 Grt25	76111A F7 Grt26	76111A F7 Grt27	76111A F12 Grt1	76111A F12 Grt2	76111A F12 Grt3
Analysis														
SiO_2	36.72	36.69	36.84	36.50	36.77	36.67	36.88	36.74	36.69	36.70	37.68	36.98	37.07	36.86
TiO_2	0.17	0.26	0.34	0.35	0.19	0.14	0.08	0.11	0.11	0.09	0.09	0.16	0.10	0.11
Al_2O_3	21.13	20.93	20.92	20.81	20.99	21.04	21.05	21.07	21.11	21.09	20.99	21.08	21.24	21.09
Cr_2O_3	0.00	0.01	0.04	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Fe_2O_3	1.92	1.58	1.44	1.70	1.42	2.06	1.33	1.70	1.85	1.52	0.42	1.71	1.49	1.36
MgO	0.66	0.78	0.79	0.82	0.92	1.00	1.15	1.27	1.44	1.54	1.70	1.51	1.38	1.33
CaO	10.67	10.56	10.48	10.59	10.41	10.54	10.24	9.94	9.57	9.48	9.47	9.97	9.88	9.83
MnO	9.89	8.90	8.47	8.01	7.36	6.70	5.35	4.28	3.63	3.33	3.11	1.36	1.69	1.67
FeO	19.13	20.03	20.78	20.54	21.60	21.66	23.52	24.41	25.37	25.57	26.59	27.29	27.37	27.43
Na_2O	0.02	0.03	0.04	0.06	0.03	0.05	0.02	0.06	0.02	0.03	0.05	0.05	0.05	0.02
Total	100.30	99.76	100.12	99.42	99.68	99.86	99.62	99.58	99.78	99.36	100.10	100.11	100.29	99.69
Cations														
Si	2.937	2.948	2.951	2.942	2.954	2.939	2.960	2.950	2.942	2.951	3.001	2.951	2.955	2.957
Ti	0.010	0.015	0.020	0.021	0.012	0.008	0.005	0.006	0.006	0.005	0.005	0.010	0.006	0.006
Al	1.992	1.982	1.975	1.977	1.987	1.988	1.991	1.994	1.995	1.999	1.971	1.983	1.996	1.994
Cr	0.000	0.000	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Fe^{3+}	0.116	0.096	0.087	0.103	0.086	0.124	0.080	0.103	0.111	0.092	0.025	0.103	0.090	0.082
Mg	0.078	0.093	0.094	0.099	0.110	0.120	0.137	0.152	0.172	0.185	0.201	0.179	0.164	0.160
Ca	0.914	0.909	0.899	0.915	0.896	0.905	0.880	0.856	0.822	0.817	0.808	0.853	0.843	0.845
Mn	0.670	0.606	0.575	0.547	0.501	0.455	0.364	0.291	0.247	0.227	0.210	0.092	0.114	0.114
Fe^{2+}	1.280	1.346	1.392	1.385	1.451	1.452	1.579	1.639	1.701	1.720	1.771	1.822	1.824	1.840
Na	0.003	0.005	0.006	0.009	0.004	0.008	0.003	0.010	0.003	0.005	0.008	0.008	0.007	0.003
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	2.7	3.2	3.2	3.4	3.7	4.1	4.6	5.2	5.9	6.3	6.7	6.1	5.6	5.4
Almandine	43.5	45.6	47.0	47.0	49.1	49.5	53.3	55.8	57.8	58.3	59.2	61.8	61.9	62.2
Spessartine	22.8	20.5	19.4	18.6	16.9	15.5	12.3	9.9	8.4	7.7	7.0	3.1	3.9	3.8
Grossular	31.1	30.8	30.4	31.1	30.3	30.9	29.7	29.1	27.9	27.7	27.0	29.0	28.6	28.6

	76111A F12 Grt4	76111A F12 Grt5	76111A F12 Grt6	76111A F12 Grt7	76111A F12 Grt8	76111A F12 Grt9	76111A F12 Grt10	76111A F12 Grt11	76111A F12 Grt12	76111A F12 Grt13	76111A F12 Grt14	76111A F12 Grt15	76111A F12 Grt16	76111A F12 Grt17
Analysis														
SiO_2	31.26	36.98	36.92	36.83	37.08	37.34	37.08	37.09	36.65	34.54	36.90	37.03	36.87	36.83
TiO_2	25.09	0.15	0.15	0.13	0.17	0.13	0.13	0.12	0.10	16.72	0.08	0.12	0.11	0.12
Al_2O_3	8.22	20.94	20.87	21.00	20.80	20.99	21.03	20.93	21.12	12.65	21.06	21.01	20.92	20.95
Cr_2O_3	0.00	0.05	0.02	0.03	0.03	0.04	0.01	0.02	0.02	0.00	0.02	0.01	0.00	0.03
Fe_2O_3	0.00	1.20	1.34	1.43	1.10	0.54	1.13	1.28	2.04	0.00	1.43	0.82	1.25	1.28
MgO	0.41	1.24	1.28	1.25	1.22	1.19	1.21	1.20	1.15	0.57	1.10	1.11	1.13	1.07
CaO	22.80	9.66	9.70	9.68	9.77	9.57	9.51	9.33	9.64	20.42	9.50	9.45	9.49	9.43
MnO	0.62	1.83	2.19	2.27	2.68	2.84	3.12	3.26	3.45	1.99	3.69	3.91	3.92	3.92
FeO	11.52	27.54	27.26	26.97	27.01	27.35	26.83	26.83	25.83	14.47	26.22	26.17	25.93	26.03
Na_2O	0.00	0.08	0.02	0.06	0.02	0.03	0.03	0.05	0.04	0.01	0.02	0.04	0.03	0.04
Total	99.93	99.69	99.76	99.64	99.86	100.01	100.07	100.11	100.04	101.38	100.02	99.65	99.63	99.70
Cations														
Si	2.501	2.969	2.964	2.959	2.974	2.988	2.968	2.970	2.938	2.707	2.958	2.976	2.966	2.963
Ti	1.510	0.009	0.009	0.008	0.010	0.008	0.008	0.007	0.006	0.985	0.005	0.007	0.007	0.007
Al	0.775	1.981	1.975	1.988	1.966	1.979	1.984	1.975	1.995	1.169	1.990	1.990	1.984	1.986
Cr	0.000	0.003	0.001	0.002	0.002	0.003	0.001	0.001	0.002	0.000	0.001	0.000	0.000	0.002
Fe^{3+}	0.000	0.073	0.081	0.086	0.066	0.033	0.068	0.077	0.123	0.000	0.086	0.049	0.076	0.078
Mg	0.049	0.149	0.153	0.150	0.146	0.142	0.144	0.143	0.137	0.067	0.132	0.133	0.135	0.128
Ca	1.954	0.831	0.834	0.833	0.839	0.820	0.815	0.801	0.828	1.715	0.816	0.813	0.818	0.813
Mn	0.042	0.125	0.149	0.154	0.182	0.193	0.212	0.221	0.234	0.132	0.250	0.266	0.267	0.267
Fe^{2+}	0.771	1.849	1.830	1.812	1.812	1.830	1.796	1.797	1.731	0.948	1.758	1.759	1.744	1.751
Na	0.000	0.012	0.004	0.009	0.002	0.005	0.005	0.007	0.007	0.002	0.004	0.006	0.004	0.006
Total	7.602	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	7.725	8.000	8.000	8.000	8.000
Endmember														
Pyrope	1.7	5.0	5.1	5.1	4.9	4.8	4.9	4.8	4.7	2.3	4.5	4.5	4.6	4.3
Almandine	27.4	62.6	61.7	61.4	60.8	61.3	60.5	60.7	59.1	33.1	59.5	59.2	58.8	59.2
Spessartine	1.5	4.2	5.0	5.2	6.1	6.5	7.1	7.5	8.0	4.6	8.5	8.9	9.0	9.0
Grossular	69.4	28.1	28.1	28.3	28.2	27.5	27.5	27.0	28.2	59.9	27.6	27.4	27.6	27.5

	76111A F12 Grt18	76111A F14 Grt1	76111A F14 Grt2	76111A F14 Grt3	76111A F14 Grt4	76111A F14 Grt5	76111A F14 Grt6	76111A F14 Grt7	76111A F14 Grt8	76111A F14 Grt9	76111A F14 Grt10	76111A F14 Grt11	76111A F14 Grt12	76111A F14 Grt13
Analysis		1	2	3	4	5	6	7	8	9	10	11	12	13
SiO_2	36.81	37.07	37.14	36.97	36.89	36.95	37.08	36.90	32.27	37.00	37.39	36.84	37.07	37.10
TiO_2	0.12	0.14	0.09	0.10	0.09	0.08	0.14	0.15	36.39	0.12	0.11	0.10	0.10	0.15
Al_2O_3	20.97	21.04	21.17	21.19	21.06	21.02	21.18	21.09	1.99	20.89	21.12	21.20	21.05	20.90
Cr_2O_3	0.01	0.02	0.04	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.02	0.01
Fe_2O_3	1.52	1.44	1.86	1.48	2.12	1.68	1.36	1.76	0.00	1.39	0.88	1.21	1.20	1.80
MgO	1.12	1.96	1.83	1.65	1.47	1.41	1.35	1.30	0.01	1.22	1.20	1.21	1.14	1.09
CaO	9.45	10.10	10.13	9.90	9.95	10.20	10.26	9.92	29.77	9.51	9.57	9.47	9.57	9.71
MnO	3.88	0.81	1.01	1.15	1.35	1.57	1.62	1.96	0.14	2.33	2.76	3.20	3.53	3.87
FeO	26.01	27.12	27.03	27.31	27.30	27.07	27.13	26.97	1.12	27.47	27.49	26.57	26.42	25.96
Na_2O	0.02	0.02	0.04	0.05	0.03	0.01	0.03	0.06	0.03	0.03	0.03	0.01	0.03	0.05
Total	99.92	99.73	100.33	99.79	100.29	99.98	100.16	100.12	101.72	99.97	100.55	99.80	100.14	100.63
Cations														
Si	2.956	2.959	2.950	2.955	2.942	2.955	2.957	2.949	2.485	2.966	2.978	2.956	2.967	2.959
Ti	0.007	0.009	0.005	0.006	0.005	0.005	0.009	0.009	2.108	0.007	0.006	0.006	0.006	0.009
Al	1.984	1.980	1.982	1.996	1.980	1.981	1.991	1.986	0.181	1.974	1.982	2.004	1.986	1.964
Cr	0.001	0.001	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001
Fe^{3+}	0.092	0.087	0.111	0.089	0.127	0.101	0.082	0.106	0.000	0.084	0.053	0.073	0.072	0.108
Mg	0.134	0.233	0.217	0.196	0.175	0.167	0.161	0.155	0.002	0.146	0.142	0.144	0.136	0.130
Ca	0.813	0.863	0.862	0.847	0.851	0.873	0.876	0.850	2.457	0.817	0.816	0.814	0.820	0.830
Mn	0.264	0.055	0.068	0.078	0.091	0.106	0.110	0.133	0.009	0.158	0.186	0.218	0.239	0.261
Fe^{2+}	1.746	1.811	1.796	1.826	1.821	1.810	1.809	1.803	0.072	1.842	1.831	1.783	1.768	1.731
Na	0.003	0.003	0.007	0.007	0.005	0.001	0.005	0.009	0.004	0.005	0.004	0.002	0.005	0.008
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	7.318	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	4.5	7.9	7.4	6.7	6.0	5.7	5.4	5.3	0.1	4.9	4.8	4.9	4.6	4.4
Almandine	59.1	61.1	61.0	61.9	62.0	61.2	61.2	61.3	2.9	62.2	61.5	60.2	59.7	58.7
Spessartine	8.9	1.9	2.3	2.6	3.1	3.6	3.7	4.5	0.4	5.3	6.2	7.4	8.1	8.8
Grossular	27.5	29.1	29.3	28.8	28.9	29.5	29.7	28.9	96.7	27.6	27.4	27.5	27.7	28.1

	76111A F14 Grt14	76111A F14 Grt15	76111A F14 Grt16	76111A F14 Grt17	76111A F14 Grt18	76111A F14 Grt19	76111A F14 Grt20	76111A F14 Grt21	76111A F14 Grt22	76111A F14 Grt23	76111A F14 Grt24	76111A F21 Grt1	76111A F21 Grt2	76111A F21 Grt3
Analysis	14	15	16	17	18	19	20	21	22	23	24			
SiO_2	36.93	37.02	37.20	37.09	37.08	38.01	36.95	36.44	37.27	37.08	37.16	37.91	37.94	37.83
TiO_2	0.09	0.13	0.14	0.17	0.14	0.10	0.16	0.07	0.08	0.17	0.25	0.07	0.10	0.15
Al_2O_3	20.81	20.92	20.96	20.69	20.88	20.91	20.84	20.51	20.77	20.63	20.99	20.35	20.43	20.94
Cr_2O_3	0.01	0.00	0.04	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03
Fe_2O_3	1.16	1.32	1.36	1.21	1.29	0.11	1.66	2.10	1.17	1.88	1.45	0.00	0.00	0.00
MgO	1.05	0.98	0.94	0.91	0.84	0.80	0.79	0.75	0.71	0.76	0.68	1.28	1.20	1.19
CaO	9.64	9.88	9.92	9.96	10.17	10.09	10.21	9.96	10.01	10.36	10.24	8.53	8.75	9.09
MnO	4.40	4.56	5.94	6.56	7.16	7.89	8.29	8.45	8.86	8.87	9.36	3.78	3.66	3.50
FeO	25.38	25.15	23.83	23.30	22.54	23.03	21.37	20.77	21.43	20.73	20.72	27.22	26.90	26.51
Na_2O	0.04	0.05	0.08	0.04	0.03	0.04	0.02	0.05	0.03	0.03	0.03	0.00	0.00	0.00
Total	99.51	100.01	100.41	99.92	100.17	100.99	100.29	99.09	100.33	100.52	100.88	99.15	98.99	99.24
Cations														
Si	2.974	2.967	2.970	2.977	2.969	3.016	2.958	2.955	2.983	2.964	2.959	3.055	3.057	3.035
Ti	0.006	0.008	0.008	0.010	0.008	0.006	0.010	0.004	0.005	0.010	0.015	0.004	0.006	0.009
Al	1.976	1.977	1.972	1.958	1.970	1.955	1.967	1.960	1.959	1.944	1.970	1.933	1.940	1.979
Cr	0.001	0.000	0.002	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002
Fe^{3+}	0.070	0.079	0.082	0.073	0.078	0.007	0.100	0.128	0.070	0.113	0.087	0.000	0.000	0.000
Mg	0.126	0.117	0.112	0.109	0.100	0.094	0.094	0.091	0.085	0.091	0.081	0.154	0.144	0.142
Ca	0.832	0.849	0.848	0.856	0.872	0.857	0.876	0.865	0.858	0.887	0.873	0.737	0.755	0.782
Mn	0.300	0.310	0.402	0.446	0.486	0.530	0.562	0.581	0.601	0.600	0.631	0.258	0.250	0.238
Fe^{2+}	1.710	1.686	1.591	1.564	1.510	1.528	1.431	1.409	1.434	1.386	1.380	1.834	1.812	1.778
Na	0.006	0.007	0.012	0.006	0.005	0.006	0.003	0.007	0.005	0.005	0.004	0.000	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	7.975	7.966	7.965
Endmember														
Pyrope	4.2	3.9	3.8	3.7	3.4	3.1	3.2	3.1	2.8	3.1	2.7	5.2	4.9	4.8
Almandine	57.6	56.9	53.9	52.6	50.9	50.8	48.3	47.8	48.2	46.8	46.5	61.5	61.2	60.5
Spessartine	10.1	10.5	13.6	15.0	16.4	17.6	19.0	19.7	20.2	20.2	21.3	8.7	8.4	8.1
Grossular	28.0	28.7	28.7	28.8	29.4	28.5	29.6	29.4	28.8	29.9	29.4	24.7	25.5	26.6

	76111A F21 Grt4	76111A F21 Grt5	76111A F21 Grt6	76111A F21 Grt7	76111A F21 Grt8	76111A F21 Grt9	76111A F21 Grt10	76111A F21 Grt11	76111A F21 Grt12	76111A F21 Grt13	76111A F21 Grt14	76111A F21 Grt15	76111A F21 Grt16	76111A F21 Grt17
Analysis														
SiO_2	37.95	38.26	37.93	37.83	37.97	37.93	37.89	37.81	37.97	38.21	37.84	37.70	37.78	37.81
TiO_2	0.17	0.15	0.17	0.19	0.20	0.13	0.14	0.14	0.11	0.14	0.15	0.17	0.16	0.08
Al_2O_3	19.99	20.02	20.28	19.97	20.25	20.36	20.19	20.48	20.07	20.02	20.31	20.37	20.19	20.48
Cr_2O_3	0.02	0.00	0.02	0.00	0.02	0.00	0.03	0.02	0.04	0.00	0.01	0.02	0.00	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.19	1.16	1.20	1.23	1.18	1.24	1.31	1.30	1.33	1.41	1.48	1.45	1.47	1.98
CaO	9.04	8.84	8.45	8.74	8.70	8.52	8.71	9.12	8.87	8.65	9.00	9.05	9.30	8.35
MnO	3.94	3.96	4.14	3.71	3.82	3.73	3.08	2.97	2.55	2.51	1.92	1.94	1.78	1.40
FeO	26.57	26.85	26.99	27.60	26.87	27.08	27.93	27.34	28.31	28.70	28.36	28.31	28.34	28.91
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.87	99.24	99.15	99.26	99.00	99.00	99.28	99.19	99.25	99.63	99.07	99.01	99.01	99.02
Cations														
Si	3.066	3.079	3.057	3.053	3.061	3.058	3.052	3.042	3.059	3.067	3.047	3.039	3.046	3.041
Ti	0.010	0.009	0.010	0.011	0.012	0.008	0.009	0.009	0.007	0.008	0.009	0.010	0.009	0.005
Al	1.904	1.898	1.926	1.900	1.924	1.934	1.917	1.942	1.905	1.894	1.928	1.935	1.918	1.941
Cr	0.001	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.003	0.000	0.000	0.001	0.000	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.144	0.139	0.144	0.148	0.141	0.150	0.157	0.156	0.160	0.168	0.178	0.174	0.177	0.237
Ca	0.783	0.762	0.729	0.756	0.752	0.736	0.752	0.786	0.765	0.744	0.777	0.781	0.803	0.719
Mn	0.269	0.270	0.282	0.254	0.261	0.254	0.210	0.202	0.174	0.171	0.131	0.132	0.122	0.096
Fe^{2+}	1.795	1.807	1.819	1.863	1.812	1.826	1.882	1.840	1.907	1.926	1.910	1.909	1.911	1.944
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.972	7.963	7.969	7.985	7.964	7.967	7.980	7.978	7.981	7.978	7.980	7.982	7.986	7.983
Endmember														
Pyrope	4.8	4.7	4.8	4.9	4.8	5.0	5.2	5.2	5.3	5.6	5.9	5.8	5.9	7.9
Almandine	60.0	60.7	61.2	61.7	61.1	61.6	62.7	61.7	63.4	64.0	63.7	63.7	63.4	64.9
Spessartine	9.0	9.1	9.5	8.4	8.8	8.6	7.0	6.8	5.8	5.7	4.4	4.4	4.0	3.2
Grossular	26.2	25.6	24.5	25.0	25.4	24.8	25.1	26.3	25.5	24.7	25.9	26.1	26.7	24.0

	76111A F21 Grt18	76111A F21 Grt19	76111A F21 Grt20	76111A F21 Grt21	76111A F21 Grt22	76111A F21 Grt23	76111A F21 Grt24	76111A F21 Grt25	76111A F21 Grt26	76114C F7 Grt2	76114C F7 Grt3	76114C F7 Grt4	76114C F7 Grt6	76114C F7 Grt7
Analysis														
SiO_2	38.27	37.95	38.21	37.91	38.09	37.89	37.85	38.27	38.11	37.30	37.85	37.88	37.58	37.59
TiO_2	0.12	0.11	0.09	0.11	0.14	0.13	0.11	0.14	0.10	0.00	0.00	0.03	0.00	0.04
Al_2O_3	20.36	20.66	20.62	20.38	20.45	20.36	20.52	20.25	20.40	21.22	21.11	21.15	21.08	21.22
Cr_2O_3	0.02	0.00	0.01	0.03	0.00	0.00	0.00	0.02	0.00	0.04	0.03	0.05	0.04	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.07	0.25	0.00
MgO	1.93	2.03	2.01	2.05	2.03	1.96	1.95	2.06	2.25	4.70	4.61	4.69	4.78	4.91
CaO	8.44	8.77	9.09	8.94	9.05	9.02	9.11	8.92	9.21	2.28	2.34	2.30	2.39	2.38
MnO	1.23	0.83	0.74	0.73	0.62	0.59	0.60	0.52	0.24	2.35	2.35	2.33	2.13	2.03
FeO	28.78	28.98	28.37	28.72	28.55	29.00	28.93	28.74	28.69	31.30	30.92	31.23	31.20	30.87
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	99.14	99.32	99.15	98.86	98.91	98.95	99.07	98.92	99.01	99.58	99.20	99.74	99.45	99.05
Cations														
Si	3.067	3.037	3.054	3.047	3.054	3.045	3.038	3.068	3.052	2.980	3.023	3.012	2.999	3.004
Ti	0.007	0.006	0.006	0.006	0.008	0.008	0.006	0.008	0.006	0.000	0.000	0.002	0.000	0.002
Al	1.923	1.948	1.943	1.931	1.933	1.929	1.941	1.913	1.925	1.998	1.986	1.983	1.983	1.999
Cr	0.001	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.003	0.002	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.000	0.004	0.015	0.000
Mg	0.230	0.242	0.240	0.245	0.242	0.234	0.233	0.246	0.269	0.560	0.549	0.556	0.569	0.585
Ca	0.724	0.752	0.779	0.769	0.777	0.777	0.784	0.767	0.790	0.195	0.200	0.196	0.204	0.204
Mn	0.084	0.056	0.050	0.050	0.042	0.040	0.041	0.036	0.017	0.159	0.159	0.157	0.144	0.138
Fe^{2+}	1.928	1.939	1.897	1.930	1.914	1.949	1.942	1.927	1.921	2.091	2.065	2.077	2.083	2.063
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Total	7.964	7.982	7.968	7.981	7.971	7.982	7.985	7.966	7.980	8.008	7.983	7.991	8.000	7.995
Endmember														
Pyrope	7.8	8.1	8.1	8.2	8.1	7.8	7.8	8.3	9.0	18.6	18.5	18.6	19.0	19.6
Almandine	65.0	64.9	64.0	64.5	64.3	65.0	64.7	64.8	64.1	69.6	69.5	69.5	69.4	69.0
Spessartine	2.8	1.9	1.7	1.7	1.4	1.3	1.4	1.2	0.6	5.3	5.4	5.3	4.8	4.6
Grossular	24.4	25.2	26.3	25.7	26.1	25.9	26.1	25.8	26.4	6.5	6.7	6.6	6.8	6.8

	76114C F7 Grt8	76114C F7 Grt9	76114C F7 Grt11	76114C F7 Grt12	76114C F7 Grt15	76114C F7 Grt18	76114C F7 Grt21	76114C F7 Grt25	76114C F7 Grt27	76114C F7 Grt28	76114C F7 Grt32	76114C F7 Grt34	76114C F7 Grt48	76114C F7 Grt49
Analysis														
SiO_2	37.48	37.45	38.04	37.46	37.15	37.92	37.51	37.50	37.58	37.59	37.66	37.03	37.67	37.82
TiO_2	0.03	0.02	0.00	0.02	0.00	0.04	0.01	0.03	0.00	0.01	0.00	0.04	0.01	0.02
Al_2O_3	21.07	20.96	21.52	20.97	20.99	21.42	21.00	20.85	21.53	21.33	21.22	20.87	21.01	21.04
Cr_2O_3	0.03	0.05	0.06	0.01	0.04	0.05	0.08	0.04	0.04	0.05	0.03	0.03	0.06	0.08
Fe_2O_3	0.66	0.67	0.00	0.06	0.31	0.00	0.28	0.40	0.21	0.38	0.34	0.40	0.34	0.16
MgO	4.83	4.94	5.12	4.89	4.88	4.82	4.61	4.91	4.95	5.08	5.00	4.96	4.82	4.88
CaO	2.34	2.40	2.26	2.45	2.20	2.30	2.33	2.59	2.73	2.80	2.79	2.78	2.25	2.29
MnO	2.22	1.98	1.89	1.89	1.99	2.26	2.48	1.93	1.97	1.88	1.88	1.82	2.13	2.05
FeO	31.27	31.13	30.63	30.68	31.08	31.16	31.15	30.69	31.04	30.72	30.79	30.23	31.32	31.13
Na_2O	0.03	0.01	0.01	0.00	0.02	0.04	0.02	0.00	0.00	0.05	0.02	0.00	0.00	0.03
Total	99.96	99.60	99.52	98.42	98.66	100.00	99.47	98.95	100.05	99.88	99.71	98.17	99.61	99.50
Cations														
Si	2.983	2.987	3.014	3.012	2.989	3.004	2.998	3.004	2.978	2.982	2.992	2.988	3.003	3.012
Ti	0.002	0.001	0.000	0.001	0.000	0.002	0.001	0.002	0.000	0.000	0.000	0.003	0.000	0.001
Al	1.976	1.970	2.009	1.987	1.990	2.000	1.979	1.968	2.010	1.994	1.987	1.984	1.974	1.975
Cr	0.002	0.003	0.004	0.000	0.002	0.003	0.005	0.003	0.003	0.003	0.002	0.002	0.004	0.005
Fe^{3+}	0.039	0.040	0.000	0.004	0.019	0.000	0.017	0.024	0.013	0.022	0.020	0.024	0.021	0.010
Mg	0.573	0.588	0.605	0.586	0.585	0.569	0.550	0.587	0.584	0.601	0.592	0.597	0.573	0.580
Ca	0.200	0.205	0.192	0.211	0.189	0.195	0.199	0.222	0.232	0.238	0.238	0.240	0.192	0.195
Mn	0.150	0.134	0.126	0.129	0.136	0.152	0.168	0.131	0.132	0.126	0.126	0.125	0.144	0.139
Fe^{2+}	2.081	2.077	2.029	2.063	2.091	2.065	2.083	2.056	2.057	2.037	2.046	2.040	2.088	2.073
Na	0.004	0.001	0.001	0.000	0.003	0.006	0.004	0.000	0.000	0.007	0.002	0.000	0.000	0.005
Total	8.009	8.006	7.981	7.992	8.006	7.995	8.002	7.997	8.009	8.012	8.005	8.004	7.998	7.994
Endmember														
Pyrope	19.1	19.6	20.5	19.6	19.5	19.1	18.3	19.6	19.4	20.0	19.7	19.9	19.1	19.4
Almandine	69.3	69.2	68.7	69.0	69.7	69.3	69.4	68.6	68.4	67.9	68.2	68.0	69.7	69.4
Spessartine	5.0	4.4	4.3	4.3	4.5	5.1	5.6	4.4	4.4	4.2	4.2	4.2	4.8	4.6
Grossular	6.6	6.8	6.5	7.1	6.3	6.6	6.6	7.4	7.7	7.9	7.9	8.0	6.4	6.5

	76114C F7 Grt51	76114C F7 Grt52	76114C F7 Grt53	76114C F7 Grt59	76114C F7 Grt69	76114C F7 Grt73	76114C F7 Grt76	76114C F7 Grt79	76114C F7 Grt80	76163B F4 Grt L1	76163B F4 Grt L2	76163B F4 Grt L3	76163B F4 Grt L4	76163B F4 Grt L5
Analysis														
SiO_2	37.53	37.39	37.52	37.80	37.72	37.45	38.01	37.54	37.53	36.27	36.64	36.59	36.70	36.40
TiO_2	0.03	0.03	0.00	0.00	0.03	0.02	0.00	0.00	0.04	0.03	0.01	0.00	0.00	0.00
Al_2O_3	20.90	21.16	20.88	21.27	21.01	21.05	21.20	20.94	21.00	20.80	20.82	20.86	21.05	20.92
Cr_2O_3	0.08	0.06	0.06	0.08	0.06	0.04	0.00	0.05	0.10	0.01	0.04	0.01	0.03	0.00
Fe_2O_3	0.16	0.00	0.00	0.00	0.36	0.51	0.30	0.35	0.15	0.12	0.52	0.40	0.10	0.71
MgO	4.67	4.77	4.73	4.83	4.95	4.90	4.91	4.62	4.60	3.08	3.24	3.24	3.33	3.42
CaO	2.25	2.32	2.39	2.43	2.21	2.38	2.69	2.52	2.53	1.67	1.63	1.65	1.63	1.63
MnO	1.98	2.09	2.08	2.01	2.04	2.11	2.26	2.24	2.38	2.64	2.80	2.84	2.63	2.58
FeO	31.34	30.92	30.63	29.88	31.29	31.06	30.75	31.08	30.94	33.42	33.55	33.40	33.58	33.48
Na_2O	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.96	98.73	98.27	98.30	99.67	99.53	100.13	99.36	99.26	98.03	99.23	98.99	99.05	99.15
Cations														
Si	3.010	3.001	3.022	3.028	3.003	2.988	3.007	3.002	3.003	2.980	2.977	2.978	2.980	2.959
Ti	0.002	0.002	0.000	0.000	0.001	0.001	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000
Al	1.976	2.001	1.982	2.008	1.971	1.979	1.977	1.974	1.980	2.014	1.993	2.001	2.015	2.004
Cr	0.005	0.004	0.004	0.005	0.004	0.003	0.000	0.003	0.006	0.000	0.002	0.001	0.002	0.000
Fe^{3+}	0.010	0.000	0.000	0.000	0.021	0.030	0.018	0.021	0.009	0.007	0.032	0.024	0.006	0.044
Mg	0.559	0.571	0.567	0.576	0.587	0.583	0.579	0.551	0.548	0.378	0.392	0.393	0.402	0.414
Ca	0.193	0.199	0.206	0.209	0.189	0.203	0.228	0.216	0.217	0.147	0.142	0.144	0.141	0.142
Mn	0.135	0.142	0.142	0.136	0.138	0.143	0.152	0.152	0.162	0.184	0.192	0.196	0.181	0.178
Fe^{2+}	2.102	2.076	2.063	2.002	2.083	2.073	2.034	2.078	2.070	2.296	2.279	2.273	2.280	2.276
Na	0.003	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.994	7.995	7.985	7.966	7.997	8.005	7.995	7.999	7.997	8.008	8.010	8.009	8.008	8.017
Endmember														
Pyrope	18.7	19.1	19.1	19.7	19.6	19.4	19.3	18.4	18.3	12.6	13.0	13.1	13.4	13.8
Almandine	70.3	69.5	69.3	68.5	69.5	69.0	68.0	69.3	69.1	76.4	75.8	75.6	75.9	75.6
Spessartine	4.5	4.8	4.8	4.7	4.6	4.8	5.1	5.1	5.4	6.1	6.4	6.5	6.0	5.9
Grossular	6.5	6.7	6.9	7.1	6.3	6.8	7.6	7.2	7.2	4.9	4.7	4.8	4.7	4.7

	76163B F4 Grt L6	76163B F4 Grt L7	76163B F4 Grt L8	76163B F4 Grt L9	76163B F4 Grt L10	76163B F4 Grt L11	76163B F4 Grt L12	76163B F4 Grt L13	76163B F4 Grt L14	76163B F4 Grt L15	76163B F4 Grt L16	76163B F4 Grt L17	76163B F4 Grt L21	76163B F4 Grt L22
Analysis														
SiO_2	36.47	36.43	36.34	36.70	36.33	36.59	36.55	36.44	36.98	36.49	36.73	34.52	36.74	36.71
TiO_2	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.02	0.02	0.01
Al_2O_3	20.96	20.99	20.84	20.97	21.01	21.02	21.01	20.91	21.09	20.87	20.94	19.59	21.04	21.04
Cr_2O_3	0.02	0.00	0.06	0.01	0.00	0.00	0.02	0.00	0.03	0.01	0.02	0.02	0.00	0.03
Fe_2O_3	0.68	0.56	0.00	0.37	0.28	0.24	0.31	0.37	0.56	0.64	0.24	0.36	0.00	0.00
MgO	3.50	3.56	3.48	3.66	3.67	3.74	3.82	3.80	3.83	3.81	3.82	3.63	3.90	3.84
CaO	1.60	1.56	1.56	1.64	1.58	1.55	1.49	1.55	1.56	1.46	1.51	1.45	1.66	1.45
MnO	2.68	2.59	2.21	2.41	2.43	2.31	2.39	2.31	2.40	2.41	2.44	2.24	2.20	2.30
FeO	33.36	33.31	32.98	33.26	33.02	33.23	33.11	32.98	33.50	33.14	33.02	30.99	32.73	32.82
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.31	98.99	97.47	99.02	98.32	98.68	98.71	98.36	99.94	98.83	98.74	92.80	98.29	98.18
Cations														
Si	2.958	2.961	2.989	2.976	2.967	2.975	2.971	2.972	2.972	2.966	2.982	2.982	2.988	2.990
Ti	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001
Al	2.003	2.011	2.020	2.004	2.022	2.015	2.013	2.010	1.997	1.999	2.004	1.995	2.017	2.019
Cr	0.001	0.000	0.004	0.001	0.000	0.000	0.001	0.000	0.002	0.001	0.001	0.001	0.000	0.002
Fe^{3+}	0.041	0.034	0.000	0.023	0.017	0.014	0.019	0.023	0.034	0.039	0.014	0.023	0.000	0.000
Mg	0.423	0.432	0.427	0.442	0.446	0.453	0.463	0.462	0.458	0.462	0.463	0.467	0.472	0.466
Ca	0.139	0.136	0.137	0.142	0.139	0.135	0.130	0.136	0.134	0.127	0.132	0.134	0.145	0.126
Mn	0.184	0.178	0.154	0.166	0.168	0.159	0.164	0.160	0.163	0.166	0.168	0.164	0.152	0.158
Fe^{2+}	2.263	2.264	2.268	2.256	2.255	2.260	2.250	2.250	2.251	2.253	2.242	2.239	2.227	2.236
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.016	8.016	7.999	8.010	8.014	8.010	8.012	8.012	8.012	8.014	8.007	8.007	8.002	7.998
Endmember														
Pyrope	14.1	14.3	14.3	14.7	14.8	15.1	15.4	15.4	15.2	15.4	15.4	15.6	15.8	15.6
Almandine	75.2	75.2	75.9	75.0	75.0	75.2	74.8	74.8	74.9	74.9	74.6	74.5	74.3	74.9
Spessartine	6.1	5.9	5.2	5.5	5.6	5.3	5.5	5.3	5.4	5.5	5.6	5.5	5.1	5.3
Grossular	4.6	4.5	4.6	4.7	4.6	4.5	4.3	4.5	4.5	4.2	4.4	4.5	4.8	4.2

	76163B F4 Grt L23	76163B F4 Grt L24	76163B F4 Grt L25	76163B F4 Grt L26	76163B F4 Grt L27	76163B F4 Grt L28	76163B F4 Grt L29	76163B F4 Grt L30	76163B F4 Grt L31	76163B F4 Grt L32	76163B F4 Grt L33	76163B F4 Grt L34	76163B F4 Grt L35	76163B F4 Grt L36
Analysis														
SiO_2	37.03	36.76	36.84	36.60	36.60	36.86	36.63	37.05	36.81	36.74	36.80	36.97	36.59	36.68
TiO_2	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.00
Al_2O_3	21.02	21.17	20.88	21.01	21.07	21.07	21.05	21.16	21.11	20.96	21.09	20.93	20.98	20.82
Cr_2O_3	0.03	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.02	0.00	0.00	0.00
Fe_2O_3	0.57	0.36	0.58	0.45	0.41	0.25	0.34	0.30	0.10	0.54	0.54	0.37	0.30	0.60
MgO	3.99	3.91	3.96	3.92	3.94	3.94	3.89	3.99	3.98	3.96	3.91	3.90	3.92	4.00
CaO	1.37	1.40	1.37	1.46	1.47	1.51	1.44	1.50	1.45	1.49	1.45	1.46	1.42	1.42
MnO	2.25	2.34	2.33	2.29	2.23	2.25	2.50	2.24	2.31	2.28	2.43	2.32	2.29	2.29
FeO	33.56	33.42	33.27	33.16	33.21	33.21	33.02	33.39	33.07	33.17	33.33	33.29	33.08	33.03
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.82	99.37	99.23	98.90	98.93	99.12	98.90	99.62	98.84	99.15	99.54	99.23	98.61	98.84
Cations														
Si	2.976	2.968	2.979	2.968	2.967	2.979	2.970	2.979	2.981	2.972	2.968	2.986	2.975	2.976
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Al	1.991	2.014	1.989	2.008	2.013	2.007	2.012	2.005	2.015	1.999	2.004	1.993	2.010	1.991
Cr	0.002	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Fe^{3+}	0.035	0.022	0.035	0.028	0.025	0.015	0.021	0.018	0.006	0.033	0.033	0.022	0.018	0.036
Mg	0.478	0.470	0.477	0.474	0.476	0.475	0.471	0.478	0.481	0.477	0.470	0.469	0.475	0.483
Ca	0.118	0.121	0.119	0.127	0.127	0.131	0.125	0.129	0.126	0.129	0.125	0.126	0.124	0.123
Mn	0.153	0.160	0.159	0.157	0.153	0.154	0.171	0.153	0.158	0.156	0.166	0.159	0.158	0.158
Fe^{2+}	2.256	2.257	2.250	2.249	2.252	2.245	2.240	2.245	2.240	2.244	2.248	2.249	2.249	2.241
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.010	8.013	8.009	8.013	8.014	8.008	8.012	8.008	8.008	8.011	8.013	8.005	8.010	8.010
Endmember														
Pyrope	15.9	15.6	15.9	15.8	15.8	15.8	15.7	15.9	16.0	15.9	15.6	15.6	15.8	16.1
Almandine	75.1	75.0	74.9	74.8	74.8	74.7	74.5	74.7	74.5	74.6	74.7	74.9	74.8	74.6
Spessartine	5.1	5.3	5.3	5.2	5.1	5.1	5.7	5.1	5.3	5.2	5.5	5.3	5.2	5.2
Grossular	3.9	4.0	4.0	4.2	4.2	4.4	4.2	4.3	4.2	4.3	4.2	4.2	4.1	4.1

	76163B F4 Grt L37	76163B F4 Grt L38	76163B F4 Grt L39	76163B F4 Grt L40	76163B F4 Grt L41	76163B F4 Grt L42	76163B F4 Grt L43	76163B F4 Grt L44	76163B F4 Grt L45	76163B F4 Grt L46	76163B F4 Grt L47	76163B F4 Grt L48	76163B F4 Grt L49	76163B F4 Grt L50
Analysis														
SiO_2	36.77	36.94	36.98	36.50	36.38	36.65	36.95	36.87	36.86	36.68	36.63	36.99	36.92	36.73
TiO_2	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.02	0.01	0.00	0.01	0.00	0.01	0.00
Al_2O_3	21.10	21.05	21.16	21.00	21.05	21.12	21.11	21.16	21.05	21.09	20.97	21.13	21.10	21.00
Cr_2O_3	0.00	0.03	0.03	0.02	0.02	0.02	0.03	0.00	0.00	0.01	0.01	0.00	0.02	0.02
Fe_2O_3	0.37	0.09	0.30	0.65	0.22	0.06	0.28	0.13	0.28	0.24	0.71	0.23	0.08	0.23
MgO	3.86	3.83	3.93	3.90	3.87	3.89	3.85	3.82	3.89	3.76	3.77	3.72	3.71	3.65
CaO	1.44	1.43	1.47	1.48	1.45	1.43	1.43	1.44	1.45	1.46	1.47	1.48	1.52	1.48
MnO	2.25	2.26	2.26	2.37	2.33	2.31	2.35	2.33	2.38	2.43	2.40	2.53	2.37	2.46
FeO	33.50	33.45	33.49	33.15	32.98	33.15	33.50	33.46	33.24	33.32	33.47	33.48	33.45	33.42
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.28	99.08	99.62	99.07	98.31	98.65	99.54	99.22	99.17	98.99	99.43	99.57	99.17	98.98
Cations														
Si	2.972	2.988	2.976	2.959	2.967	2.976	2.978	2.979	2.980	2.974	2.963	2.981	2.985	2.980
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.000
Al	2.010	2.006	2.008	2.006	2.023	2.022	2.005	2.015	2.006	2.015	1.999	2.008	2.011	2.008
Cr	0.000	0.002	0.002	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.002
Fe^{3+}	0.023	0.006	0.018	0.040	0.013	0.004	0.017	0.008	0.017	0.015	0.043	0.014	0.005	0.014
Mg	0.464	0.462	0.471	0.471	0.471	0.471	0.463	0.460	0.469	0.454	0.454	0.447	0.447	0.441
Ca	0.124	0.124	0.127	0.129	0.127	0.125	0.124	0.124	0.126	0.127	0.127	0.128	0.132	0.128
Mn	0.154	0.155	0.154	0.163	0.161	0.159	0.161	0.159	0.163	0.167	0.164	0.173	0.162	0.169
Fe^{2+}	2.264	2.263	2.254	2.248	2.249	2.251	2.258	2.261	2.247	2.259	2.264	2.257	2.262	2.267
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.012	8.005	8.010	8.017	8.014	8.009	8.008	8.008	8.008	8.011	8.015	8.008	8.006	8.009
Endmember														
Pyrope	15.4	15.4	15.7	15.6	15.7	15.7	15.4	15.3	15.6	15.1	15.1	14.9	14.9	14.7
Almandine	75.3	75.3	75.0	74.7	74.8	74.9	75.1	75.2	74.8	75.1	75.2	75.1	75.3	75.4
Spessartine	5.1	5.1	5.1	5.4	5.4	5.3	5.3	5.3	5.4	5.5	5.5	5.8	5.4	5.6
Grossular	4.1	4.1	4.2	4.3	4.2	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.4	4.3

	76163B F4 Grt L51	76163B F4 Grt L52	76163B F4 Grt L53	76163B F4 Grt L54	76163B F4 Grt L55	76163B F4 Grt L56	76163B F4 Grt L57	76163B F4 Grt L58	76163B F4 Grt L59	76163F F5 Grt L2	76163F F5 Grt L3	76163F F5 Grt L4	76163F F5 Grt L5	76163F F5 Grt L6
Analysis														
SiO_2	36.70	36.92	35.00	34.65	36.03	36.72	36.38	36.93	36.63	37.42	37.64	37.50	37.66	37.70
TiO_2	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.01	0.01	0.02	0.00	0.03	0.02	0.02
Al_2O_3	21.02	21.00	19.96	19.81	20.53	21.05	20.93	20.90	21.08	20.97	20.93	21.08	20.93	20.96
Cr_2O_3	0.00	0.02	0.05	0.01	0.00	0.03	0.01	0.02	0.00	0.00	0.01	0.02	0.02	0.02
Fe_2O_3	0.37	0.15	0.59	0.32	0.48	0.14	0.30	0.15	0.00	0.79	0.87	1.15	1.12	0.88
MgO	3.50	3.58	3.33	3.25	3.39	3.20	3.21	3.07	2.75	4.02	4.28	4.44	4.50	4.44
CaO	1.55	1.58	1.55	1.55	1.60	1.64	1.74	2.12	2.32	5.89	6.03	6.03	6.06	6.02
MnO	2.49	2.41	2.51	2.42	2.71	2.72	2.73	2.63	2.74	1.71	1.67	1.69	1.52	1.57
FeO	33.61	33.53	31.92	31.63	32.69	33.71	33.32	33.43	33.39	28.61	28.15	28.10	28.05	28.08
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.24	99.19	94.92	93.67	97.44	99.21	98.63	99.26	98.91	99.42	99.59	100.03	99.88	99.69
Cations														
Si	2.974	2.988	2.969	2.975	2.976	2.980	2.970	2.993	2.983	2.983	2.989	2.968	2.981	2.988
Ti	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.002	0.001	0.001
Al	2.008	2.003	1.995	2.005	1.998	2.013	2.014	1.997	2.023	1.971	1.959	1.966	1.953	1.958
Cr	0.000	0.001	0.003	0.001	0.000	0.002	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001
Fe^{3+}	0.022	0.009	0.038	0.021	0.030	0.008	0.018	0.009	0.000	0.048	0.052	0.068	0.067	0.052
Mg	0.423	0.432	0.421	0.416	0.417	0.387	0.391	0.370	0.333	0.478	0.507	0.523	0.531	0.525
Ca	0.135	0.137	0.141	0.142	0.142	0.143	0.152	0.184	0.202	0.504	0.513	0.512	0.514	0.511
Mn	0.171	0.165	0.181	0.176	0.190	0.187	0.189	0.181	0.189	0.115	0.113	0.113	0.102	0.105
Fe^{2+}	2.278	2.269	2.265	2.271	2.257	2.288	2.275	2.266	2.274	1.907	1.870	1.860	1.857	1.861
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.011	8.005	8.013	8.009	8.010	8.008	8.012	8.003	8.005	8.007	8.004	8.013	8.007	8.004
Endmember														
Pyrope	14.1	14.4	14.0	13.8	13.9	12.9	13.0	12.3	11.1	15.9	16.9	17.4	17.7	17.5
Almandine	75.8	75.6	75.3	75.6	75.1	76.1	75.7	75.5	75.8	63.5	62.3	61.8	61.8	62.0
Spessartine	5.7	5.5	6.0	5.9	6.3	6.2	6.3	6.0	6.3	3.8	3.7	3.8	3.4	3.5
Grossular	4.5	4.5	4.7	4.7	4.7	4.8	5.1	6.1	6.7	16.8	17.1	17.0	17.1	17.0

	76163F F5 Grt L7	76163F F5 Grt L8	76163F F5 Grt L9	76163F F5 Grt L11	76163F F5 Grt L12	76163F F5 Grt L13	76163F F5 Grt L14	76163F F5 Grt L15	76163F F5 Grt L16	76163F F5 Grt L17	76163F F5 Grt L18	76163F F5 Grt L19	76163F F5 Grt L20	76163F F5 Grt L21
Analysis														
SiO_2	37.95	37.56	37.69	37.50	37.26	37.67	37.45	37.46	37.59	37.42	37.23	37.41	37.44	37.33
TiO_2	0.05	0.01	0.02	0.03	0.02	0.00	0.00	0.01	0.00	0.02	0.00	0.04	0.02	0.02
Al_2O_3	21.04	21.04	21.05	21.00	20.90	21.04	21.05	21.01	21.09	20.85	20.95	21.08	21.21	21.11
Cr_2O_3	0.02	0.00	0.01	0.01	0.03	0.01	0.04	0.00	0.03	0.01	0.05	0.01	0.01	0.00
Fe_2O_3	0.76	0.87	0.99	0.84	1.18	1.15	1.07	1.21	0.72	1.29	0.94	1.19	1.01	1.32
MgO	4.52	4.60	4.43	4.51	4.38	4.45	4.29	4.19	4.16	4.30	4.22	4.28	4.18	4.19
CaO	6.14	6.14	6.26	6.46	6.52	6.53	6.66	6.63	6.64	6.75	6.68	6.62	6.75	6.74
MnO	1.46	1.69	1.66	1.68	1.90	1.89	1.96	2.26	2.18	2.21	2.41	2.47	2.61	2.61
FeO	28.06	27.49	27.84	27.15	27.05	27.29	27.16	27.13	27.11	26.71	26.50	26.78	26.70	26.70
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.99	99.40	99.94	99.19	99.24	100.04	99.68	99.89	99.51	99.55	98.99	99.89	99.92	100.02
Cations														
Si	2.995	2.982	2.981	2.982	2.969	2.976	2.971	2.969	2.984	2.973	2.973	2.964	2.964	2.957
Ti	0.003	0.001	0.001	0.002	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.001
Al	1.956	1.968	1.962	1.968	1.962	1.959	1.968	1.963	1.974	1.953	1.971	1.968	1.980	1.970
Cr	0.001	0.000	0.001	0.001	0.002	0.001	0.002	0.000	0.002	0.001	0.003	0.001	0.000	0.000
Fe^{3+}	0.045	0.052	0.059	0.051	0.071	0.068	0.064	0.072	0.043	0.077	0.057	0.071	0.060	0.079
Mg	0.532	0.544	0.522	0.535	0.521	0.524	0.508	0.495	0.493	0.509	0.502	0.506	0.493	0.495
Ca	0.519	0.522	0.530	0.551	0.557	0.553	0.566	0.563	0.565	0.575	0.572	0.562	0.573	0.572
Mn	0.097	0.114	0.111	0.113	0.128	0.127	0.132	0.152	0.147	0.148	0.163	0.166	0.175	0.175
Fe^{2+}	1.852	1.825	1.841	1.805	1.802	1.803	1.802	1.799	1.800	1.775	1.770	1.775	1.768	1.768
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.001	8.007	8.008	8.007	8.012	8.010	8.012	8.013	8.007	8.011	8.011	8.014	8.014	8.017
Endmember														
Pyrope	17.7	18.1	17.4	17.8	17.3	17.4	16.9	16.4	16.4	16.9	16.7	16.8	16.4	16.4
Almandine	61.7	60.7	61.3	60.1	59.9	60.0	59.9	59.8	59.9	59.0	58.9	59.0	58.8	58.7
Spessartine	3.2	3.8	3.7	3.8	4.3	4.2	4.4	5.0	4.9	4.9	5.4	5.5	5.8	5.8
Grossular	17.3	17.4	17.7	18.3	18.5	18.4	18.8	18.7	18.8	19.1	19.0	18.7	19.0	19.0

	76163F F5 Grt L22	76163F F5 Grt L23	76163F F5 Grt L24	76163F F5 Grt L25	76163F F5 Grt L26	76163F F5 Grt L27	76163F F5 Grt L28	76163F F5 Grt L30	76163F F5 Grt L31	76163F F5 Grt L32	76163F F5 Grt L33	76163F F5 Grt L34	76163F F5 Grt L35	76163F F5 Grt L36
Analysis														
SiO_2	37.43	37.34	37.41	37.30	37.51	37.61	37.64	37.43	37.44	37.41	37.80	37.32	37.63	37.75
TiO_2	0.02	0.01	0.04	0.02	0.00	0.01	0.01	0.05	0.03	0.02	0.00	0.03	0.04	0.04
Al_2O_3	21.24	21.01	20.84	21.05	20.91	20.90	20.99	20.92	21.00	20.98	20.98	21.00	20.97	20.95
Cr_2O_3	0.03	0.01	0.02	0.02	0.00	0.00	0.00	0.01	0.04	0.00	0.02	0.02	0.04	0.01
Fe_2O_3	0.93	0.74	1.41	1.32	1.08	0.99	0.98	1.05	0.77	1.11	0.85	1.18	0.72	0.89
MgO	4.18	4.09	4.14	4.14	4.07	4.02	4.03	3.97	3.97	3.99	3.92	3.92	3.88	3.94
CaO	6.71	6.77	6.83	6.67	6.66	6.95	6.94	6.99	6.95	6.79	6.68	6.67	6.71	6.85
MnO	2.50	2.67	2.75	2.71	2.91	2.90	2.81	2.84	2.70	2.80	2.90	2.96	2.69	2.70
FeO	26.84	26.35	26.40	26.72	26.50	26.22	26.40	26.27	26.39	26.61	26.86	26.73	26.94	26.80
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.88	98.99	99.83	99.95	99.64	99.58	99.81	99.53	99.29	99.70	100.01	99.84	99.62	99.92
Cations														
Si	2.964	2.981	2.968	2.958	2.980	2.987	2.983	2.976	2.981	2.973	2.992	2.965	2.990	2.990
Ti	0.001	0.001	0.002	0.001	0.000	0.000	0.001	0.003	0.002	0.001	0.000	0.002	0.002	0.002
Al	1.983	1.976	1.949	1.967	1.958	1.956	1.961	1.960	1.971	1.964	1.957	1.967	1.964	1.956
Cr	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.002	0.000	0.001	0.001	0.002	0.001
Fe^{3+}	0.056	0.044	0.084	0.079	0.064	0.059	0.058	0.063	0.046	0.066	0.050	0.071	0.043	0.053
Mg	0.493	0.486	0.490	0.490	0.481	0.475	0.476	0.471	0.472	0.472	0.462	0.464	0.460	0.465
Ca	0.570	0.579	0.581	0.567	0.567	0.591	0.590	0.595	0.593	0.578	0.567	0.568	0.571	0.581
Mn	0.168	0.180	0.185	0.182	0.196	0.195	0.189	0.191	0.182	0.188	0.195	0.199	0.181	0.181
Fe^{2+}	1.778	1.759	1.752	1.772	1.761	1.741	1.750	1.747	1.757	1.768	1.778	1.776	1.790	1.775
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.014	8.008	8.012	8.017	8.008	8.005	8.007	8.008	8.007	8.011	8.003	8.014	8.003	8.003
Endmember														
Pyrope	16.4	16.2	16.3	16.3	16.0	15.8	15.9	15.7	15.7	15.7	15.4	15.4	15.3	15.5
Almandine	59.1	58.5	58.3	58.9	58.6	58.0	58.2	58.1	58.5	58.8	59.2	59.0	59.6	59.1
Spessartine	5.6	6.0	6.1	6.0	6.5	6.5	6.3	6.4	6.1	6.3	6.5	6.6	6.0	6.0
Grossular	18.9	19.3	19.3	18.8	18.9	19.7	19.6	19.8	19.7	19.2	18.9	18.9	19.0	19.4

	76163F F5 Grt L37	76163F F5 Grt L38	76163F F5 Grt L39	76163F F5 Grt L40	76163F F5 Grt L41	76163F F5 Grt L42	76163F F5 Grt L43	76163F F5 Grt L44	76163F F5 Grt L45	76163F F5 Grt L46	76163F F5 Grt L47	76163F F5 Grt L48	76163F F5 Grt L49	76163F F5 Grt L50
Analysis														
SiO_2	37.59	37.40	37.27	37.25	37.72	37.23	37.50	37.74	37.43	37.46	37.53	37.32	37.50	37.63
TiO_2	0.04	0.04	0.04	0.05	0.04	0.06	0.02	0.03	0.04	0.02	0.05	0.04	0.05	0.05
Al_2O_3	21.14	21.03	21.09	20.95	20.98	20.65	20.84	21.17	21.05	21.28	21.15	20.97	21.11	21.07
Cr_2O_3	0.00	0.01	0.02	0.02	0.03	0.04	0.01	0.00	0.00	0.03	0.00	0.02	0.01	0.01
Fe_2O_3	0.96	1.07	1.13	1.19	1.04	1.08	0.86	1.16	0.96	1.16	1.16	0.95	0.93	1.12
MgO	3.98	3.94	3.88	3.97	3.92	3.89	3.87	3.99	3.92	4.07	3.99	3.90	3.94	4.05
CaO	6.95	6.86	6.87	6.86	7.01	6.83	6.93	7.05	6.93	6.81	6.99	6.94	7.00	6.93
MnO	2.86	2.87	3.07	2.89	3.23	2.74	2.91	3.23	3.18	3.35	3.32	3.28	3.16	3.16
FeO	26.55	26.55	26.48	26.39	26.19	26.39	26.31	26.27	26.17	26.25	26.11	25.94	26.14	26.21
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.06	99.77	99.85	99.57	100.16	98.90	99.24	100.63	99.67	100.41	100.29	99.35	99.83	100.21
Cations														
Si	2.974	2.970	2.960	2.965	2.982	2.982	2.990	2.970	2.974	2.956	2.964	2.974	2.973	2.973
Ti	0.002	0.002	0.003	0.003	0.002	0.003	0.001	0.002	0.002	0.001	0.003	0.002	0.003	0.003
Al	1.971	1.968	1.974	1.966	1.955	1.950	1.958	1.963	1.971	1.979	1.969	1.969	1.972	1.961
Cr	0.000	0.000	0.001	0.001	0.002	0.003	0.001	0.000	0.000	0.002	0.000	0.001	0.001	0.001
Fe^{3+}	0.057	0.064	0.068	0.071	0.062	0.065	0.052	0.069	0.057	0.069	0.069	0.057	0.055	0.066
Mg	0.469	0.467	0.459	0.472	0.462	0.464	0.460	0.468	0.464	0.479	0.470	0.464	0.466	0.477
Ca	0.589	0.584	0.585	0.585	0.594	0.586	0.592	0.594	0.590	0.576	0.591	0.593	0.595	0.586
Mn	0.191	0.193	0.206	0.195	0.216	0.186	0.196	0.215	0.214	0.224	0.222	0.221	0.212	0.211
Fe^{2+}	1.756	1.764	1.759	1.756	1.731	1.767	1.754	1.730	1.739	1.733	1.725	1.729	1.733	1.731
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.010	8.012	8.015	8.013	8.007	8.006	8.004	8.012	8.010	8.018	8.014	8.010	8.010	8.010
Endmember														
Pyrope	15.6	15.5	15.3	15.7	15.4	15.4	15.3	15.6	15.4	15.9	15.6	15.4	15.5	15.9
Almandine	58.4	58.6	58.5	58.4	57.6	58.8	58.4	57.5	57.8	57.6	57.3	57.5	57.7	57.6
Spessartine	6.4	6.4	6.9	6.5	7.2	6.2	6.5	7.2	7.1	7.4	7.4	7.4	7.1	7.0
Grossular	19.6	19.4	19.4	19.5	19.8	19.5	19.7	19.8	19.6	19.1	19.7	19.7	19.8	19.5

	76163F F5 Grt L51	76163F F5 Grt L53	76163F F5 Grt L54	76163F F5 Grt L55	76163F F5 Grt L56	76163F F5 Grt L57	76163F F5 Grt L58	76163F F5 Grt L59	76163F F5 Grt L60	76163F F5 Grt L61	76163F F5 Grt L62	76163F F5 Grt L63	76163F F5 Grt L64	76163F F5 Grt L65
Analysis														
SiO_2	37.44	37.59	37.58	37.60	38.04	37.87	37.70	37.76	37.74	37.76	37.63	37.85	37.62	37.62
TiO_2	0.01	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.02	0.01	0.03	0.03	0.03
Al_2O_3	20.94	21.25	20.91	21.15	21.23	21.13	20.95	21.08	21.15	21.01	21.21	21.19	21.06	21.16
Cr_2O_3	0.00	0.00	0.02	0.01	0.03	0.00	0.06	0.00	0.03	0.01	0.00	0.04	0.01	0.00
Fe_2O_3	1.21	0.96	0.95	0.89	0.66	0.81	1.16	0.84	0.72	1.29	0.86	1.24	1.21	0.84
MgO	3.94	4.02	3.99	4.12	4.17	4.22	4.18	4.24	4.22	4.31	4.37	4.48	4.43	4.45
CaO	6.94	6.86	6.87	6.87	6.90	6.82	6.96	6.83	6.70	6.76	6.60	6.63	6.53	6.28
MnO	2.94	2.89	2.73	2.83	2.67	2.79	2.60	2.43	2.20	2.19	2.08	2.02	1.92	1.87
FeO	26.40	26.65	26.54	26.41	26.68	26.43	26.49	26.64	27.08	27.05	27.11	27.31	27.32	27.54
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.81	100.25	99.61	99.90	100.40	100.09	100.13	99.83	99.85	100.40	99.86	100.78	100.14	99.78
Cations														
Si	2.972	2.968	2.985	2.976	2.991	2.987	2.978	2.986	2.985	2.975	2.976	2.969	2.971	2.977
Ti	0.000	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.002	0.002	0.002
Al	1.960	1.978	1.958	1.973	1.968	1.964	1.951	1.965	1.971	1.951	1.977	1.959	1.960	1.974
Cr	0.000	0.000	0.001	0.001	0.002	0.000	0.004	0.000	0.002	0.000	0.000	0.002	0.001	0.000
Fe^{3+}	0.072	0.057	0.057	0.053	0.039	0.048	0.069	0.050	0.043	0.076	0.051	0.073	0.072	0.050
Mg	0.466	0.473	0.472	0.486	0.489	0.497	0.492	0.500	0.497	0.507	0.515	0.523	0.521	0.525
Ca	0.590	0.581	0.585	0.583	0.581	0.576	0.589	0.578	0.568	0.571	0.559	0.558	0.553	0.532
Mn	0.198	0.193	0.183	0.190	0.178	0.186	0.174	0.162	0.147	0.146	0.139	0.134	0.129	0.125
Fe^{2+}	1.753	1.760	1.763	1.748	1.754	1.744	1.750	1.762	1.791	1.782	1.793	1.792	1.804	1.823
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.011	8.012	8.006	8.010	8.003	8.004	8.008	8.005	8.006	8.010	8.010	8.012	8.012	8.009
Endmember														
Pyrope	15.5	15.7	15.7	16.2	16.3	16.5	16.4	16.7	16.6	16.9	17.1	17.4	17.3	17.5
Almandine	58.3	58.5	58.7	58.2	58.4	58.1	58.2	58.7	59.6	59.3	59.6	59.6	60.0	60.6
Spessartine	6.6	6.4	6.1	6.3	5.9	6.2	5.8	5.4	4.9	4.9	4.6	4.5	4.3	4.2
Grossular	19.6	19.3	19.5	19.4	19.4	19.2	19.6	19.3	18.9	19.0	18.6	18.5	18.4	17.7

	76163F F5 Grt L66	76163F F5 Grt L67	76163F F5 Grt L68	76163F F5 Grt L69	76163F F5 Grt L70	76163F F5 Grt L71	76163F F5 Grt L72	76163F F5 Grt L73	76163F F5 Grt L74	76163F F5 Grt L75	76172C F2 Grt L2	76172C F2 Grt L3	76172C F2 Grt L4	76172C F2 Grt L5
Analysis														
SiO_2	36.91	37.85	37.90	38.09	37.61	37.98	37.79	37.50	37.84	37.48	36.63	37.05	37.22	37.29
TiO_2	0.01	0.01	0.01	0.01	0.04	0.04	0.03	0.01	0.02	0.01	0.01	0.02	0.00	0.01
Al_2O_3	21.04	21.06	21.16	21.31	21.14	21.18	21.22	21.34	21.12	21.00	20.85	20.83	20.93	21.03
Cr_2O_3	0.00	0.01	0.02	0.00	0.00	0.02	0.01	0.00	0.01	0.03	0.03	0.04	0.02	0.02
Fe_2O_3	1.37	0.69	0.68	0.69	1.17	0.93	0.70	0.92	0.54	0.61	0.67	0.48	0.99	0.73
MgO	4.58	4.52	4.49	4.43	4.51	4.40	4.35	4.24	4.03	3.57	3.41	4.06	4.49	4.61
CaO	5.83	6.32	6.35	6.35	6.23	6.15	6.05	6.06	6.03	6.07	2.34	2.29	2.25	2.24
MnO	1.92	1.67	1.60	1.65	1.57	1.69	1.64	1.72	1.61	1.78	7.53	6.03	5.79	5.40
FeO	27.57	27.51	27.73	28.05	27.97	28.29	28.33	28.48	28.78	29.08	27.65	28.24	28.26	28.45
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.23	99.66	99.93	100.57	100.24	100.69	100.11	100.28	99.97	99.63	99.11	99.04	99.94	99.78
Cations														
Si	2.946	2.994	2.991	2.990	2.967	2.983	2.984	2.963	2.996	2.989	2.970	2.988	2.973	2.978
Ti	0.001	0.000	0.000	0.000	0.002	0.002	0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.000
Al	1.979	1.964	1.968	1.971	1.966	1.961	1.974	1.987	1.971	1.974	1.992	1.980	1.971	1.980
Cr	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.002	0.002	0.003	0.001	0.001
Fe^{3+}	0.083	0.041	0.040	0.041	0.069	0.055	0.042	0.055	0.032	0.037	0.041	0.029	0.059	0.044
Mg	0.545	0.533	0.528	0.518	0.531	0.515	0.512	0.499	0.475	0.425	0.413	0.488	0.535	0.548
Ca	0.498	0.536	0.537	0.534	0.526	0.518	0.512	0.513	0.512	0.518	0.203	0.198	0.192	0.191
Mn	0.130	0.112	0.107	0.109	0.105	0.113	0.110	0.115	0.108	0.120	0.517	0.412	0.392	0.366
Fe^{2+}	1.840	1.820	1.830	1.841	1.846	1.858	1.871	1.882	1.906	1.939	1.875	1.905	1.888	1.900
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.022	8.002	8.003	8.004	8.013	8.006	8.006	8.015	8.001	8.004	8.012	8.004	8.011	8.009
Endmember														
Pyrope	18.1	17.8	17.6	17.3	17.6	17.1	17.0	16.6	15.8	14.1	13.7	16.2	17.8	18.2
Almandine	61.1	60.7	61.0	61.3	61.4	61.9	62.3	62.5	63.5	64.6	62.3	63.4	62.8	63.2
Spessartine	4.3	3.7	3.6	3.6	3.5	3.7	3.6	3.8	3.6	4.0	17.2	13.7	13.0	12.2
Grossular	16.5	17.9	17.9	17.8	17.5	17.2	17.0	17.1	17.1	17.3	6.7	6.6	6.4	6.4

	76172C F2 Grt L6	76172C F2 Grt L7	76172C F2 Grt L8	76172C F2 Grt L9	76172C F2 Grt L10	76172C F2 Grt L11	76172C F2 Grt L12	76172C F2 Grt L13	76172C F2 Grt L14	76172C F2 Grt L15	76172C F2 Grt L16	76172C F2 Grt L17	76172C F2 Grt L18	76172C F2 Grt L19
Analysis														
SiO_2	37.08	37.25	37.37	37.31	37.14	37.11	37.43	37.38	37.56	37.43	37.26	37.27	37.68	37.70
TiO_2	0.01	0.02	0.00	0.02	0.01	0.00	0.00	0.04	0.02	0.00	0.03	0.01	0.03	0.00
Al_2O_3	20.87	21.11	20.94	21.08	21.03	20.80	20.98	21.22	21.07	21.03	21.02	21.13	21.09	21.02
Cr_2O_3	0.00	0.00	0.02	0.06	0.03	0.00	0.03	0.03	0.00	0.02	0.01	0.00	0.03	0.01
Fe_2O_3	0.65	0.05	0.70	0.70	0.62	0.62	0.46	0.41	0.44	0.51	0.79	0.62	0.68	0.43
MgO	4.73	4.79	4.99	5.11	5.14	5.21	5.15	5.34	5.35	5.30	5.39	5.41	5.43	5.54
CaO	2.20	2.11	2.11	2.08	2.07	2.03	2.03	2.05	1.97	1.96	1.98	1.85	1.88	1.84
MnO	5.07	4.85	4.61	4.59	4.65	4.56	4.55	4.52	4.40	4.38	4.32	4.39	4.33	4.43
FeO	28.24	28.47	28.68	28.65	28.32	28.06	28.49	28.34	28.50	28.54	28.49	28.55	28.82	28.31
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.86	98.63	99.42	99.61	99.00	98.39	99.12	99.32	99.29	99.18	99.27	99.24	99.95	99.28
Cations														
Si	2.984	2.996	2.986	2.975	2.977	2.990	2.994	2.980	2.994	2.990	2.976	2.977	2.987	3.002
Ti	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.002	0.001	0.000	0.002	0.001	0.002	0.000
Al	1.979	2.001	1.973	1.982	1.987	1.974	1.977	1.994	1.979	1.979	1.979	1.989	1.971	1.973
Cr	0.000	0.000	0.001	0.004	0.002	0.000	0.002	0.002	0.000	0.001	0.000	0.000	0.002	0.001
Fe^{3+}	0.040	0.003	0.042	0.042	0.037	0.037	0.028	0.025	0.026	0.031	0.047	0.038	0.041	0.026
Mg	0.568	0.574	0.594	0.607	0.614	0.625	0.614	0.635	0.635	0.631	0.641	0.644	0.641	0.657
Ca	0.190	0.182	0.180	0.178	0.178	0.175	0.174	0.175	0.168	0.168	0.170	0.158	0.160	0.157
Mn	0.346	0.330	0.312	0.310	0.315	0.311	0.308	0.305	0.297	0.297	0.292	0.297	0.290	0.299
Fe^{2+}	1.901	1.915	1.917	1.911	1.898	1.891	1.905	1.889	1.900	1.907	1.903	1.906	1.911	1.885
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.007	8.001	8.006	8.010	8.009	8.004	8.002	8.007	8.002	8.004	8.009	8.009	8.005	7.999
Endmember														
Pyrope	18.9	19.1	19.8	20.2	20.4	20.8	20.5	21.1	21.2	21.0	21.3	21.4	21.4	21.9
Almandine	63.3	63.8	63.8	63.6	63.2	63.0	63.5	62.9	63.3	63.5	63.3	63.4	63.7	62.9
Spessartine	11.5	11.0	10.4	10.3	10.5	10.4	10.3	10.2	9.9	9.9	9.7	9.9	9.7	10.0
Grossular	6.3	6.1	6.0	5.9	5.9	5.8	5.8	5.8	5.6	5.6	5.6	5.3	5.3	5.2

	76172C F2 Grt L20	76172C F2 Grt L21	76172C F2 Grt L22	76172C F2 Grt L23	76172C F2 Grt L24	76172C F2 Grt L25	76172C F2 Grt L26	76172C F2 Grt L27	76172C F2 Grt L28	76172C F2 Grt L29	76172C F2 Grt L30	76172C F2 Grt L31	76172C F2 Grt L32	76172C F2 Grt L33
Analysis														
SiO_2	37.58	37.61	37.55	37.55	37.65	37.45	37.53	37.56	37.66	37.48	37.41	37.74	37.56	37.76
TiO_2	0.00	0.00	0.04	0.00	0.00	0.01	0.02	0.01	0.00	0.01	0.04	0.02	0.01	0.01
Al_2O_3	21.22	21.17	21.16	21.03	21.31	21.16	21.28	21.20	21.19	21.33	21.13	21.38	21.22	21.21
Cr_2O_3	0.03	0.03	0.04	0.00	0.01	0.01	0.03	0.01	0.01	0.00	0.02	0.00	0.03	0.03
Fe_2O_3	0.55	0.44	0.81	0.61	0.58	0.65	0.25	0.47	0.46	0.69	0.64	0.30	0.67	0.54
MgO	5.41	5.32	5.26	5.37	5.45	5.46	5.54	5.58	5.60	5.55	5.64	5.55	5.66	5.61
CaO	1.83	1.80	1.85	1.86	1.85	1.84	1.82	1.82	1.77	1.80	1.72	1.71	1.66	1.74
MnO	4.46	4.24	4.26	4.28	4.33	4.22	4.25	4.17	4.13	4.38	4.34	4.29	4.23	4.21
FeO	28.74	29.08	29.29	28.78	28.91	28.81	28.59	28.66	28.79	28.74	28.47	28.92	28.83	28.88
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.81	99.70	100.25	99.49	100.08	99.61	99.30	99.48	99.60	99.98	99.41	99.91	99.87	99.99
Cations														
Si	2.983	2.990	2.975	2.991	2.980	2.979	2.988	2.986	2.991	2.970	2.978	2.988	2.978	2.988
Ti	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.002	0.001	0.001	0.001
Al	1.985	1.983	1.976	1.974	1.988	1.984	1.996	1.987	1.983	1.993	1.983	1.995	1.983	1.979
Cr	0.002	0.002	0.003	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.001	0.000	0.002	0.002
Fe^{3+}	0.033	0.026	0.048	0.037	0.034	0.039	0.015	0.028	0.028	0.041	0.038	0.018	0.040	0.032
Mg	0.640	0.631	0.622	0.638	0.644	0.647	0.657	0.662	0.663	0.656	0.670	0.655	0.668	0.662
Ca	0.156	0.153	0.157	0.158	0.157	0.156	0.155	0.155	0.151	0.152	0.146	0.145	0.141	0.148
Mn	0.300	0.286	0.286	0.289	0.290	0.284	0.287	0.281	0.277	0.294	0.293	0.288	0.284	0.282
Fe^{2+}	1.908	1.933	1.941	1.917	1.914	1.917	1.903	1.906	1.912	1.905	1.896	1.915	1.912	1.911
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.007	8.004	8.010	8.004	8.008	8.008	8.005	8.006	8.004	8.012	8.008	8.005	8.009	8.005
Endmember														
Pyrope	21.3	21.0	20.7	21.3	21.4	21.5	21.9	22.0	22.1	21.8	22.3	21.8	22.2	22.0
Almandine	63.5	64.4	64.6	63.8	63.7	63.8	63.4	63.5	63.7	63.3	63.1	63.8	63.6	63.7
Spessartine	10.0	9.5	9.5	9.6	9.7	9.5	9.5	9.3	9.2	9.8	9.7	9.6	9.5	9.4
Grossular	5.2	5.1	5.2	5.3	5.2	5.2	5.2	5.2	5.0	5.1	4.9	4.8	4.7	4.9

	76172C F2 Grt L34	76172C F2 Grt L35	76172C F2 Grt L36	76172C F2 Grt L37	76172C F2 Grt L38	76172C F2 Grt L39	76172C F2 Grt L40	76172C F2 Grt L41	76172C F2 Grt L43	76172C F2 Grt L44	76172C F2 Grt L45	76172C F2 Grt L46	76172C F2 Grt L47	76172C F2 Grt L48
Analysis														
SiO_2	37.61	37.68	37.66	37.54	37.30	37.62	37.65	37.66	37.58	37.64	37.44	37.53	37.43	37.68
TiO_2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03
Al_2O_3	21.29	21.13	21.16	21.06	21.06	21.25	21.17	21.03	21.16	21.17	21.10	21.26	21.14	21.37
Cr_2O_3	0.02	0.03	0.03	0.04	0.02	0.00	0.02	0.03	0.00	0.04	0.03	0.02	0.01	0.01
Fe_2O_3	0.71	0.53	0.59	0.46	0.52	0.34	0.60	0.42	0.33	0.59	0.40	0.52	0.62	0.30
MgO	5.61	5.65	5.59	5.58	5.57	5.62	5.68	5.60	5.78	5.71	5.60	5.68	5.53	5.54
CaO	1.67	1.72	1.66	1.57	1.60	1.52	1.55	1.53	1.41	1.35	1.39	1.40	1.51	1.58
MnO	4.27	4.07	4.27	4.07	4.13	4.20	4.28	4.28	4.37	4.38	4.13	4.35	4.25	4.15
FeO	28.97	28.84	28.87	28.94	28.73	28.95	28.84	28.77	28.50	28.93	29.01	28.91	29.01	29.22
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.14	99.65	99.84	99.26	98.94	99.50	99.79	99.31	99.13	99.80	99.09	99.68	99.50	99.86
Cations														
Si	2.975	2.991	2.986	2.992	2.984	2.991	2.986	2.999	2.994	2.986	2.990	2.981	2.981	2.986
Ti	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002
Al	1.985	1.977	1.978	1.979	1.986	1.991	1.979	1.974	1.987	1.979	1.986	1.990	1.984	1.996
Cr	0.001	0.002	0.002	0.002	0.001	0.000	0.001	0.002	0.000	0.002	0.002	0.001	0.001	0.000
Fe^{3+}	0.042	0.032	0.035	0.027	0.032	0.020	0.036	0.025	0.020	0.035	0.024	0.031	0.037	0.018
Mg	0.662	0.668	0.660	0.663	0.665	0.666	0.671	0.665	0.687	0.675	0.667	0.673	0.657	0.654
Ca	0.142	0.146	0.141	0.134	0.137	0.130	0.132	0.130	0.120	0.115	0.119	0.119	0.129	0.134
Mn	0.286	0.274	0.287	0.275	0.280	0.283	0.287	0.289	0.295	0.294	0.279	0.293	0.287	0.278
Fe^{2+}	1.916	1.915	1.914	1.929	1.922	1.924	1.913	1.916	1.899	1.919	1.938	1.920	1.932	1.936
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.010	8.004	8.005	8.003	8.007	8.004	8.006	8.000	8.002	8.006	8.004	8.008	8.008	8.005
Endmember														
Pyrope	22.0	22.2	22.0	22.1	22.1	22.2	22.3	22.2	22.9	22.5	22.2	22.4	21.9	21.8
Almandine	63.8	63.8	63.7	64.3	64.0	64.1	63.7	63.9	63.3	63.9	64.5	63.9	64.3	64.5
Spessartine	9.5	9.1	9.6	9.2	9.3	9.4	9.6	9.6	9.8	9.8	9.3	9.7	9.5	9.3
Grossular	4.7	4.9	4.7	4.5	4.6	4.3	4.4	4.3	4.0	3.8	4.0	4.0	4.3	4.5

	76172C F2 Grt L49	76172C F2 Grt L50	76172C F2 Grt L51	76172C F2 Grt L52	76172C F2 Grt L53	76172C F2 Grt L54	76172C F2 Grt L55	76172C F2 Grt L56	76172C F2 Grt L57	76172C F2 Grt L58	76172C F2 Grt L60	76172C F2 Grt L61	76172C F2 Grt L62	76172C F2 Grt L65
Analysis														
SiO_2	37.57	37.62	37.69	37.49	39.61	37.55	37.58	37.53	37.38	37.55	37.65	37.66	38.24	37.31
TiO_2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.01
Al_2O_3	21.32	21.30	21.18	21.32	23.65	21.10	21.21	21.24	21.25	20.96	21.05	21.10	21.52	21.12
Cr_2O_3	0.02	0.01	0.02	0.02	0.04	0.01	0.02	0.04	0.01	0.02	0.02	0.02	0.01	0.03
Fe_2O_3	0.37	0.55	0.34	0.03	0.00	0.56	0.38	0.36	0.64	0.86	0.53	0.48	0.07	0.89
MgO	5.60	5.65	5.65	5.63	4.58	5.57	5.56	5.58	5.48	5.55	5.57	5.60	5.66	5.59
CaO	1.53	1.48	1.45	1.44	1.20	1.60	1.57	1.63	1.66	1.68	1.80	1.77	1.73	1.82
MnO	4.37	4.14	4.23	4.13	3.41	4.28	4.07	4.27	4.20	4.30	4.19	4.24	4.24	4.37
FeO	28.86	29.18	28.94	28.88	23.58	28.82	29.10	28.77	29.05	28.77	28.66	28.61	29.00	28.46
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.63	99.92	99.49	98.95	96.07	99.51	99.48	99.43	99.66	99.69	99.48	99.51	100.47	99.60
Cations														
Si	2.984	2.981	2.995	2.993	3.131	2.988	2.989	2.986	2.973	2.986	2.994	2.993	3.004	2.969
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Al	1.996	1.989	1.984	2.005	2.203	1.979	1.989	1.992	1.992	1.964	1.973	1.976	1.992	1.980
Cr	0.001	0.000	0.001	0.001	0.003	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002
Fe^{3+}	0.022	0.033	0.020	0.002	0.000	0.034	0.023	0.021	0.038	0.051	0.032	0.029	0.004	0.053
Mg	0.663	0.668	0.669	0.670	0.540	0.661	0.659	0.662	0.650	0.658	0.660	0.664	0.663	0.664
Ca	0.130	0.125	0.123	0.124	0.102	0.136	0.133	0.139	0.141	0.143	0.153	0.151	0.145	0.155
Mn	0.294	0.278	0.285	0.279	0.228	0.288	0.274	0.288	0.283	0.289	0.282	0.286	0.282	0.295
Fe^{2+}	1.917	1.934	1.924	1.928	1.559	1.918	1.936	1.914	1.933	1.913	1.906	1.902	1.905	1.894
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.007	8.008	8.002	8.003	7.766	8.005	8.004	8.006	8.011	8.006	8.002	8.002	7.997	8.013
Endmember														
Pyrope	22.1	22.2	22.3	22.3	22.2	22.0	21.9	22.0	21.6	21.9	22.0	22.1	22.1	22.1
Almandine	63.8	64.4	64.1	64.2	64.2	63.9	64.5	63.7	64.3	63.7	63.5	63.4	63.6	63.0
Spessartine	9.8	9.3	9.5	9.3	9.4	9.6	9.1	9.6	9.4	9.6	9.4	9.5	9.4	9.8
Grossular	4.3	4.2	4.1	4.1	4.2	4.5	4.4	4.6	4.7	4.8	5.1	5.0	4.9	5.2

	76172C F2 Grt L66	76172C F2 Grt L67	76172C F2 Grt L68	76172C F2 Grt L69	76172C F2 Grt L70	76172C F2 Grt L71	76172C F2 Grt L72	76172C F2 Grt L73	76172C F2 Grt L74	76172C F2 Grt L75	76172C F2 Grt L76	76172C F2 Grt L77	76172C F2 Grt L78	76172C F2 Grt L80
Analysis														
SiO_2	37.59	37.74	37.63	38.65	37.44	37.75	37.82	37.76	37.71	37.80	37.85	37.69	37.80	37.77
TiO_2	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00
Al_2O_3	21.34	21.23	21.38	21.87	21.23	21.34	21.24	21.05	21.08	21.25	21.37	21.24	21.12	21.05
Cr_2O_3	0.02	0.00	0.02	0.01	0.02	0.03	0.00	0.00	0.03	0.03	0.02	0.02	0.02	0.03
Fe_2O_3	0.08	0.58	0.80	0.00	0.62	0.18	0.28	0.72	0.57	0.31	0.21	0.35	0.42	0.54
MgO	5.49	5.53	5.56	5.62	5.43	5.47	5.49	5.38	5.44	5.39	5.33	5.27	5.21	5.17
CaO	1.78	1.83	1.82	1.80	1.94	1.82	1.89	1.86	1.91	1.91	1.96	2.02	1.96	2.01
MnO	4.07	4.23	4.37	4.21	4.23	4.25	4.44	4.46	4.40	4.41	4.59	4.37	4.52	4.82
FeO	28.90	28.89	28.93	29.33	28.76	28.86	28.54	28.81	28.62	28.76	28.70	28.82	28.84	28.53
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.30	100.02	100.50	101.49	99.67	99.69	99.70	100.04	99.75	99.87	100.02	99.78	99.89	99.93
Cations														
Si	2.992	2.987	2.969	3.004	2.977	2.994	2.999	2.992	2.993	2.995	2.994	2.992	2.999	2.997
Ti	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Al	2.002	1.980	1.988	2.004	1.989	1.995	1.984	1.966	1.972	1.985	1.993	1.987	1.975	1.969
Cr	0.001	0.000	0.001	0.001	0.001	0.002	0.000	0.000	0.002	0.002	0.001	0.002	0.001	0.002
Fe^{3+}	0.005	0.034	0.047	0.000	0.037	0.011	0.017	0.043	0.034	0.018	0.012	0.021	0.025	0.032
Mg	0.652	0.653	0.654	0.651	0.644	0.646	0.649	0.636	0.643	0.636	0.629	0.623	0.617	0.612
Ca	0.152	0.155	0.154	0.150	0.166	0.155	0.160	0.158	0.163	0.162	0.166	0.171	0.167	0.171
Mn	0.275	0.283	0.292	0.277	0.285	0.286	0.298	0.299	0.296	0.296	0.307	0.294	0.303	0.324
Fe^{2+}	1.924	1.913	1.909	1.907	1.912	1.914	1.893	1.909	1.900	1.906	1.899	1.913	1.913	1.894
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.003	8.005	8.013	7.993	8.010	8.002	8.000	8.003	8.003	8.002	8.002	8.003	8.000	8.001
Endmember														
Pyrope	22.1	21.7	21.7	21.8	21.4	21.5	21.6	21.2	21.4	21.2	21.0	20.8	20.5	20.4
Almandine	63.0	63.7	63.5	63.9	63.6	63.8	63.1	63.6	63.3	63.5	63.3	63.7	63.8	63.1
Spessartine	9.8	9.4	9.7	9.3	9.5	9.5	9.9	10.0	9.9	9.9	10.2	9.8	10.1	10.8
Grossular	5.2	5.2	5.1	5.0	5.5	5.2	5.3	5.2	5.4	5.4	5.5	5.7	5.6	5.7

	76172C F2 Grt L81	76172C F2 Grt L82	76172C F2 Grt L83	76172C F2 Grt L84	76172C F2 Grt L85	76172C F2 Grt L86	76172C F2 Grt L87	76172C F2 Grt L88	76172C F2 Grt L89	76172C F2 Grt L90	76175A F12ms Grt L1	76175A F12ms Grt L2	76175A F12ms Grt L3	76175A F12ms Grt L4
Analysis														
SiO_2	37.57	37.55	37.64	37.37	37.61	37.45	37.51	37.41	37.73	37.12	36.70	36.96	36.80	36.91
TiO_2	0.01	0.00	0.00	0.00	0.02	0.03	0.03	0.01	0.02	0.00	0.06	0.05	0.04	0.00
Al_2O_3	21.16	21.08	21.24	21.10	20.88	21.17	20.96	21.10	20.84	20.99	20.74	20.79	20.92	20.83
Cr_2O_3	0.00	0.04	0.03	0.01	0.01	0.05	0.03	0.02	0.02	0.05	0.00	0.00	0.01	0.02
Fe_2O_3	0.53	0.27	0.14	0.92	0.35	0.39	0.49	0.62	0.32	0.63	0.00	0.00	0.25	0.00
MgO	5.16	5.02	4.98	4.96	4.80	4.62	4.55	4.36	3.99	3.53	1.66	2.12	2.32	2.34
CaO	1.99	2.08	2.08	2.17	2.13	2.16	2.15	2.13	2.24	2.22	1.79	1.73	1.67	1.68
MnO	4.73	4.79	4.81	5.05	5.19	5.50	5.77	5.92	6.28	7.62	4.90	4.33	4.14	3.89
FeO	28.65	28.47	28.64	28.50	28.11	28.48	28.23	28.58	28.22	27.96	33.23	33.50	33.81	33.77
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.80	99.29	99.56	100.08	99.09	99.85	99.72	100.15	99.67	100.10	99.08	99.48	99.95	99.43
Cations														
Si	2.987	2.998	2.998	2.972	3.011	2.985	2.995	2.982	3.018	2.978	3.007	3.008	2.984	3.003
Ti	0.001	0.000	0.000	0.000	0.001	0.002	0.002	0.001	0.001	0.000	0.004	0.003	0.002	0.000
Al	1.982	1.983	1.993	1.977	1.970	1.989	1.972	1.982	1.965	1.985	2.002	1.994	2.000	1.997
Cr	0.000	0.002	0.002	0.001	0.001	0.003	0.002	0.001	0.002	0.003	0.000	0.000	0.000	0.001
Fe^{3+}	0.032	0.016	0.008	0.055	0.021	0.023	0.030	0.037	0.019	0.038	0.000	0.000	0.015	0.000
Mg	0.611	0.598	0.591	0.588	0.573	0.549	0.542	0.518	0.475	0.422	0.202	0.257	0.281	0.284
Ca	0.169	0.178	0.178	0.185	0.183	0.184	0.184	0.182	0.192	0.191	0.157	0.151	0.145	0.147
Mn	0.318	0.324	0.324	0.340	0.352	0.371	0.390	0.400	0.426	0.518	0.340	0.299	0.284	0.268
Fe^{2+}	1.905	1.901	1.908	1.895	1.882	1.898	1.885	1.905	1.888	1.876	2.277	2.280	2.294	2.298
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.005	8.001	8.001	8.012	7.992	8.005	8.001	8.007	7.987	8.009	7.988	7.992	8.005	7.998
Endmember														
Pyrope	20.3	19.9	19.7	19.5	19.2	18.3	18.0	17.3	15.9	14.0	6.8	8.6	9.3	9.5
Almandine	63.4	63.4	63.6	63.0	63.0	63.2	62.8	63.4	63.3	62.4	76.5	76.4	76.4	76.7
Spessartine	10.6	10.8	10.8	11.3	11.8	12.4	13.0	13.3	14.3	17.2	11.4	10.0	9.5	8.9
Grossular	5.6	5.9	5.9	6.1	6.1	6.1	6.1	6.0	6.4	6.3	5.3	5.0	4.8	4.9

	76175A F12ms Grt L5	76175A F12ms Grt L6	76175A F12ms Grt L7	76175A F12ms Grt L8	76175A F12ms Grt L9	76175A F12ms Grt L10	76175A F12ms Grt L11	76175A F12ms Grt L12	76175A F12ms Grt L13	76175A F12ms Grt L14	76175A F12ms Grt L15	76175A F12ms Grt L16	76175A F12ms Grt L17	76175A F12ms Grt L18
Analysis														
SiO_2	36.95	36.93	36.86	36.93	37.11	37.05	37.10	36.97	36.83	36.95	36.95	37.13	37.22	37.23
TiO_2	0.00	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.02	0.02
Al_2O_3	20.73	20.87	20.89	20.80	20.89	20.77	20.85	20.86	20.89	20.93	20.83	20.85	20.85	21.01
Cr_2O_3	0.01	0.01	0.04	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.00	0.03	0.04	0.03
Fe_2O_3	0.16	0.00	0.00	0.38	0.00	0.18	0.27	0.00	0.00	0.07	0.00	0.25	0.06	0.00
MgO	2.43	2.55	2.58	2.59	2.58	2.62	2.66	2.68	2.67	2.68	2.75	2.83	2.77	2.83
CaO	1.73	1.68	1.70	1.73	1.71	1.72	1.68	1.75	1.64	1.73	1.73	1.70	1.71	1.68
MnO	3.70	3.70	3.76	3.76	3.51	3.58	3.71	3.44	3.48	3.42	3.31	3.52	3.37	3.39
FeO	33.76	33.46	33.44	33.69	33.57	33.71	33.75	33.50	33.70	33.83	33.05	33.65	33.72	33.62
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.48	99.23	99.28	99.91	99.40	99.67	100.05	99.23	99.25	99.65	98.62	99.97	99.76	99.81
Cations														
Si	3.004	3.004	2.998	2.991	3.011	3.003	2.997	3.005	2.996	2.994	3.014	2.998	3.008	3.005
Ti	0.000	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.002	0.001	0.001
Al	1.987	2.000	2.002	1.986	1.997	1.984	1.985	1.998	2.003	1.999	2.002	1.984	1.987	1.998
Cr	0.001	0.001	0.003	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.000	0.002	0.002	0.002
Fe^{3+}	0.010	0.000	0.000	0.023	0.000	0.011	0.016	0.000	0.000	0.004	0.000	0.015	0.004	0.000
Mg	0.294	0.309	0.313	0.312	0.312	0.316	0.321	0.325	0.324	0.324	0.335	0.340	0.334	0.340
Ca	0.151	0.146	0.148	0.150	0.148	0.150	0.146	0.152	0.143	0.150	0.151	0.147	0.148	0.145
Mn	0.255	0.255	0.259	0.258	0.241	0.246	0.254	0.237	0.240	0.235	0.228	0.240	0.231	0.232
Fe^{2+}	2.295	2.276	2.275	2.282	2.278	2.285	2.281	2.277	2.293	2.292	2.254	2.272	2.279	2.269
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.997	7.993	7.999	8.004	7.989	7.997	8.001	7.995	8.001	8.002	7.985	8.000	7.994	7.993
Endmember														
Pyrope	9.8	10.4	10.5	10.4	10.5	10.6	10.7	10.9	10.8	10.8	11.3	11.3	11.1	11.4
Almandine	76.6	76.2	76.0	76.0	76.4	76.2	76.0	76.1	76.4	76.4	75.9	75.7	76.2	76.0
Spessartine	8.5	8.5	8.6	8.6	8.1	8.2	8.4	7.9	8.0	7.8	7.7	8.0	7.7	7.8
Grossular	5.0	4.9	4.9	5.0	5.0	5.0	4.9	5.1	4.8	5.0	5.1	4.9	4.9	4.9

	76175A F12ms Grt L19	76175A F12ms Grt L20	76175A F12ms Grt L21	76175A F12ms Grt L22	76175A F12ms Grt L23	76175A F12ms Grt L24	76175A F12ms Grt L25	76175A F12ms Grt L26	76175A F12ms Grt L27	76175A F12ms Grt L28	76175A F12ms Grt L29	76175A F12ms Grt L30	76175A F12ms Grt L35	76175A F12ms Grt L36
Analysis														
SiO_2	37.02	37.06	37.14	37.02	36.83	37.07	36.85	36.88	37.08	36.93	37.05	36.91	36.99	37.19
TiO_2	0.01	0.03	0.00	0.00	0.02	0.00	0.02	0.00	0.02	0.03	0.00	0.02	0.01	0.00
Al_2O_3	20.83	21.04	20.88	20.98	21.06	20.91	21.06	20.95	20.96	20.81	20.81	20.96	20.86	20.79
Cr_2O_3	0.04	0.03	0.03	0.02	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.01	0.04	0.05
Fe_2O_3	0.24	0.03	0.02	0.00	0.00	0.01	0.00	0.07	0.12	0.29	0.05	0.02	0.15	0.08
MgO	2.78	2.82	2.84	2.78	2.84	2.82	2.88	2.88	2.90	2.84	2.80	2.73	2.74	2.80
CaO	1.78	1.69	1.69	1.76	1.77	1.72	1.73	1.71	1.74	1.68	1.72	1.72	1.68	1.73
MnO	3.35	3.32	3.55	3.32	3.39	3.38	3.26	3.36	3.23	3.27	3.32	3.29	3.37	3.28
FeO	33.71	33.89	33.40	33.65	33.25	33.62	33.38	33.52	33.75	33.76	33.52	33.86	33.84	33.58
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.75	99.91	99.54	99.53	99.20	99.55	99.21	99.40	99.83	99.62	99.30	99.52	99.67	99.49
Cations														
Si	2.996	2.993	3.006	2.999	2.991	3.002	2.991	2.992	2.995	2.993	3.008	2.994	2.997	3.012
Ti	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.002	0.000	0.001	0.000	0.000
Al	1.987	2.003	1.993	2.003	2.015	1.996	2.015	2.003	1.995	1.988	1.991	2.004	1.992	1.984
Cr	0.002	0.002	0.002	0.001	0.003	0.002	0.003	0.001	0.002	0.001	0.002	0.000	0.002	0.003
Fe^{3+}	0.015	0.002	0.001	0.000	0.000	0.001	0.000	0.004	0.007	0.018	0.003	0.001	0.009	0.005
Mg	0.336	0.339	0.342	0.336	0.344	0.340	0.348	0.348	0.349	0.343	0.339	0.329	0.331	0.338
Ca	0.154	0.146	0.147	0.153	0.154	0.149	0.151	0.149	0.151	0.146	0.150	0.149	0.146	0.150
Mn	0.230	0.227	0.243	0.228	0.233	0.232	0.224	0.231	0.221	0.224	0.228	0.226	0.231	0.225
Fe^{2+}	2.281	2.289	2.261	2.279	2.258	2.277	2.266	2.274	2.280	2.288	2.275	2.297	2.293	2.275
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.001	8.002	7.996	7.999	7.999	7.998	7.999	8.003	8.002	8.002	7.995	8.002	8.001	7.992
Endmember														
Pyrope	11.2	11.3	11.4	11.2	11.5	11.3	11.6	11.6	11.6	11.4	11.3	11.0	11.0	11.3
Almandine	76.0	76.3	75.5	76.1	75.5	76.0	75.8	75.8	76.0	76.2	76.0	76.5	76.4	76.1
Spessartine	7.7	7.6	8.1	7.6	7.8	7.7	7.5	7.7	7.4	7.5	7.6	7.5	7.7	7.5
Grossular	5.1	4.9	4.9	5.1	5.2	5.0	5.0	5.0	5.0	4.9	5.0	5.0	4.9	5.0

	76175A F12ms Grt L37	76175A F12ms Grt L38	76175A F12ms Grt L39	76175A F12ms Grt L40	76175A F12ms Grt L41	76175A F12ms Grt L42	76175A F12ms Grt L43	76175A F12ms Grt L44	76175A F12ms Grt L45	76175A F12ms Grt L46	76175A F12ms Grt L47	76175A F12ms Grt L48	76175A F12ms Grt L49	76175A F12ms Grt L50
Analysis														
SiO_2	36.85	36.84	36.99	36.86	36.94	36.94	36.94	36.71	36.99	36.75	37.09	36.88	36.81	36.95
TiO_2	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.00	0.01	0.03	0.01	0.00	0.01
Al_2O_3	20.89	20.91	20.92	20.86	20.87	20.92	20.86	21.01	21.01	20.94	20.87	21.05	20.97	20.93
Cr_2O_3	0.04	0.04	0.04	0.03	0.02	0.01	0.04	0.04	0.02	0.04	0.04	0.05	0.04	0.05
Fe_2O_3	0.10	0.19	0.27	0.00	0.00	0.00	0.19	0.03	0.26	0.26	0.14	0.16	0.00	0.07
MgO	2.84	2.83	2.94	2.86	2.86	2.84	2.88	2.85	2.88	2.82	2.87	2.81	2.79	2.88
CaO	1.72	1.71	1.74	1.72	1.70	1.72	1.78	1.71	1.75	1.72	1.73	1.73	1.77	1.72
MnO	3.14	3.53	3.24	3.29	3.37	3.32	3.35	3.25	3.40	3.40	3.57	3.47	3.49	3.40
FeO	33.76	33.46	33.67	33.03	33.47	33.40	33.48	33.64	33.67	33.60	33.42	33.67	33.38	33.52
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.35	99.52	99.80	98.64	99.25	99.16	99.51	99.27	99.97	99.55	99.77	99.85	99.23	99.53
Cations														
Si	2.992	2.988	2.990	3.006	3.000	3.001	2.994	2.983	2.986	2.982	2.998	2.983	2.992	2.994
Ti	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.002	0.000	0.001	0.002	0.001	0.000	0.001
Al	1.999	1.999	1.993	2.005	1.997	2.003	1.992	2.013	1.999	2.002	1.989	2.006	2.008	1.999
Cr	0.003	0.003	0.002	0.002	0.001	0.000	0.002	0.003	0.001	0.003	0.003	0.003	0.002	0.003
Fe^{3+}	0.006	0.012	0.016	0.000	0.000	0.000	0.012	0.002	0.016	0.016	0.008	0.010	0.000	0.004
Mg	0.344	0.342	0.354	0.348	0.346	0.344	0.348	0.345	0.347	0.341	0.346	0.339	0.338	0.348
Ca	0.149	0.149	0.150	0.150	0.148	0.150	0.154	0.149	0.151	0.150	0.150	0.150	0.154	0.149
Mn	0.216	0.243	0.222	0.227	0.232	0.228	0.230	0.224	0.232	0.234	0.245	0.238	0.240	0.233
Fe^{2+}	2.292	2.270	2.276	2.252	2.273	2.269	2.270	2.287	2.273	2.280	2.259	2.277	2.268	2.271
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.003	8.005	8.004	7.991	7.999	7.997	8.002	8.006	8.006	8.007	8.000	8.007	8.003	8.002
Endmember														
Pyrope	11.5	11.4	11.8	11.7	11.5	11.5	11.6	11.5	11.5	11.3	11.5	11.3	11.3	11.6
Almandine	76.4	75.6	75.8	75.6	75.8	75.9	75.6	76.1	75.7	75.9	75.3	75.8	75.6	75.7
Spessartine	7.2	8.1	7.4	7.6	7.7	7.6	7.7	7.4	7.7	7.8	8.2	7.9	8.0	7.8
Grossular	5.0	5.0	5.0	5.0	4.9	5.0	5.1	5.0	5.0	5.0	5.0	5.0	5.1	5.0

	76175A F12ms Grt L51	76175A F12ms Grt L52	76175A F12ms Grt L53	76175A F12ms Grt L54	76175A F12ms Grt L55	76175A F12ms Grt L56	76175A F12ms Grt L57	76175A F12ms Grt L58	76175A F12ms Grt L59	76175A F12ms Grt L60	76175A F12ms Grt L61	76175A F12ms Grt L62	76175A F12ms Grt L63	76175A F12ms Grt L64
Analysis														
SiO_2	37.27	36.84	37.53	36.82	36.68	36.63	36.70	36.84	37.07	36.75	37.11	36.76	36.56	36.84
TiO_2	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.01	0.00	0.02	0.00	0.01	0.02
Al_2O_3	21.02	20.86	21.04	20.89	20.80	20.83	21.01	20.99	21.05	20.89	20.88	21.04	20.91	20.80
Cr_2O_3	0.04	0.04	0.02	0.05	0.00	0.02	0.02	0.02	0.01	0.02	0.00	0.01	0.04	0.02
Fe_2O_3	0.00	0.18	0.00	0.03	0.31	0.20	0.28	0.03	0.00	0.15	0.01	0.03	0.18	0.13
MgO	2.86	2.80	2.84	2.78	2.76	2.80	2.75	2.75	2.72	2.74	2.78	2.74	2.66	2.69
CaO	1.69	1.72	1.73	1.70	1.79	1.74	1.75	1.75	1.73	1.70	1.74	1.69	1.73	1.69
MnO	3.22	3.40	3.32	3.29	3.45	3.50	3.37	3.48	3.39	3.34	3.54	3.54	3.52	3.56
FeO	33.09	33.56	33.31	33.67	33.40	33.29	33.75	33.57	33.34	33.70	33.41	33.58	33.55	33.56
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.21	99.41	99.79	99.23	99.19	99.00	99.63	99.45	99.31	99.29	99.48	99.40	99.16	99.29
Cations														
Si	3.017	2.991	3.022	2.994	2.987	2.987	2.977	2.989	3.005	2.989	3.007	2.986	2.980	2.996
Ti	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001
Al	2.005	1.997	1.996	2.002	1.996	2.001	2.009	2.008	2.011	2.002	1.994	2.014	2.009	1.994
Cr	0.003	0.003	0.001	0.003	0.000	0.001	0.001	0.001	0.001	0.002	0.000	0.001	0.003	0.001
Fe^{3+}	0.000	0.011	0.000	0.002	0.019	0.012	0.017	0.002	0.000	0.009	0.000	0.002	0.011	0.008
Mg	0.345	0.339	0.340	0.337	0.335	0.340	0.333	0.333	0.328	0.333	0.336	0.332	0.324	0.326
Ca	0.147	0.150	0.149	0.148	0.156	0.152	0.152	0.152	0.150	0.148	0.151	0.147	0.151	0.147
Mn	0.221	0.234	0.227	0.227	0.238	0.241	0.231	0.239	0.233	0.230	0.243	0.243	0.243	0.245
Fe^{2+}	2.240	2.279	2.243	2.289	2.274	2.270	2.289	2.278	2.260	2.292	2.264	2.281	2.287	2.283
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.978	8.004	7.979	8.002	8.005	8.005	8.010	8.004	7.989	8.005	7.995	8.006	8.008	8.001
Endmember														
Pyrope	11.7	11.3	11.5	11.2	11.1	11.3	11.1	11.1	11.0	11.1	11.2	11.1	10.8	10.9
Almandine	75.9	75.9	75.8	76.3	75.7	75.6	76.2	75.9	76.1	76.3	75.6	75.9	76.1	76.1
Spessartine	7.5	7.8	7.7	7.6	7.9	8.0	7.7	8.0	7.8	7.7	8.1	8.1	8.1	8.2
Grossular	5.0	5.0	5.0	4.9	5.2	5.1	5.1	5.1	5.1	4.9	5.0	4.9	5.0	4.9

	76175A F12ms Grt L65	76175A F12ms Grt L66	76175A F12ms Grt L67	76175A F12ms Grt L68	76175A F12ms Grt L69	76175A F12ms Grt L70	76175A F12ms Grt L71	76175A F12ms Grt L72	76175A F12ms Grt L73	76175A F12ms Grt L74	76175A F5lq Grt L1	76175A F5lq Grt L2	76175A F5lq Grt L3	76175A F5lq Grt L4
Analysis														
SiO_2	36.76	36.65	37.03	36.88	36.97	36.70	36.39	36.68	36.66	36.24	36.14	36.78	36.64	36.52
TiO_2	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.03	0.04	0.00	0.01	0.00	0.02	0.02
Al_2O_3	21.00	20.91	20.75	20.94	20.75	20.98	20.77	21.00	20.72	20.85	20.89	20.66	21.02	20.88
Cr_2O_3	0.02	0.02	0.04	0.03	0.02	0.01	0.02	0.00	0.01	0.02	0.00	0.01	0.01	0.01
Fe_2O_3	0.08	0.00	0.06	0.27	0.14	0.26	0.31	0.00	0.13	0.16	0.00	0.00	0.30	0.33
MgO	2.66	2.56	2.61	2.66	2.54	2.55	2.49	2.40	2.33	2.03	2.20	2.69	2.85	2.93
CaO	1.71	1.77	1.75	1.67	1.66	1.75	1.74	1.73	1.72	1.76	1.55	1.66	1.65	1.67
MnO	3.58	3.65	3.57	3.72	3.77	3.86	3.92	3.90	4.02	4.48	3.79	3.32	3.21	3.15
FeO	33.65	33.41	33.49	33.72	33.62	33.57	33.26	33.49	33.49	33.36	33.47	33.42	33.84	33.55
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.45	98.99	99.31	99.90	99.46	99.68	98.92	99.22	99.11	98.89	98.05	98.53	99.54	99.05
Cations														
Si	2.986	2.990	3.009	2.985	3.004	2.979	2.978	2.989	2.995	2.976	2.983	3.010	2.974	2.976
Ti	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.002	0.002	0.000	0.001	0.000	0.001	0.001
Al	2.010	2.011	1.988	1.998	1.988	2.007	2.004	2.017	1.995	2.017	2.032	1.993	2.010	2.005
Cr	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000
Fe^{3+}	0.005	0.000	0.004	0.016	0.009	0.016	0.019	0.000	0.008	0.010	0.000	0.000	0.018	0.020
Mg	0.322	0.311	0.317	0.321	0.307	0.308	0.304	0.291	0.284	0.249	0.271	0.328	0.345	0.355
Ca	0.149	0.155	0.153	0.145	0.144	0.152	0.153	0.151	0.151	0.155	0.137	0.145	0.144	0.146
Mn	0.246	0.252	0.246	0.255	0.260	0.265	0.272	0.269	0.278	0.311	0.265	0.230	0.221	0.217
Fe^{2+}	2.286	2.280	2.276	2.283	2.285	2.279	2.276	2.282	2.288	2.291	2.311	2.287	2.297	2.287
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.006	8.002	7.994	8.006	7.997	8.009	8.009	8.001	8.001	8.010	8.000	7.993	8.010	8.009
Endmember														
Pyrope	10.7	10.4	10.6	10.7	10.3	10.3	10.1	9.7	9.4	8.3	9.1	11.0	11.5	11.8
Almandine	76.1	76.0	76.1	76.0	76.3	75.8	75.8	76.2	76.3	76.2	77.5	76.5	76.4	76.1
Spessartine	8.2	8.4	8.2	8.5	8.7	8.8	9.0	9.0	9.3	10.4	8.9	7.7	7.3	7.2
Grossular	5.0	5.2	5.1	4.8	4.8	5.1	5.1	5.0	5.0	5.2	4.6	4.9	4.8	4.9

	76175A F5lq Grt L5	76175A F5lq Grt L6	76175A F5lq Grt L8	76175A F5lq Grt L9	76175A F5lq Grt L10	76175A F5lq Grt L12	76175A F5lq Grt L13	76175A F5lq Grt L14	76175A F5lq Grt L15	76175A F5lq Grt L16	76175A F5lq Grt L17	76175A F5lq Grt L18	76175A F5lq Grt L19	76175A F5lq Grt L20
Analysis														
SiO_2	36.67	36.41	36.98	36.92	36.68	36.84	36.49	36.82	36.73	36.44	36.83	36.62	36.77	36.72
TiO_2	0.00	0.00	0.00	0.02	0.01	0.00	0.03	0.00	0.02	0.02	0.01	0.01	0.02	0.03
Al_2O_3	20.76	20.86	20.79	20.76	20.77	20.86	20.81	20.71	20.69	20.86	20.82	20.89	20.59	20.55
Cr_2O_3	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.02
Fe_2O_3	0.25	0.58	0.05	0.33	0.31	0.27	0.51	0.16	0.22	0.18	0.30	0.54	0.20	0.14
MgO	3.11	3.23	3.07	3.27	3.19	3.25	3.20	3.32	3.26	3.27	3.25	3.23	3.32	3.15
CaO	1.66	1.67	1.59	1.64	1.66	1.70	1.66	1.62	1.68	1.73	1.68	1.73	1.71	1.69
MnO	2.97	2.99	2.99	2.80	2.97	2.66	2.95	3.01	2.78	2.88	2.87	2.89	2.76	2.85
FeO	33.34	33.22	33.49	33.46	33.28	33.57	33.29	32.98	33.21	32.97	33.37	33.39	32.97	33.05
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.75	98.95	98.96	99.21	98.91	99.14	98.95	98.62	98.60	98.37	99.12	99.30	98.37	98.19
Cations														
Si	2.991	2.967	3.007	2.995	2.987	2.990	2.973	3.000	2.996	2.980	2.990	2.973	3.003	3.007
Ti	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.001	0.001	0.001	0.001	0.001	0.002
Al	1.995	2.003	1.992	1.985	1.993	1.995	1.998	1.989	1.989	2.011	1.993	1.998	1.982	1.984
Cr	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.001
Fe^{3+}	0.015	0.035	0.003	0.020	0.019	0.017	0.031	0.010	0.014	0.011	0.018	0.033	0.012	0.009
Mg	0.378	0.392	0.372	0.396	0.387	0.393	0.389	0.403	0.397	0.399	0.394	0.390	0.404	0.384
Ca	0.145	0.146	0.138	0.143	0.145	0.148	0.145	0.142	0.146	0.152	0.146	0.151	0.150	0.148
Mn	0.205	0.206	0.206	0.193	0.204	0.183	0.204	0.208	0.192	0.200	0.197	0.199	0.191	0.198
Fe^{2+}	2.274	2.264	2.277	2.270	2.267	2.279	2.268	2.247	2.266	2.254	2.266	2.267	2.252	2.263
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.004	8.014	7.995	8.002	8.005	8.004	8.010	8.000	8.001	8.008	8.004	8.011	7.997	7.995
Endmember														
Pyrope	12.6	13.0	12.4	13.2	12.9	13.1	12.9	13.4	13.2	13.3	13.1	13.0	13.5	12.8
Almandine	75.8	75.3	76.1	75.6	75.5	75.9	75.5	74.9	75.5	75.0	75.5	75.4	75.2	75.6
Spessartine	6.8	6.8	6.9	6.4	6.8	6.1	6.8	6.9	6.4	6.6	6.6	6.6	6.4	6.6
Grossular	4.8	4.9	4.6	4.8	4.8	4.9	4.8	4.7	4.9	5.0	4.9	5.0	5.0	5.0

	76175A F5lq Grt L21	76175A F5lq Grt L22	76175A F5lq Grt L23	76175A F5lq Grt L24	76175A F5lq Grt L25	76175A F5lq Grt L26	76175A F5lq Grt L27	76175A F5lq Grt L28	76175A F5lq Grt L29	76175A F5lq Grt L30	76175A F5lq Grt L31	76175A F5lq Grt L32	811079A F1 Grt1	811079A F1 Grt2
Analysis														
SiO_2	36.65	36.91	36.85	36.79	36.06	36.94	37.49	36.82	36.98	36.68	36.39	38.52	37.97	37.72
TiO_2	0.00	0.01	0.01	0.01	0.00	0.02	0.00	0.01	0.01	0.02	0.00	0.03	0.10	0.10
Al_2O_3	20.82	20.76	20.86	20.68	20.76	20.74	21.64	20.79	20.94	20.73	20.61	19.93	20.68	20.78
Cr_2O_3	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.05	0.02
Fe_2O_3	0.44	0.26	0.40	0.55	0.08	0.00	0.00	0.43	0.00	0.22	0.05	0.00	0.00	0.00
MgO	3.27	3.27	3.26	3.36	3.32	3.11	2.88	3.07	2.92	2.78	2.58	1.69	1.86	1.87
CaO	1.69	1.66	1.72	1.68	1.48	1.67	1.52	1.69	1.69	1.67	1.55	1.34	9.29	8.58
MnO	3.00	2.86	2.98	2.92	2.72	2.97	2.68	2.95	2.99	3.18	3.29	3.67	3.53	3.61
FeO	33.15	33.34	33.31	33.10	32.95	33.09	31.17	33.63	33.37	33.67	33.66	30.39	26.13	26.70
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.00	99.09	99.40	99.10	97.37	98.56	97.39	99.40	98.90	98.95	98.12	95.57	99.60	99.38
Cations														
Si	2.981	2.996	2.985	2.988	2.978	3.011	3.050	2.987	3.006	2.993	2.997	3.192	3.032	3.023
Ti	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.002	0.006	0.006
Al	1.995	1.986	1.991	1.980	2.020	1.993	2.075	1.988	2.006	1.993	2.000	1.946	1.946	1.963
Cr	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.003	0.001
Fe^{3+}	0.027	0.016	0.024	0.034	0.005	0.000	0.000	0.026	0.000	0.013	0.003	0.000	0.000	0.000
Mg	0.397	0.396	0.394	0.407	0.408	0.378	0.349	0.372	0.354	0.338	0.316	0.209	0.222	0.224
Ca	0.147	0.144	0.150	0.147	0.131	0.146	0.132	0.147	0.147	0.146	0.137	0.119	0.795	0.736
Mn	0.206	0.197	0.204	0.201	0.190	0.205	0.185	0.202	0.206	0.219	0.230	0.258	0.239	0.245
Fe^{2+}	2.255	2.264	2.256	2.248	2.276	2.256	2.121	2.282	2.269	2.297	2.318	2.106	1.745	1.789
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.008	8.001	8.006	8.005	8.009	7.991	7.912	8.005	7.989	8.003	8.001	7.833	7.987	7.988
Endmember														
Pyrope	13.2	13.2	13.1	13.6	13.6	12.7	12.5	12.4	11.9	11.3	10.5	7.8	7.4	7.5
Almandine	75.0	75.4	75.1	74.9	75.7	75.6	76.1	76.0	76.3	76.5	77.3	78.2	58.2	59.8
Spessartine	6.9	6.6	6.8	6.7	6.3	6.9	6.6	6.7	6.9	7.3	7.6	9.6	8.0	8.2
Grossular	4.9	4.8	5.0	4.9	4.4	4.9	4.7	4.9	4.9	4.9	4.6	4.4	26.5	24.6

	811079A F1 Grt3	811079A F1 Grt4	811079A F1 Grt5	811079A F1 Grt6	811079A F1 Grt7	811079A F1 Grt8	811079A F1 Grt9	811079A F1 Grt10	811079A F1 Grt11	811079A F1 Grt12	811079A F1 Grt13	811079A F1 Grt14	811079A F1 Grt15	811079A F1 Grt16
Analysis														
SiO_2	37.64	37.75	37.08	37.13	37.27	37.51	37.41	37.30	37.42	37.33	37.47	37.16	37.51	37.54
TiO_2	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.00	0.00	0.00
Al_2O_3	20.95	20.76	20.63	20.76	20.71	20.61	20.91	20.71	20.50	20.62	20.84	20.69	20.76	20.89
Cr_2O_3	0.04	0.04	0.04	0.06	0.01	0.03	0.02	0.02	0.00	0.03	0.02	0.00	0.01	0.03
Fe_2O_3	0.00	0.00	0.66	0.23	0.00	0.00	0.00	0.00	0.14	0.15	0.00	0.26	0.00	0.00
MgO	1.73	1.77	1.94	2.04	2.11	2.04	2.07	2.10	2.09	2.09	2.06	2.04	2.08	2.15
CaO	9.01	8.32	6.92	5.23	5.09	5.13	4.96	5.14	5.11	5.20	5.22	5.43	5.33	5.24
MnO	4.11	4.72	5.32	5.66	5.81	5.86	5.87	5.76	6.08	5.97	5.87	5.85	5.70	5.83
FeO	26.04	26.06	26.63	28.33	28.40	28.43	28.26	28.15	28.35	28.22	28.48	27.92	28.03	28.14
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.54	99.45	99.22	99.43	99.41	99.60	99.52	99.20	99.71	99.62	99.96	99.36	99.41	99.83
Cations														
Si	3.014	3.027	2.996	3.002	3.013	3.026	3.016	3.018	3.020	3.013	3.012	3.006	3.025	3.016
Ti	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000
Al	1.977	1.962	1.964	1.978	1.973	1.959	1.987	1.975	1.949	1.962	1.975	1.972	1.973	1.978
Cr	0.002	0.002	0.002	0.004	0.000	0.002	0.002	0.001	0.000	0.002	0.001	0.000	0.001	0.002
Fe^{3+}	0.000	0.000	0.040	0.014	0.000	0.000	0.000	0.000	0.008	0.009	0.000	0.016	0.000	0.000
Mg	0.206	0.212	0.233	0.246	0.255	0.245	0.249	0.253	0.252	0.251	0.247	0.246	0.250	0.258
Ca	0.773	0.715	0.599	0.453	0.441	0.443	0.429	0.446	0.442	0.450	0.449	0.471	0.460	0.451
Mn	0.279	0.321	0.364	0.387	0.398	0.400	0.401	0.395	0.415	0.408	0.400	0.401	0.389	0.397
Fe^{2+}	1.744	1.748	1.800	1.916	1.920	1.918	1.906	1.905	1.913	1.905	1.915	1.888	1.890	1.891
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.996	7.989	8.000	8.000	8.000	7.994	7.989	7.993	8.000	8.000	7.999	8.000	7.988	7.994
Endmember														
Pyrope	6.9	7.1	7.8	8.2	8.5	8.1	8.3	8.4	8.3	8.3	8.2	8.2	8.4	8.6
Almandine	58.1	58.3	60.1	63.8	63.7	63.8	63.9	63.5	63.3	63.2	63.6	62.8	63.2	63.1
Spessartine	9.3	10.7	12.1	12.9	13.2	13.3	13.4	13.2	13.7	13.5	13.3	13.3	13.0	13.2
Grossular	25.7	23.9	20.0	15.1	14.6	14.8	14.4	14.9	14.6	14.9	14.9	15.7	15.4	15.1

	811079A F1 Grt17	811079A F1 Grt18	811079A F1 Grt19	811079A F1 Grt20	811079A F1 Grt21	811079A F1 Grt22	811079A F1 Grt23	811079A F1 Grt24	811079A F1 Grt25	811079A F1 Grt26	811079A F1 Grt27	811079A F1 Grt1	811079A F1 Grt2	811079A F1 Grt3
Analysis														
SiO_2	37.38	37.36	37.36	37.63	37.20	37.25	37.31	37.56	37.48	37.51	37.95	37.97	37.72	37.64
TiO_2	0.03	0.00	0.00	0.00	0.05	0.01	0.00	0.01	0.02	0.02	0.00	0.10	0.10	0.01
Al_2O_3	20.89	21.23	20.74	20.90	20.81	20.82	20.82	20.80	20.39	20.71	20.86	20.68	20.78	20.95
Cr_2O_3	0.00	0.01	0.00	0.02	0.04	0.00	0.01	0.05	0.01	0.02	0.04	0.05	0.02	0.04
Fe_2O_3	0.00	0.00	0.08	0.00	0.18	0.06	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.05	2.10	2.16	2.09	2.17	2.10	2.20	2.22	2.22	2.20	1.96	1.86	1.87	1.73
CaO	5.21	5.21	5.28	5.22	5.27	5.20	5.22	5.15	5.06	5.27	7.69	9.29	8.58	9.01
MnO	5.86	5.93	5.64	5.88	5.67	5.67	5.59	5.42	5.44	5.02	4.62	3.53	3.61	4.11
FeO	28.34	28.27	28.35	28.42	28.15	28.41	28.34	28.25	28.61	28.94	27.13	26.13	26.70	26.04
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.77	100.12	99.61	100.16	99.55	99.52	99.93	99.45	99.21	99.69	100.25	99.60	99.38	99.54
Cations														
Si	3.009	2.996	3.012	3.017	3.001	3.007	3.000	3.025	3.033	3.019	3.024	3.032	3.023	3.014
Ti	0.002	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.001	0.000	0.006	0.006	0.001
Al	1.982	2.006	1.971	1.975	1.979	1.981	1.973	1.974	1.945	1.965	1.959	1.946	1.963	1.977
Cr	0.000	0.001	0.000	0.001	0.003	0.000	0.001	0.003	0.000	0.001	0.003	0.003	0.001	0.002
Fe^{3+}	0.000	0.000	0.005	0.000	0.011	0.004	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.247	0.251	0.259	0.250	0.261	0.252	0.264	0.267	0.268	0.263	0.233	0.222	0.224	0.206
Ca	0.449	0.447	0.456	0.448	0.456	0.450	0.449	0.445	0.439	0.455	0.657	0.795	0.736	0.773
Mn	0.400	0.403	0.385	0.399	0.387	0.388	0.381	0.370	0.373	0.343	0.312	0.239	0.245	0.279
Fe^{2+}	1.908	1.895	1.912	1.905	1.899	1.918	1.906	1.902	1.936	1.949	1.808	1.745	1.789	1.744
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.997	8.000	8.000	7.995	8.000	8.000	8.000	7.986	7.994	7.996	7.995	7.987	7.988	7.996
Endmember														
Pyrope	8.2	8.4	8.6	8.3	8.7	8.4	8.8	8.9	8.9	8.8	7.7	7.4	7.5	6.9
Almandine	63.5	63.2	63.5	63.4	63.2	63.8	63.5	63.8	64.2	64.8	60.1	58.2	59.8	58.1
Spessartine	13.3	13.4	12.8	13.3	12.9	12.9	12.7	12.4	12.4	11.4	10.4	8.0	8.2	9.3
Grossular	15.0	14.9	15.1	14.9	15.2	15.0	15.0	14.9	14.5	15.1	21.8	26.5	24.6	25.7

	811079A F1 Grt4	811079A F1 Grt5	811079A F1 Grt6	811079A F1 Grt7	811079A F1 Grt8	811079A F1 Grt9	811079A F1 Grt10	811079A F1 Grt11	811079A F1 Grt12	811079A F1 Grt13	811079A F1 Grt14	811079A F1 Grt15	811079A F1 Grt16	811079A F1 Grt17
Analysis														
SiO_2	37.75	37.08	37.13	37.27	37.51	37.41	37.30	37.42	37.33	37.47	37.16	37.51	37.54	37.38
TiO_2	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.03
Al_2O_3	20.76	20.63	20.76	20.71	20.61	20.91	20.71	20.50	20.62	20.84	20.69	20.76	20.89	20.89
Cr_2O_3	0.04	0.04	0.06	0.01	0.03	0.02	0.02	0.00	0.03	0.02	0.00	0.01	0.03	0.00
Fe_2O_3	0.00	0.66	0.23	0.00	0.00	0.00	0.00	0.14	0.15	0.00	0.26	0.00	0.00	0.00
MgO	1.77	1.94	2.04	2.11	2.04	2.07	2.10	2.09	2.09	2.06	2.04	2.08	2.15	2.05
CaO	8.32	6.92	5.23	5.09	5.13	4.96	5.14	5.11	5.20	5.22	5.43	5.33	5.24	5.21
MnO	4.72	5.32	5.66	5.81	5.86	5.87	5.76	6.08	5.97	5.87	5.85	5.70	5.83	5.86
FeO	26.06	26.63	28.33	28.40	28.43	28.26	28.15	28.35	28.22	28.48	27.92	28.03	28.14	28.34
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.45	99.22	99.43	99.41	99.60	99.52	99.20	99.71	99.62	99.96	99.36	99.41	99.83	99.77
Cations														
Si	3.027	2.996	3.002	3.013	3.026	3.016	3.018	3.020	3.013	3.012	3.006	3.025	3.016	3.009
Ti	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.002
Al	1.962	1.964	1.978	1.973	1.959	1.987	1.975	1.949	1.962	1.975	1.972	1.973	1.978	1.982
Cr	0.002	0.002	0.004	0.000	0.002	0.002	0.001	0.000	0.002	0.001	0.000	0.001	0.002	0.000
Fe^{3+}	0.000	0.040	0.014	0.000	0.000	0.000	0.000	0.008	0.009	0.000	0.016	0.000	0.000	0.000
Mg	0.212	0.233	0.246	0.255	0.245	0.249	0.253	0.252	0.251	0.247	0.246	0.250	0.258	0.247
Ca	0.715	0.599	0.453	0.441	0.443	0.429	0.446	0.442	0.450	0.449	0.471	0.460	0.451	0.449
Mn	0.321	0.364	0.387	0.398	0.400	0.401	0.395	0.415	0.408	0.400	0.401	0.389	0.397	0.400
Fe^{2+}	1.748	1.800	1.916	1.920	1.918	1.906	1.905	1.913	1.905	1.915	1.888	1.890	1.891	1.908
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.989	8.000	8.000	8.000	7.994	7.989	7.993	8.000	8.000	7.999	8.000	7.988	7.994	7.997
Endmember														
Pyrope	7.1	7.8	8.2	8.5	8.1	8.3	8.4	8.3	8.3	8.2	8.2	8.4	8.6	8.2
Almandine	58.3	60.1	63.8	63.7	63.8	63.9	63.5	63.3	63.2	63.6	62.8	63.2	63.1	63.5
Spessartine	10.7	12.1	12.9	13.2	13.3	13.4	13.2	13.7	13.5	13.3	13.3	13.0	13.2	13.3
Grossular	23.9	20.0	15.1	14.6	14.8	14.4	14.9	14.6	14.9	14.9	15.7	15.4	15.1	15.0

	811079A F1 Grt18	811079A F1 Grt19	811079A F1 Grt20	811079A F1 Grt21	811079A F1 Grt22	811079A F1 Grt23	811079A F1 Grt24	811079A F1 Grt25	811079A F1 Grt26	811079A F1 Grt27	811079A F1 Grt1	811079A F1 Grt2	811079A F1 Grt3	811079A F1 Grt4
Analysis														
SiO_2	37.36	37.36	37.63	37.20	37.25	37.31	37.56	37.48	37.51	37.95	37.97	37.72	37.64	37.75
TiO_2	0.00	0.00	0.00	0.05	0.01	0.00	0.01	0.02	0.02	0.00	0.10	0.10	0.01	0.03
Al_2O_3	21.23	20.74	20.90	20.81	20.82	20.82	20.80	20.39	20.71	20.86	20.68	20.78	20.95	20.76
Cr_2O_3	0.01	0.00	0.02	0.04	0.00	0.01	0.05	0.01	0.02	0.04	0.05	0.02	0.04	0.04
Fe_2O_3	0.00	0.08	0.00	0.18	0.06	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.10	2.16	2.09	2.17	2.10	2.20	2.22	2.22	2.20	1.96	1.86	1.87	1.73	1.77
CaO	5.21	5.28	5.22	5.27	5.20	5.22	5.15	5.06	5.27	7.69	9.29	8.58	9.01	8.32
MnO	5.93	5.64	5.88	5.67	5.67	5.59	5.42	5.44	5.02	4.62	3.53	3.61	4.11	4.72
FeO	28.27	28.35	28.42	28.15	28.41	28.34	28.25	28.61	28.94	27.13	26.13	26.70	26.04	26.06
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.12	99.61	100.16	99.55	99.52	99.93	99.45	99.21	99.69	100.25	99.60	99.38	99.54	99.45
Cations														
Si	2.996	3.012	3.017	3.001	3.007	3.000	3.025	3.033	3.019	3.024	3.032	3.023	3.014	3.027
Ti	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.001	0.000	0.006	0.006	0.001	0.002
Al	2.006	1.971	1.975	1.979	1.981	1.973	1.974	1.945	1.965	1.959	1.946	1.963	1.977	1.962
Cr	0.001	0.000	0.001	0.003	0.000	0.001	0.003	0.000	0.001	0.003	0.003	0.001	0.002	0.002
Fe^{3+}	0.000	0.005	0.000	0.011	0.004	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.251	0.259	0.250	0.261	0.252	0.264	0.267	0.268	0.263	0.233	0.222	0.224	0.206	0.212
Ca	0.447	0.456	0.448	0.456	0.450	0.449	0.445	0.439	0.455	0.657	0.795	0.736	0.773	0.715
Mn	0.403	0.385	0.399	0.387	0.388	0.381	0.370	0.373	0.343	0.312	0.239	0.245	0.279	0.321
Fe^{2+}	1.895	1.912	1.905	1.899	1.918	1.906	1.902	1.936	1.949	1.808	1.745	1.789	1.744	1.748
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	7.995	8.000	8.000	8.000	7.986	7.994	7.996	7.995	7.987	7.988	7.996	7.989
Endmember														
Pyrope	8.4	8.6	8.3	8.7	8.4	8.8	8.9	8.9	8.8	7.7	7.4	7.5	6.9	7.1
Almandine	63.2	63.5	63.4	63.2	63.8	63.5	63.8	64.2	64.8	60.1	58.2	59.8	58.1	58.3
Spessartine	13.4	12.8	13.3	12.9	12.9	12.7	12.4	12.4	11.4	10.4	8.0	8.2	9.3	10.7
Grossular	14.9	15.1	14.9	15.2	15.0	15.0	14.9	14.5	15.1	21.8	26.5	24.6	25.7	23.9

	811079A F1 Grt5	811079A F1 Grt6	811079A F1 Grt7	811079A F1 Grt8	811079A F1 Grt9	811079A F1 Grt10	811079A F1 Grt11	811079A F1 Grt12	811079A F1 Grt13	811079A F1 Grt14	811079A F1 Grt15	811079A F1 Grt16	811079A F1 Grt17	811079A F1 Grt18
Analysis														
SiO_2	37.08	37.13	37.27	37.51	37.41	37.30	37.42	37.33	37.47	37.16	37.51	37.54	37.38	37.36
TiO_2	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.03	0.00
Al_2O_3	20.63	20.76	20.71	20.61	20.91	20.71	20.50	20.62	20.84	20.69	20.76	20.89	20.89	21.23
Cr_2O_3	0.04	0.06	0.01	0.03	0.02	0.02	0.00	0.03	0.02	0.00	0.01	0.03	0.00	0.01
Fe_2O_3	0.66	0.23	0.00	0.00	0.00	0.00	0.14	0.15	0.00	0.26	0.00	0.00	0.00	0.00
MgO	1.94	2.04	2.11	2.04	2.07	2.10	2.09	2.09	2.06	2.04	2.08	2.15	2.05	2.10
CaO	6.92	5.23	5.09	5.13	4.96	5.14	5.11	5.20	5.22	5.43	5.33	5.24	5.21	5.21
MnO	5.32	5.66	5.81	5.86	5.87	5.76	6.08	5.97	5.87	5.85	5.70	5.83	5.86	5.93
FeO	26.63	28.33	28.40	28.43	28.26	28.15	28.35	28.22	28.48	27.92	28.03	28.14	28.34	28.27
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.22	99.43	99.41	99.60	99.52	99.20	99.71	99.62	99.96	99.36	99.41	99.83	99.77	100.12
Cations														
Si	2.996	3.002	3.013	3.026	3.016	3.018	3.020	3.013	3.012	3.006	3.025	3.016	3.009	2.996
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.002	0.000
Al	1.964	1.978	1.973	1.959	1.987	1.975	1.949	1.962	1.975	1.972	1.973	1.978	1.982	2.006
Cr	0.002	0.004	0.000	0.002	0.002	0.001	0.000	0.002	0.001	0.000	0.001	0.002	0.000	0.001
Fe^{3+}	0.040	0.014	0.000	0.000	0.000	0.000	0.008	0.009	0.000	0.016	0.000	0.000	0.000	0.000
Mg	0.233	0.246	0.255	0.245	0.249	0.253	0.252	0.251	0.247	0.246	0.250	0.258	0.247	0.251
Ca	0.599	0.453	0.441	0.443	0.429	0.446	0.442	0.450	0.449	0.471	0.460	0.451	0.449	0.447
Mn	0.364	0.387	0.398	0.400	0.401	0.395	0.415	0.408	0.400	0.401	0.389	0.397	0.400	0.403
Fe^{2+}	1.800	1.916	1.920	1.918	1.906	1.905	1.913	1.905	1.915	1.888	1.890	1.891	1.908	1.895
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	8.000	7.994	7.989	7.993	8.000	8.000	7.999	8.000	7.988	7.994	7.997	8.000
Endmember														
Pyrope	7.8	8.2	8.5	8.1	8.3	8.4	8.3	8.3	8.2	8.2	8.4	8.6	8.2	8.4
Almandine	60.1	63.8	63.7	63.8	63.9	63.5	63.3	63.2	63.6	62.8	63.2	63.6	62.8	63.2
Spessartine	12.1	12.9	13.2	13.3	13.4	13.2	13.7	13.5	13.3	13.3	13.0	13.2	13.3	13.4
Grossular	20.0	15.1	14.6	14.8	14.4	14.9	14.6	14.9	14.9	15.7	15.4	15.1	15.0	14.9

	811079A F1 Grt19	811079A F1 Grt20	811079A F1 Grt21	811079A F1 Grt22	811079A F1 Grt23	811079A F1 Grt24	811079A F1 Grt25	811079A F1 Grt26	811079A F1 Grt27	811081A F3 Grt1	811081A F3 Grt2	811081A F3 Grt3	811081A F3 Grt4	811081A F3 Grt5
Analysis														
SiO_2	37.36	37.63	37.20	37.25	37.31	37.56	37.48	37.51	37.95	38.40	38.31	38.52	38.44	38.55
TiO_2	0.00	0.00	0.05	0.01	0.00	0.01	0.02	0.02	0.00	0.11	0.04	0.04	0.04	0.08
Al_2O_3	20.74	20.90	20.81	20.82	20.82	20.80	20.39	20.71	20.86	21.05	21.27	21.17	21.27	21.15
Cr_2O_3	0.00	0.02	0.04	0.00	0.01	0.05	0.01	0.02	0.04	0.00	0.00	0.01	0.02	0.01
Fe_2O_3	0.08	0.00	0.18	0.06	0.45	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00
MgO	2.16	2.09	2.17	2.10	2.20	2.22	2.22	2.20	1.96	3.71	3.79	3.39	3.61	3.47
CaO	5.28	5.22	5.27	5.20	5.22	5.15	5.06	5.27	7.69	9.68	9.66	9.94	9.01	10.20
MnO	5.64	5.88	5.67	5.67	5.59	5.42	5.44	5.02	4.62	0.88	0.90	0.72	0.68	0.74
FeO	28.35	28.42	28.15	28.41	28.34	28.25	28.61	28.94	27.13	25.75	25.80	26.16	26.85	26.12
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.61	100.16	99.55	99.52	99.93	99.45	99.21	99.69	100.25	99.57	100.18	99.95	99.90	100.33
Cations														
Si	3.012	3.017	3.001	3.007	3.000	3.025	3.033	3.019	3.024	3.025	3.003	3.026	3.022	3.020
Ti	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.001	0.000	0.006	0.002	0.002	0.002	0.005
Al	1.971	1.975	1.979	1.981	1.973	1.974	1.945	1.965	1.959	1.954	1.965	1.961	1.971	1.952
Cr	0.000	0.001	0.003	0.000	0.001	0.003	0.000	0.001	0.003	0.000	0.000	0.001	0.001	0.001
Fe^{3+}	0.005	0.000	0.011	0.004	0.027	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.000
Mg	0.259	0.250	0.261	0.252	0.264	0.267	0.268	0.263	0.233	0.435	0.443	0.397	0.423	0.405
Ca	0.456	0.448	0.456	0.450	0.449	0.445	0.439	0.455	0.657	0.817	0.812	0.836	0.759	0.856
Mn	0.385	0.399	0.387	0.388	0.381	0.370	0.373	0.343	0.312	0.059	0.059	0.048	0.045	0.049
Fe^{2+}	1.912	1.905	1.899	1.918	1.906	1.902	1.936	1.949	1.808	1.696	1.691	1.719	1.765	1.711
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.995	8.000	8.000	8.000	7.986	7.994	7.996	7.995	7.992	8.000	7.990	7.989	7.999
Endmember														
Pyrope	8.6	8.3	8.7	8.4	8.8	8.9	8.9	8.8	7.7	14.5	14.7	13.2	14.1	13.4
Almandine	63.5	63.4	63.2	63.8	63.5	63.8	64.2	64.8	60.1	56.4	56.3	57.3	59.0	56.6
Spessartine	12.8	13.3	12.9	12.9	12.7	12.4	12.4	11.4	10.4	2.0	2.0	1.6	1.5	1.6
Grossular	15.1	14.9	15.2	15.0	15.0	14.9	14.5	15.1	21.8	27.2	27.0	27.9	25.4	28.3

	811081A F3 Grt6	811081A F3 Grt7	811081A F3 Grt8	811081A F3 Grt9	811081A F3 Grt10	811081A F3 Grt11	811081A F3 Grt12	811081A F3 Grt13	811081A F3 Grt14	811081A F3 Grt15	811081A F3 Grt16	811081A F3 Grt17	811081A F3 Grt18	811081A F3 Grt19
Analysis														
SiO_2	38.44	38.26	38.73	38.62	38.44	38.67	38.68	38.67	38.56	38.41	38.62	38.68	38.42	38.62
TiO_2	0.05	0.09	0.05	0.08	0.12	0.15	0.14	0.14	0.15	0.12	0.18	0.13	0.12	0.09
Al_2O_3	21.22	21.06	21.11	20.90	21.11	20.94	20.91	21.05	21.01	21.04	21.03	20.91	21.05	21.20
Cr_2O_3	0.01	0.00	0.03	0.01	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.29	0.16	0.14	0.00	0.13	0.00
MgO	2.63	3.11	3.54	3.89	3.91	3.71	3.78	3.97	4.01	4.11	4.06	3.83	3.93	3.76
CaO	9.69	10.17	8.68	9.28	9.47	10.05	9.62	9.63	9.87	9.10	9.45	9.37	8.94	9.55
MnO	0.64	0.70	0.69	0.80	0.70	0.77	0.66	0.69	0.78	0.78	0.73	0.62	0.76	0.67
FeO	27.88	26.47	27.36	26.37	26.13	25.76	26.18	26.24	25.61	26.26	26.27	26.90	26.83	26.31
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.56	99.85	100.19	99.94	99.87	100.05	99.99	100.45	100.28	99.97	100.47	100.45	100.18	100.19
Cations														
Si	3.022	3.018	3.039	3.033	3.019	3.031	3.035	3.021	3.016	3.015	3.017	3.028	3.015	3.024
Ti	0.003	0.005	0.003	0.005	0.007	0.009	0.008	0.008	0.009	0.007	0.011	0.007	0.007	0.005
Al	1.966	1.958	1.953	1.935	1.954	1.935	1.934	1.938	1.936	1.946	1.936	1.929	1.947	1.956
Cr	0.001	0.000	0.002	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.017	0.009	0.008	0.000	0.007	0.000
Mg	0.309	0.365	0.414	0.455	0.458	0.434	0.442	0.463	0.468	0.481	0.472	0.447	0.459	0.439
Ca	0.816	0.860	0.729	0.781	0.797	0.844	0.808	0.806	0.827	0.765	0.791	0.786	0.752	0.801
Mn	0.043	0.046	0.046	0.053	0.046	0.051	0.044	0.046	0.052	0.052	0.048	0.041	0.050	0.044
Fe^{2+}	1.833	1.746	1.795	1.732	1.716	1.689	1.717	1.714	1.675	1.724	1.716	1.761	1.761	1.723
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.992	7.998	7.981	7.994	7.997	7.993	7.990	8.000	7.999	8.000	8.000	8.000	8.000	7.993
Endmember														
Pyrope	10.3	12.1	13.9	15.1	15.2	14.4	14.7	15.3	15.5	15.9	15.6	14.7	15.2	14.6
Almandine	61.1	57.9	60.1	57.3	56.9	56.0	57.0	56.6	55.4	57.1	56.7	58.0	58.3	57.3
Spessartine	1.4	1.5	1.5	1.8	1.5	1.7	1.5	1.5	1.7	1.7	1.6	1.4	1.7	1.5
Grossular	27.2	28.5	24.4	25.8	26.4	28.0	26.8	26.6	27.4	25.3	26.1	25.9	24.9	26.7

	811081A F3 Grt20	811081A F3 Grt21	811081A F3 Grt22	811081A F3 Grt23	811081A F1 Grt1	811081A F1 Grt2	811081A F1 Grt3	811081A F1 Grt4	811081A F1 Grt5	811081A F1 Grt6	811081A F1 Grt7	811081A F1 Grt8	811081A F1 Grt9	811081A F1 Grt10
Analysis														
SiO_2	38.81	38.62	38.39	38.53	38.80	38.65	38.59	38.58	38.94	38.48	38.60	38.63	38.78	38.66
TiO_2	0.05	0.08	0.11	0.07	0.03	0.15	0.14	0.16	0.21	0.18	0.11	0.11	0.11	0.18
Al_2O_3	21.30	21.16	20.65	21.21	21.45	21.20	21.38	21.29	21.05	21.05	21.09	21.40	21.25	21.34
Cr_2O_3	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00
Fe_2O_3	0.00	0.00	0.15	0.00	0.15	0.00	0.13	0.00	0.00	0.06	0.00	0.00	0.20	0.36
MgO	3.91	3.44	2.77	3.63	4.67	4.20	4.11	4.02	3.99	3.97	4.08	3.94	4.09	3.99
CaO	8.71	9.37	10.82	10.06	8.70	9.70	9.72	9.52	9.94	9.92	8.90	9.77	9.63	9.96
MnO	0.80	0.77	0.69	0.74	0.67	0.66	0.74	0.68	0.80	0.80	0.76	0.78	0.78	0.80
FeO	27.35	26.77	26.51	25.60	26.29	25.39	25.74	25.74	25.77	25.57	26.42	25.36	26.05	25.70
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.92	100.20	100.10	99.84	100.77	99.95	100.54	99.99	100.72	100.03	99.95	100.00	100.91	100.99
Cations														
Si	3.023	3.029	3.029	3.024	3.012	3.023	3.007	3.020	3.029	3.015	3.027	3.021	3.014	3.002
Ti	0.003	0.005	0.007	0.004	0.002	0.009	0.008	0.009	0.012	0.010	0.007	0.006	0.006	0.011
Al	1.956	1.957	1.920	1.962	1.962	1.954	1.963	1.964	1.930	1.944	1.950	1.972	1.946	1.953
Cr	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000
Fe^{3+}	0.000	0.000	0.009	0.000	0.009	0.000	0.007	0.000	0.000	0.003	0.000	0.000	0.012	0.021
Mg	0.453	0.402	0.326	0.425	0.540	0.490	0.477	0.468	0.462	0.464	0.477	0.459	0.474	0.462
Ca	0.727	0.787	0.914	0.846	0.723	0.813	0.812	0.798	0.829	0.833	0.747	0.819	0.802	0.829
Mn	0.053	0.051	0.046	0.049	0.044	0.043	0.049	0.045	0.053	0.053	0.050	0.052	0.051	0.052
Fe^{2+}	1.782	1.756	1.749	1.681	1.707	1.660	1.677	1.685	1.676	1.676	1.733	1.658	1.693	1.669
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.996	7.987	8.000	7.991	8.000	7.992	8.000	7.989	7.993	8.000	7.991	7.987	8.000	8.000
Endmember														
Pyrope	15.0	13.4	10.7	14.2	17.9	16.3	15.8	15.6	15.3	15.3	15.9	15.4	15.7	15.3
Almandine	59.1	58.6	57.6	56.0	56.6	55.2	55.6	56.2	55.5	55.4	57.6	55.5	56.0	55.4
Spessartine	1.7	1.7	1.5	1.6	1.5	1.4	1.6	1.5	1.7	1.8	1.7	1.7	1.7	1.7
Grossular	24.1	26.3	30.1	28.2	24.0	27.0	26.9	26.6	27.4	27.5	24.9	27.4	26.6	27.5

	811081A F1 Grt11	811081A F1 Grt12	811081A F1 Grt13	811081A F1 Grt14	811081A F1 Grt15	811084A F5 Grt1	811084A F5 Grt2	811084A F5 Grt3	811084A F5 Grt4	811084A F5 Grt5	811084A F5 Grt6	811084A F5 Grt7	811084A F5 Grt8	811084A F5 Grt9
Analysis														
SiO_2	38.68	38.79	38.62	38.72	38.83	38.20	38.22	38.34	38.49	38.17	38.08	37.74	37.80	38.20
TiO_2	0.18	0.14	0.16	0.16	0.10	0.06	0.07	0.13	0.14	0.20	0.34	0.87	0.16	0.16
Al_2O_3	21.39	21.38	21.34	21.18	21.43	21.29	21.25	20.87	21.05	20.82	20.67	20.72	20.76	20.90
Cr_2O_3	0.03	0.02	0.00	0.01	0.02	0.11	0.04	0.03	0.05	0.02	0.00	0.03	0.04	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	3.97	4.04	4.15	4.21	4.50	4.23	3.24	2.87	2.73	2.68	2.61	2.38	2.28	2.20
CaO	9.67	9.29	9.42	9.37	9.34	9.62	9.66	9.45	9.32	9.46	9.87	10.44	9.78	9.89
MnO	0.67	0.73	0.67	0.68	0.50	0.53	0.34	0.38	0.35	0.39	0.40	0.39	0.42	0.46
FeO	26.07	26.26	25.44	25.87	25.59	25.32	26.90	27.89	27.89	27.89	27.88	27.48	28.28	28.47
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.66	100.64	99.79	100.18	100.29	99.50	99.70	99.96	100.01	99.61	99.85	100.05	99.51	100.27
Cations														
Si	3.012	3.019	3.023	3.024	3.021	3.003	3.015	3.030	3.036	3.029	3.019	2.989	3.015	3.022
Ti	0.010	0.008	0.010	0.009	0.006	0.003	0.004	0.008	0.008	0.012	0.020	0.052	0.009	0.010
Al	1.963	1.961	1.968	1.949	1.965	1.972	1.976	1.944	1.956	1.947	1.932	1.934	1.952	1.949
Cr	0.002	0.001	0.000	0.001	0.001	0.007	0.002	0.002	0.003	0.002	0.000	0.002	0.002	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.461	0.469	0.484	0.490	0.521	0.496	0.381	0.338	0.321	0.316	0.308	0.281	0.271	0.259
Ca	0.806	0.775	0.790	0.784	0.779	0.811	0.816	0.800	0.787	0.804	0.838	0.886	0.836	0.838
Mn	0.044	0.048	0.044	0.045	0.033	0.035	0.022	0.025	0.023	0.026	0.027	0.026	0.028	0.031
Fe^{2+}	1.697	1.709	1.665	1.690	1.665	1.665	1.775	1.843	1.840	1.851	1.849	1.820	1.886	1.884
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.996	7.991	7.984	7.992	7.990	8.000	7.992	7.990	7.976	7.986	7.994	7.991	7.999	7.993
Endmember														
Pyrope	15.3	15.6	16.2	16.3	17.4	16.5	12.7	11.3	10.8	10.6	10.2	9.3	9.0	8.6
Almandine	56.4	56.9	55.8	56.2	55.5	55.4	59.3	61.3	61.9	61.7	61.2	60.4	62.4	62.5
Spessartine	1.5	1.6	1.5	1.5	1.1	1.2	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.0
Grossular	26.8	25.8	26.5	26.1	26.0	27.0	27.3	26.6	26.5	26.8	27.7	29.4	27.7	27.8

	811084A F5 Grt10	811084A F5 Grt11	811084A F5 Grt12	811084A F5 Grt13	811084A F5 Grt14	811084A F5 Grt15	811084A F5 Grt16	811084A F5 Grt17	811084A F5 Grt18	811084A F5 Grt20	811084A F5 Grt21	811084A F5 Grt22	811084A F5 Grt23	811084A F5 Grt24
Analysis														
SiO_2	37.96	38.23	38.02	38.28	38.18	38.23	38.46	38.17	38.45	38.43	38.34	38.21	38.23	38.17
TiO_2	0.21	0.19	0.21	0.20	0.23	0.09	0.13	0.26	0.25	0.18	0.21	0.19	0.18	0.21
Al_2O_3	20.81	20.84	20.78	20.98	20.81	20.97	20.98	20.82	20.98	20.90	21.13	20.84	20.85	20.80
Cr_2O_3	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.08	2.08	2.03	2.10	2.48	2.66	2.76	3.12	3.11	3.07	2.80	2.26	2.22	2.18
CaO	10.19	10.29	10.33	10.33	10.44	10.33	10.23	10.86	10.87	11.02	10.59	10.17	10.13	10.05
MnO	0.58	0.58	0.66	0.76	1.01	1.00	1.09	0.94	0.91	0.87	0.74	0.54	0.41	0.36
FeO	27.83	28.02	27.21	27.41	26.13	26.31	26.02	25.17	25.27	25.29	26.04	27.45	27.59	28.19
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.67	100.24	99.24	100.08	99.29	99.58	99.69	99.34	99.84	99.75	99.85	99.66	99.60	99.97
Cations														
Si	3.020	3.025	3.032	3.027	3.032	3.027	3.037	3.020	3.025	3.027	3.021	3.032	3.034	3.026
Ti	0.012	0.012	0.013	0.012	0.014	0.005	0.008	0.016	0.015	0.010	0.012	0.011	0.011	0.012
Al	1.952	1.943	1.953	1.955	1.948	1.957	1.952	1.942	1.945	1.941	1.962	1.949	1.951	1.944
Cr	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.247	0.246	0.242	0.248	0.294	0.314	0.324	0.368	0.365	0.360	0.329	0.268	0.263	0.258
Ca	0.869	0.873	0.882	0.875	0.889	0.876	0.865	0.920	0.916	0.930	0.894	0.865	0.861	0.854
Mn	0.039	0.039	0.045	0.051	0.068	0.067	0.073	0.063	0.061	0.058	0.050	0.036	0.027	0.024
Fe^{2+}	1.852	1.855	1.814	1.813	1.735	1.742	1.718	1.665	1.662	1.666	1.716	1.822	1.832	1.869
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.992	7.992	7.979	7.983	7.980	7.989	7.979	7.994	7.988	7.992	7.985	7.982	7.979	7.989
Endmember														
Pyrope	8.2	8.2	8.1	8.3	9.8	10.5	10.9	12.2	12.1	11.9	11.0	9.0	8.8	8.6
Almandine	61.6	61.6	60.8	60.7	58.1	58.1	57.6	55.2	55.3	55.3	57.4	60.9	61.4	62.2
Spessartine	1.3	1.3	1.5	1.7	2.3	2.2	2.4	2.1	2.0	1.9	1.7	1.2	0.9	0.8
Grossular	28.9	29.0	29.6	29.3	29.8	29.2	29.0	30.5	30.5	30.9	29.9	28.9	28.9	28.4

	811084A F5 Grt25	811084A F5 Grt26	811084A F5 Grt27	811084A F5 Grt28	811084A F5 Grt29	811084A F5 Grt30	811084A F5 Grt31	811084A F5 Grt32	811084A F5 Grt33	811084A F5 Grt34	811084A F5 Grt35	811084A F5 Grt1	811084A F5 Grt2	811084A F5 Grt3
Analysis														
SiO_2	38.10	38.17	38.30	38.15	38.46	38.44	38.44	38.41	38.46	38.50	38.54	38.63	38.89	38.35
TiO_2	0.18	0.15	0.19	0.16	0.10	0.12	0.18	0.10	0.08	0.09	0.06	0.07	0.02	0.15
Al_2O_3	20.75	20.87	20.67	21.00	20.87	20.86	21.06	21.10	21.22	21.04	21.22	21.33	21.18	20.83
Cr_2O_3	0.02	0.00	0.01	0.01	0.03	0.02	0.01	0.01	0.03	0.01	0.02	0.00	0.01	0.03
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
MgO	2.21	2.21	2.23	2.48	2.58	2.72	2.91	3.18	3.45	3.68	4.29	4.22	3.54	3.03
CaO	10.03	9.74	9.82	9.65	9.88	9.63	9.84	9.62	9.75	10.06	9.75	9.69	9.68	9.34
MnO	0.37	0.39	0.36	0.34	0.32	0.35	0.36	0.39	0.50	0.51	0.67	0.61	0.42	0.32
FeO	27.95	28.43	27.97	27.74	27.88	27.76	27.14	27.18	26.57	25.85	25.36	25.11	26.51	27.55
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.60	99.95	99.55	99.54	100.11	99.90	99.94	99.99	100.06	99.73	100.18	99.66	100.25	99.59
Cations														
Si	3.030	3.028	3.044	3.027	3.036	3.038	3.029	3.025	3.020	3.026	3.010	3.025	3.042	3.035
Ti	0.011	0.009	0.011	0.010	0.006	0.007	0.011	0.006	0.004	0.006	0.003	0.004	0.001	0.009
Al	1.945	1.951	1.936	1.964	1.942	1.943	1.956	1.958	1.964	1.949	1.954	1.968	1.952	1.943
Cr	0.001	0.000	0.001	0.001	0.002	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.001	0.002
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000
Mg	0.262	0.262	0.264	0.293	0.303	0.320	0.342	0.373	0.404	0.431	0.499	0.493	0.413	0.357
Ca	0.855	0.828	0.836	0.821	0.835	0.815	0.831	0.811	0.821	0.847	0.816	0.813	0.811	0.792
Mn	0.025	0.026	0.024	0.023	0.021	0.023	0.024	0.026	0.033	0.034	0.044	0.040	0.028	0.021
Fe^{2+}	1.859	1.886	1.859	1.841	1.841	1.834	1.788	1.790	1.745	1.700	1.656	1.644	1.734	1.824
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.986	7.988	7.976	7.980	7.986	7.983	7.982	7.990	7.993	7.993	8.001	7.987	7.981	7.984
Endmember														
Pyrope	8.7	8.7	8.9	9.8	10.1	10.7	11.5	12.4	13.4	14.3	16.6	16.5	13.8	11.9
Almandine	62.0	62.8	62.3	61.8	61.3	61.3	59.9	59.6	58.1	56.4	54.9	55.0	58.1	60.9
Spessartine	0.8	0.9	0.8	0.8	0.7	0.8	0.8	0.9	1.1	1.1	1.5	1.3	0.9	0.7
Grossular	28.5	27.6	28.0	27.6	27.8	27.2	27.8	27.0	27.3	28.1	27.1	27.2	27.2	26.5

	811084A F5 Grt4	811084A F5 Grt5	811084A F5 Grt6	811084A F5 Grt7	811084A F5 Grt8	811084A F5 Grt9	811084A F5 Grt10	811084A F5 Grt11	811084A F5 Grt12	811084A F5 Grt13	811084A F5 Grt14	811084A F5 Grt15	811084A F5 Grt16	811084A F5 Grt17
Analysis														
SiO_2	38.29	38.02	38.27	38.26	38.12	37.97	38.38	38.05	38.11	38.37	38.09	38.19	38.21	38.54
TiO_2	0.14	0.10	0.15	0.16	0.19	0.15	0.14	0.22	0.18	0.19	0.20	0.15	0.24	0.17
Al_2O_3	21.07	21.06	21.00	20.92	20.80	20.90	20.85	21.02	21.00	21.06	21.07	20.95	21.03	21.11
Cr_2O_3	0.01	0.02	0.00	0.02	0.04	0.04	0.01	0.00	0.00	0.00	0.04	0.01	0.00	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00
MgO	3.00	2.70	2.59	2.57	2.54	2.41	2.29	2.25	2.35	2.40	2.49	2.68	2.41	2.34
CaO	9.07	9.03	9.14	9.17	9.29	9.42	9.66	9.94	10.06	10.33	10.79	10.40	10.82	10.70
MnO	0.23	0.26	0.21	0.26	0.24	0.23	0.32	0.37	0.39	0.49	0.73	0.76	0.81	0.80
FeO	27.72	28.32	28.19	29.08	28.49	28.82	28.36	27.89	27.72	26.90	26.72	26.70	26.33	26.75
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.52	99.51	99.54	100.43	99.71	99.96	100.00	99.75	99.81	99.74	100.29	99.83	99.85	100.41
Cations														
Si	3.031	3.020	3.035	3.021	3.027	3.014	3.038	3.019	3.020	3.033	3.003	3.020	3.019	3.029
Ti	0.008	0.006	0.009	0.009	0.011	0.009	0.008	0.013	0.011	0.011	0.012	0.009	0.014	0.010
Al	1.965	1.972	1.963	1.947	1.947	1.956	1.945	1.966	1.962	1.962	1.958	1.952	1.959	1.956
Cr	0.001	0.001	0.000	0.001	0.003	0.003	0.001	0.000	0.000	0.000	0.002	0.001	0.000	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000
Mg	0.354	0.320	0.306	0.302	0.301	0.286	0.270	0.266	0.278	0.282	0.292	0.315	0.284	0.274
Ca	0.769	0.769	0.777	0.776	0.791	0.802	0.819	0.845	0.854	0.875	0.912	0.881	0.916	0.901
Mn	0.015	0.017	0.014	0.017	0.016	0.015	0.021	0.025	0.026	0.033	0.049	0.051	0.054	0.053
Fe^{2+}	1.835	1.882	1.870	1.921	1.892	1.913	1.878	1.850	1.837	1.778	1.762	1.765	1.740	1.758
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.978	7.987	7.975	7.995	7.987	7.997	7.981	7.985	7.988	7.975	8.000	7.995	7.987	7.983
Endmember														
Pyrope	11.9	10.7	10.3	10.0	10.0	9.5	9.0	8.9	9.3	9.5	9.7	10.5	9.5	9.2
Almandine	61.7	63.0	63.0	63.7	63.1	63.4	62.8	62.0	61.3	59.9	58.4	58.6	58.1	58.9
Spessartine	0.5	0.6	0.5	0.6	0.5	0.5	0.7	0.8	0.9	1.1	1.6	1.7	1.8	1.8
Grossular	25.9	25.7	26.2	25.7	26.4	26.6	27.4	28.3	28.5	29.5	30.2	29.2	30.6	30.2

	811084A F5 Grt18	811084A F5 Grt19	811084A F5 Grt20	811084A F5 Grt21	811084A F5 Grt22	811084A F5 Grt23	811084A F5 Grt24	811084A F5 Grt25	811084A F5 Grt26	811084A F5 Grt27	811084A F5 Grt28	811084A F5 Grt29	811084A F5 Grt30	811102F F1 Grt1
Analysis														
SiO_2	38.05	38.65	38.48	38.53	38.35	38.19	38.16	38.12	38.34	38.57	38.15	38.26	38.73	37.19
TiO_2	0.18	0.21	0.18	0.17	0.14	0.21	0.17	0.15	0.12	0.13	0.16	0.12	0.08	0.00
Al_2O_3	20.87	20.96	21.07	20.96	21.21	20.80	20.96	20.85	20.96	20.99	20.96	21.34	21.46	21.10
Cr_2O_3	0.03	0.01	0.02	0.03	0.03	0.04	0.01	0.02	0.01	0.02	0.02	0.00	0.03	0.04
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.33	2.41	2.73	2.83	2.86	2.78	2.77	2.80	2.92	2.90	2.98	3.08	3.80	3.55
CaO	10.95	10.66	10.60	10.14	10.07	9.90	9.85	9.77	9.84	9.96	9.80	9.96	10.06	1.18
MnO	0.73	0.69	0.55	0.50	0.38	0.34	0.29	0.29	0.36	0.34	0.30	0.35	0.51	1.78
FeO	26.62	26.44	26.45	26.92	27.00	27.39	27.93	27.72	27.21	27.38	27.27	26.76	25.63	34.82
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.76	100.04	100.08	100.08	100.05	99.65	100.29	99.71	99.75	100.27	99.63	99.86	100.31	99.65
Cations														
Si	3.016	3.043	3.027	3.033	3.019	3.026	3.011	3.021	3.029	3.032	3.020	3.013	3.020	2.997
Ti	0.011	0.012	0.011	0.010	0.009	0.012	0.010	0.009	0.007	0.007	0.009	0.007	0.005	0.000
Al	1.949	1.945	1.954	1.945	1.969	1.942	1.949	1.948	1.952	1.945	1.955	1.981	1.973	2.004
Cr	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.000	0.002	0.002
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.275	0.283	0.320	0.332	0.335	0.328	0.326	0.330	0.344	0.340	0.351	0.362	0.442	0.426
Ca	0.930	0.900	0.893	0.855	0.850	0.841	0.833	0.830	0.833	0.839	0.831	0.840	0.841	0.102
Mn	0.049	0.046	0.037	0.033	0.026	0.023	0.019	0.019	0.024	0.022	0.020	0.023	0.034	0.121
Fe^{2+}	1.765	1.741	1.740	1.773	1.778	1.815	1.843	1.837	1.798	1.800	1.805	1.763	1.672	2.347
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.997	7.971	7.984	7.983	7.987	7.989	8.000	7.996	7.988	7.987	7.993	7.989	7.988	8.000
Endmember														
Pyrope	9.1	9.5	10.7	11.1	11.2	10.9	10.8	10.9	11.5	11.3	11.7	12.1	14.8	14.2
Almandine	58.4	58.6	58.2	59.2	59.5	60.4	61.0	60.9	59.9	60.0	60.0	59.0	55.9	78.3
Spessartine	1.6	1.5	1.2	1.1	0.9	0.8	0.6	0.6	0.8	0.7	0.7	0.8	1.1	4.0
Grossular	30.8	30.3	29.9	28.6	28.4	28.0	27.6	27.5	27.8	27.9	27.6	28.1	28.1	3.4

	811102F F1 Grt2	811102F F1 Grt3	811102F F1 Grt4	811102F F1 Grt5	811102F F1 Grt6	811102F F1 Grt7	811102F F1 Grt8	811102F F1 Grt9	811102F F1 Grt10	811102F F1 Grt11	811102F F1 Grt12	811102F F1 Grt13	811102F F1 Grt14	811102F F1 Grt15
Analysis														
SiO_2	38.10	37.65	37.74	37.78	37.84	37.81	37.69	37.69	37.76	37.66	37.81	37.43	37.66	37.51
TiO_2	0.00	0.00	0.03	0.00	0.00	0.01	0.01	0.03	0.03	0.02	0.00	0.01	0.00	0.01
Al_2O_3	21.39	21.42	21.07	21.37	21.25	21.17	21.31	21.29	21.53	21.33	21.30	21.40	21.25	21.24
Cr_2O_3	0.04	0.03	0.04	0.01	0.03	0.01	0.02	0.00	0.04	0.00	0.04	0.02	0.00	0.02
Fe_2O_3	0.00	0.00	0.57	0.38	0.00	0.16	0.45	0.00	0.53	0.19	0.07	0.91	0.66	0.96
MgO	4.34	4.66	4.77	4.80	4.75	4.79	4.88	4.85	4.83	4.89	4.84	4.92	4.98	4.85
CaO	0.99	1.00	0.95	0.93	0.94	0.99	0.96	1.01	0.90	0.97	0.95	0.99	0.96	1.05
MnO	1.79	1.59	1.81	1.76	1.67	1.70	1.73	1.70	1.77	1.70	1.67	1.69	1.73	1.73
FeO	34.19	33.91	33.61	33.65	33.62	33.69	33.40	33.41	33.60	33.37	33.67	33.02	33.18	33.11
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.84	100.25	100.58	100.68	100.10	100.33	100.44	99.97	100.99	100.12	100.35	100.37	100.41	100.48
Cations														
Si	3.014	2.993	2.995	2.991	3.009	3.003	2.989	3.000	2.980	2.994	3.001	2.971	2.987	2.977
Ti	0.000	0.000	0.002	0.000	0.000	0.001	0.001	0.002	0.001	0.001	0.000	0.000	0.000	0.001
Al	1.994	2.007	1.970	1.994	1.992	1.982	1.992	1.997	2.003	1.998	1.992	2.002	1.986	1.987
Cr	0.002	0.002	0.002	0.001	0.002	0.000	0.001	0.000	0.002	0.000	0.002	0.001	0.000	0.001
Fe^{3+}	0.000	0.000	0.034	0.023	0.000	0.010	0.027	0.000	0.031	0.012	0.004	0.054	0.039	0.057
Mg	0.511	0.552	0.564	0.567	0.563	0.568	0.576	0.576	0.569	0.579	0.573	0.582	0.589	0.574
Ca	0.084	0.085	0.080	0.079	0.080	0.084	0.082	0.086	0.076	0.083	0.081	0.084	0.081	0.089
Mn	0.120	0.107	0.122	0.118	0.112	0.115	0.116	0.114	0.118	0.114	0.113	0.114	0.116	0.116
Fe^{2+}	2.262	2.255	2.230	2.228	2.236	2.238	2.216	2.224	2.218	2.219	2.235	2.192	2.201	2.198
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.988	8.002	8.000	8.000	7.994	8.000	8.000	7.999	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	17.2	18.4	18.8	18.9	18.8	18.9	19.3	19.2	19.1	19.3	19.1	19.6	19.7	19.3
Almandine	76.0	75.2	74.4	74.5	74.7	74.5	74.1	74.1	74.4	74.1	74.5	73.8	73.7	73.8
Spessartine	4.0	3.6	4.1	4.0	3.7	3.8	3.9	3.8	4.0	3.8	3.7	3.8	3.9	3.9
Grossular	2.8	2.8	2.7	2.6	2.7	2.8	2.7	2.9	2.6	2.8	2.7	2.8	2.7	3.0

	811102F F1 Grt18	811102F F1 Grt19	811102F F1 Grt20	811102F F1 Grt21	811102F F1 Grt22	811102F F1 Grt23	811102F F1 Grt24	811102F F1 Grt25	811102F F1 Grt26	811102F F1 Grt27	811102F F1 Grt28	811102F F1 Grt29	811102F F1 Grt30	811102F F1 Grt31
Analysis														
SiO_2	37.82	37.89	37.73	37.74	37.58	37.88	37.66	38.01	37.13	37.91	37.95	37.56	38.08	37.64
TiO_2	0.01	0.02	0.01	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.02	0.03	0.00
Al_2O_3	21.51	21.57	21.58	21.13	21.19	21.42	21.14	21.65	21.01	21.30	21.13	21.43	21.25	21.28
Cr_2O_3	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.04	0.00	0.02	0.02
Fe_2O_3	0.31	0.37	0.00	0.46	0.63	0.00	0.56	0.32	0.71	0.37	0.00	0.31	0.09	0.55
MgO	5.00	5.05	4.98	4.96	5.07	5.02	4.96	5.11	5.03	5.13	5.04	5.07	5.04	5.03
CaO	1.05	1.01	1.09	1.07	1.05	1.08	1.13	1.04	1.06	1.04	1.07	1.02	1.10	1.05
MnO	1.75	1.69	1.52	1.65	1.68	1.57	1.55	1.64	1.52	1.66	1.61	1.54	1.63	1.68
FeO	33.21	33.35	33.40	33.27	32.85	33.12	33.19	33.35	32.55	33.22	33.43	33.02	33.52	33.00
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.65	100.94	100.31	100.28	100.05	100.12	100.21	101.14	99.03	100.65	100.26	99.96	100.75	100.24
Cations														
Si	2.989	2.986	2.989	2.997	2.988	3.004	2.992	2.987	2.983	2.996	3.010	2.986	3.007	2.988
Ti	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.002	0.000
Al	2.003	2.003	2.015	1.978	1.986	2.002	1.980	2.005	1.989	1.984	1.976	2.008	1.977	1.991
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.001	0.001
Fe^{3+}	0.019	0.022	0.000	0.027	0.038	0.000	0.033	0.019	0.043	0.022	0.000	0.018	0.005	0.033
Mg	0.589	0.593	0.588	0.587	0.601	0.593	0.587	0.599	0.603	0.604	0.596	0.600	0.593	0.595
Ca	0.089	0.085	0.092	0.091	0.090	0.092	0.096	0.088	0.091	0.088	0.091	0.087	0.093	0.089
Mn	0.117	0.113	0.102	0.111	0.113	0.106	0.105	0.109	0.103	0.111	0.108	0.104	0.109	0.113
Fe^{2+}	2.194	2.198	2.214	2.209	2.184	2.196	2.205	2.192	2.187	2.195	2.218	2.196	2.213	2.190
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	8.002	8.000	8.000	7.994	8.000	8.000	8.000	8.001	8.001	8.000	8.000	8.000
Endmember														
Pyrope	19.7	19.8	19.6	19.6	20.1	19.9	19.6	20.0	20.2	20.1	19.8	20.1	19.7	19.9
Almandine	73.4	73.5	73.9	73.7	73.1	73.5	73.7	73.4	73.3	73.2	73.6	73.5	73.6	73.3
Spessartine	3.9	3.8	3.4	3.7	3.8	3.5	3.5	3.7	3.5	3.7	3.6	3.5	3.6	3.8
Grossular	3.0	2.8	3.1	3.0	3.0	3.1	3.2	2.9	3.1	2.9	3.0	2.9	3.1	3.0

	811102F F1 Grt32	811102F F1 Grt33	811102F F1 Grt34	811102F F1 Grt35	811102F F1 Grt36	811102F F1 Grt37	811102F F1 Grt38	811102F F1 Grt39	811102F F1 Grt40	811102F F1 Grt41	811102F F1 Grt42	811102F F1 Grt43	811102F F1 Grt44	811102F F1 Grt45
Analysis														
SiO_2	37.82	37.84	37.99	37.73	37.88	37.99	37.61	37.93	37.63	37.52	37.82	38.08	37.98	38.01
TiO_2	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.01	0.00	0.01
Al_2O_3	21.18	21.50	21.30	21.23	21.36	21.17	21.17	21.04	21.16	21.39	21.52	21.37	21.24	21.53
Cr_2O_3	0.02	0.02	0.00	0.00	0.03	0.02	0.02	0.02	0.00	0.03	0.02	0.00	0.00	0.05
Fe_2O_3	0.16	0.52	0.00	0.88	0.31	0.08	0.93	0.37	0.28	0.85	0.16	0.00	0.38	0.00
MgO	4.97	5.01	4.99	5.04	5.04	5.05	5.05	5.05	4.99	5.02	4.95	5.00	4.99	4.95
CaO	1.02	1.13	1.02	1.08	1.06	1.08	1.07	1.09	1.08	1.07	1.08	1.02	1.00	1.04
MnO	1.67	1.61	1.60	1.59	1.59	1.65	1.69	1.68	1.68	1.75	1.67	1.65	1.57	1.66
FeO	33.37	33.25	33.18	33.15	33.35	33.36	32.91	33.27	33.02	32.78	33.33	33.64	33.66	33.30
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.21	100.88	100.08	100.69	100.61	100.41	100.45	100.49	99.83	100.40	100.57	100.77	100.82	100.55
Cations														
Si	3.003	2.984	3.013	2.984	2.995	3.009	2.982	3.005	2.998	2.975	2.991	3.006	3.000	3.003
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.001
Al	1.982	1.999	1.992	1.979	1.990	1.976	1.978	1.964	1.987	1.999	2.005	1.988	1.977	2.005
Cr	0.001	0.001	0.000	0.000	0.002	0.001	0.002	0.001	0.000	0.002	0.001	0.000	0.000	0.003
Fe^{3+}	0.010	0.031	0.000	0.052	0.018	0.005	0.055	0.022	0.017	0.051	0.009	0.000	0.022	0.000
Mg	0.588	0.588	0.590	0.594	0.594	0.597	0.597	0.596	0.592	0.593	0.584	0.588	0.587	0.582
Ca	0.086	0.095	0.086	0.092	0.090	0.092	0.091	0.093	0.092	0.091	0.092	0.087	0.085	0.088
Mn	0.112	0.108	0.107	0.106	0.106	0.111	0.113	0.112	0.114	0.117	0.112	0.110	0.105	0.111
Fe^{2+}	2.216	2.193	2.202	2.193	2.205	2.210	2.182	2.204	2.200	2.173	2.205	2.220	2.223	2.200
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	7.991	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	7.993
Endmember														
Pyrope	19.6	19.7	19.8	19.9	19.8	19.8	20.0	19.8	19.8	19.9	19.5	19.6	19.6	19.5
Almandine	73.8	73.5	73.7	73.5	73.6	73.4	73.1	73.3	73.4	73.1	73.7	73.9	74.1	73.8
Spessartine	3.7	3.6	3.6	3.6	3.6	3.7	3.8	3.7	3.8	3.9	3.7	3.7	3.5	3.7
Grossular	2.9	3.2	2.9	3.1	3.0	3.0	3.0	3.1	3.1	3.0	3.1	2.9	2.8	2.9

	811102F F1 Grt46	811102F F1 Grt47	811102F F1 Grt48	811102F F1 Grt49	811102F F1 Grt50	811102F F1 Grt51	811102F F1 Grt52	811102F F1 Grt53	811102F F1 Grt54	D7625A F6 Grt1	D7625A F6 Grt2	D7625A F6 Grt3	D7625A F6 Grt4	D7625A F6 Grt6
Analysis														
SiO_2	37.86	37.97	37.67	37.87	38.12	37.95	37.99	37.42	37.70	37.84	38.15	38.16	38.04	37.83
TiO_2	0.02	0.03	0.00	0.01	0.02	0.01	0.01	0.05	0.03	0.12	0.13	0.11	0.07	0.13
Al_2O_3	21.43	21.34	21.29	21.51	21.33	21.19	21.31	21.21	21.33	20.98	20.85	21.11	21.04	20.83
Cr_2O_3	0.00	0.01	0.05	0.02	0.00	0.01	0.02	0.00	0.05	0.15	0.07	0.03	0.05	0.00
Fe_2O_3	0.00	0.00	0.80	0.38	0.21	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
MgO	4.96	4.94	4.94	4.87	4.87	4.86	4.80	4.58	4.61	1.94	2.06	2.10	2.16	2.17
CaO	1.02	0.98	1.01	1.00	1.01	0.98	1.03	0.95	1.06	9.84	9.79	9.91	9.08	8.78
MnO	1.61	1.63	1.67	1.76	1.68	1.76	1.68	1.65	1.72	6.46	5.97	5.44	5.46	4.98
FeO	33.51	33.61	33.25	33.56	33.94	33.56	33.58	33.42	33.80	22.27	22.68	22.84	23.75	24.83
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.39	100.51	100.68	100.98	101.17	100.32	100.42	99.28	100.37	99.60	99.70	99.72	99.64	99.56
Cations														
Si	2.999	3.005	2.981	2.988	3.002	3.011	3.010	3.001	2.996	3.014	3.032	3.026	3.025	3.020
Ti	0.001	0.002	0.000	0.000	0.001	0.001	0.001	0.003	0.002	0.007	0.008	0.007	0.004	0.008
Al	2.001	1.990	1.986	2.000	1.980	1.982	1.990	2.005	1.997	1.969	1.952	1.973	1.973	1.960
Cr	0.000	0.001	0.003	0.001	0.000	0.001	0.001	0.000	0.003	0.010	0.004	0.002	0.003	0.000
Fe^{3+}	0.000	0.000	0.047	0.022	0.012	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000
Mg	0.585	0.583	0.583	0.572	0.571	0.575	0.567	0.548	0.546	0.230	0.244	0.249	0.256	0.258
Ca	0.086	0.083	0.086	0.084	0.085	0.084	0.087	0.082	0.090	0.840	0.834	0.842	0.774	0.751
Mn	0.108	0.109	0.112	0.118	0.112	0.118	0.113	0.112	0.115	0.436	0.401	0.365	0.368	0.337
Fe^{2+}	2.220	2.224	2.201	2.214	2.235	2.227	2.225	2.242	2.246	1.484	1.507	1.515	1.580	1.658
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	7.998	8.000	8.000	8.000	7.997	7.994	7.993	8.000	7.990	7.982	7.979	7.982	7.992
Endmember														
Pyrope	19.5	19.4	19.6	19.2	19.0	19.1	18.9	18.4	18.2	7.7	8.2	8.4	8.6	8.6
Almandine	74.0	74.1	73.8	74.1	74.4	74.2	74.4	75.1	74.9	49.6	50.5	51.0	53.1	55.2
Spessartine	3.6	3.6	3.7	3.9	3.7	3.9	3.8	3.7	3.9	14.6	13.4	12.3	12.3	11.2
Grossular	2.9	2.8	2.9	2.8	2.8	2.8	2.9	2.7	3.0	28.1	27.9	28.3	26.0	25.0

	D7625A F6 Grt7	D7625A F6 Grt8	D7625A F6 Grt9	D7625A F6 Grt10	D7625A F6 Grt11	D7625A F6 Grt12	D7625A F6 Grt13	D7625A F6 Grt14	D7625A F6 Grt15	D7625A F6 Grt16	D7625A F6 Grt17	D7625A F6 Grt18	D7625A F6 Grt19	D7625A F6 Grt20
Analysis														
SiO_2	38.05	38.02	37.81	37.87	37.96	37.88	37.98	37.95	36.06	37.93	37.86	37.99	37.82	37.80
TiO_2	0.13	0.12	0.09	0.10	0.11	0.11	0.11	0.17	0.10	0.08	0.38	0.11	0.12	0.13
Al_2O_3	20.87	20.85	20.98	21.05	21.01	20.92	21.04	20.84	20.05	20.89	20.75	20.67	20.78	20.80
Cr_2O_3	0.00	0.02	0.04	0.01	0.03	0.03	0.01	0.01	0.00	0.00	0.03	0.04	0.02	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.16	2.16	2.08	2.07	2.06	2.11	2.01	2.03	1.96	2.06	1.97	2.04	2.00	1.96
CaO	8.74	9.26	9.02	8.53	8.27	7.91	8.20	8.04	7.30	7.82	7.73	8.17	7.96	8.05
MnO	5.04	4.70	4.92	4.91	5.19	5.38	5.24	5.39	5.27	5.74	5.76	5.51	5.78	5.66
FeO	25.11	24.54	24.35	25.06	25.23	25.70	24.95	25.60	24.71	25.47	25.19	24.68	25.11	24.85
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.09	99.67	99.28	99.59	99.86	100.04	99.54	100.03	95.45	100.00	99.67	99.21	99.58	99.25
Cations														
Si	3.023	3.027	3.021	3.021	3.023	3.018	3.030	3.023	3.014	3.024	3.025	3.043	3.026	3.030
Ti	0.008	0.007	0.005	0.006	0.007	0.007	0.007	0.010	0.006	0.005	0.023	0.007	0.007	0.008
Al	1.954	1.956	1.976	1.979	1.972	1.964	1.978	1.957	1.975	1.963	1.954	1.951	1.960	1.965
Cr	0.000	0.001	0.003	0.000	0.002	0.002	0.000	0.001	0.000	0.000	0.002	0.002	0.001	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.256	0.256	0.248	0.246	0.245	0.250	0.239	0.241	0.244	0.245	0.235	0.243	0.239	0.234
Ca	0.744	0.789	0.772	0.729	0.705	0.675	0.701	0.686	0.653	0.667	0.661	0.701	0.682	0.691
Mn	0.339	0.317	0.333	0.332	0.350	0.363	0.354	0.363	0.373	0.387	0.390	0.374	0.391	0.384
Fe^{2+}	1.668	1.634	1.627	1.672	1.680	1.713	1.665	1.706	1.727	1.698	1.683	1.653	1.680	1.666
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.992	7.988	7.984	7.984	7.983	7.992	7.974	7.988	7.992	7.990	7.974	7.974	7.986	7.979
Endmember														
Pyrope	8.5	8.6	8.3	8.3	8.2	8.3	8.1	8.0	8.1	8.2	7.9	8.2	8.0	7.9
Almandine	55.5	54.5	54.6	56.1	56.4	57.1	56.3	56.9	57.6	56.6	56.7	55.6	56.1	56.0
Spessartine	11.3	10.6	11.2	11.1	11.7	12.1	12.0	12.1	12.4	12.9	13.1	12.6	13.1	12.9
Grossular	24.7	26.3	25.9	24.5	23.7	22.5	23.7	22.9	21.8	22.3	22.3	23.6	22.8	23.2

	D7625A F6 Grt21	D7625A F6 Grt22	D7625A F6 Grt23	D7625A F6 Grt24	D7625A F6 Grt25	D7625A F6 Grt26	D7625A F6 Grt27	D7625A F6 Grt28	D7625A F6 Grt29	D7625A F6 Grt30	D7625A F6 Grt31	D7625A F6 Grt32	D7625A F6 Grt33	D7625A F6 Grt34
Analysis														
SiO_2	38.06	37.74	37.90	37.66	37.81	37.65	37.82	37.72	37.49	37.82	37.93	37.67	37.72	37.89
TiO_2	0.11	0.08	0.07	0.12	0.06	0.08	0.08	0.10	0.10	0.11	0.09	0.08	0.08	0.06
Al_2O_3	20.81	20.92	20.77	20.93	20.92	20.85	20.93	21.02	21.06	20.93	20.46	21.04	20.92	20.82
Cr_2O_3	0.02	0.01	0.01	0.03	0.03	0.04	0.02	0.01	0.00	0.04	0.03	0.03	0.01	0.02
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.98	1.99	2.05	2.01	2.03	2.03	1.97	1.91	1.91	1.86	1.94	1.91	1.88	1.86
CaO	7.21	7.25	6.99	7.03	7.18	7.01	7.55	7.13	6.96	7.21	7.11	7.03	6.75	6.45
MnO	6.11	5.94	6.08	6.12	6.02	6.10	6.15	6.21	6.22	6.32	6.23	6.35	6.62	6.55
FeO	25.53	25.63	25.90	25.63	25.70	25.49	25.39	25.36	25.56	25.29	25.20	25.61	25.63	25.79
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.84	99.54	99.75	99.53	99.76	99.23	99.90	99.46	99.30	99.59	98.98	99.71	99.59	99.43
Cations														
Si	3.039	3.024	3.032	3.019	3.024	3.026	3.021	3.023	3.013	3.028	3.054	3.016	3.025	3.041
Ti	0.007	0.005	0.004	0.007	0.004	0.005	0.005	0.006	0.006	0.007	0.005	0.005	0.005	0.004
Al	1.958	1.975	1.959	1.977	1.972	1.974	1.970	1.986	1.995	1.976	1.942	1.985	1.978	1.969
Cr	0.001	0.001	0.000	0.002	0.002	0.002	0.001	0.001	0.000	0.002	0.002	0.002	0.000	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.236	0.237	0.244	0.240	0.242	0.243	0.234	0.228	0.229	0.222	0.233	0.228	0.224	0.223
Ca	0.617	0.622	0.599	0.604	0.615	0.603	0.646	0.612	0.599	0.619	0.613	0.603	0.580	0.555
Mn	0.413	0.403	0.412	0.416	0.408	0.415	0.416	0.421	0.424	0.429	0.425	0.431	0.450	0.445
Fe^{2+}	1.705	1.717	1.733	1.718	1.719	1.713	1.696	1.700	1.718	1.694	1.697	1.715	1.719	1.732
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.975	7.984	7.984	7.984	7.985	7.981	7.989	7.978	7.984	7.976	7.969	7.985	7.981	7.970
Endmember														
Pyrope	7.9	8.0	8.2	8.1	8.1	8.2	7.8	7.7	7.7	7.5	7.8	7.7	7.5	7.5
Almandine	57.4	57.6	58.0	57.7	57.6	57.6	56.7	57.4	57.8	57.2	57.2	57.6	57.8	58.6
Spessartine	13.9	13.5	13.8	14.0	13.7	14.0	13.9	14.2	14.3	14.5	14.3	14.5	15.1	15.1
Grossular	20.8	20.9	20.0	20.3	20.6	20.3	21.6	20.7	20.2	20.9	20.7	20.3	19.5	18.8

	D7625A F6 Grt35	D7625A F6 Grt36	D7625A F6 Grt37	D7625A F6 Grt38	D7625A F6 Grt39	D7625A F6 Grt40	D7625A F6 Grt41	D7625A F6 Grt42	D7625A F6 Grt43	D7625A F6 Grt44	D7625A F6 Grt45	D7625A F6 Grt46	D7625A F6 Grt47	D7625A F6 Grt48
Analysis														
SiO_2	37.67	36.82	37.64	37.65	37.65	37.77	37.72	37.11	37.76	37.88	38.07	37.92	37.29	28.18
TiO_2	0.09	0.10	0.08	0.09	0.12	0.11	0.08	0.08	0.07	0.10	0.12	0.13	0.08	0.06
Al_2O_3	20.79	20.06	20.58	20.87	20.89	20.83	20.97	20.49	20.71	20.87	20.90	20.85	20.80	15.34
Cr_2O_3	0.03	0.02	0.00	0.02	0.03	0.04	0.03	0.01	0.00	0.03	0.04	0.01	0.01	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58
MgO	1.93	1.78	1.90	1.84	1.84	1.75	1.89	1.75	1.85	1.78	1.75	1.76	1.87	1.26
CaO	6.60	6.69	6.60	6.88	6.95	7.19	6.41	6.33	7.26	7.31	7.78	7.37	6.85	5.33
MnO	6.43	5.89	6.46	6.30	6.35	6.42	6.29	6.39	6.39	6.27	6.21	6.15	6.35	5.28
FeO	26.00	24.87	25.87	25.73	25.66	25.67	25.59	25.02	25.63	25.75	25.19	25.59	25.56	19.34
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.53	96.23	99.13	99.39	99.48	99.80	99.00	97.19	99.65	99.98	100.06	99.78	98.81	77.37
Cations														
Si	3.026	3.050	3.035	3.025	3.023	3.025	3.036	3.044	3.029	3.027	3.034	3.033	3.016	2.948
Ti	0.005	0.006	0.005	0.006	0.007	0.007	0.005	0.005	0.004	0.006	0.007	0.008	0.005	0.005
Al	1.969	1.958	1.956	1.977	1.977	1.967	1.989	1.980	1.957	1.966	1.963	1.966	1.983	1.891
Cr	0.002	0.001	0.000	0.001	0.002	0.003	0.002	0.001	0.000	0.002	0.002	0.001	0.000	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.203
Mg	0.231	0.219	0.228	0.220	0.220	0.209	0.227	0.214	0.221	0.212	0.207	0.209	0.225	0.196
Ca	0.568	0.594	0.570	0.592	0.598	0.617	0.553	0.556	0.624	0.626	0.665	0.631	0.594	0.598
Mn	0.437	0.413	0.441	0.429	0.432	0.435	0.429	0.444	0.434	0.424	0.419	0.417	0.435	0.468
Fe^{2+}	1.746	1.723	1.745	1.729	1.723	1.720	1.723	1.716	1.719	1.721	1.678	1.712	1.729	1.692
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.984	7.964	7.981	7.980	7.980	7.983	7.964	7.961	7.988	7.983	7.976	7.976	7.987	8.001
Endmember														
Pyrope	7.7	7.4	7.7	7.4	7.4	7.0	7.7	7.3	7.4	7.1	7.0	7.1	7.5	6.6
Almandine	58.6	58.4	58.5	58.2	58.0	57.7	58.8	58.6	57.3	57.7	56.5	57.6	58.0	57.3
Spessartine	14.7	14.0	14.8	14.4	14.5	14.6	14.6	15.2	14.5	14.2	14.1	14.0	14.6	15.8
Grossular	19.0	20.1	19.1	19.9	20.1	20.7	18.9	19.0	20.8	21.0	22.4	21.3	19.9	20.2

	D7625A F6 Grt49	D7625A F6 Grt50	D7625A F6 Grt51	D7625A F6 Grt52	D7625A F6 Grt53	D7625A F6 Grt54	D7625A F6 Grt55	D7625A F6 Grt56	D7625A F6 Grt57	D7625A F6 Grt58	D7625A F6 Grt59	D7625A F6 Grt60	D7625A F6 Grt61	D7625A F6 Grt62
Analysis														
SiO_2	37.69	37.78	37.68	37.76	37.95	37.69	37.60	37.78	37.71	37.49	37.62	37.52	37.53	37.32
TiO_2	0.09	0.13	0.09	0.11	0.09	0.11	0.11	0.14	0.11	0.19	0.10	0.11	0.12	0.10
Al_2O_3	20.85	20.57	20.73	20.92	20.90	20.67	20.74	20.81	20.67	20.92	20.73	20.53	20.86	20.86
Cr_2O_3	0.01	0.02	0.01	0.03	0.00	0.01	0.03	0.04	0.03	0.05	0.02	0.05	0.01	0.02
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.76	1.83	1.80	1.81	1.83	1.85	1.86	1.80	1.89	1.87	1.82	1.83	1.88	1.81
CaO	6.66	7.06	6.67	6.87	6.87	6.86	7.06	7.03	6.63	6.41	6.79	7.24	6.65	6.77
MnO	6.57	6.40	6.38	6.34	6.45	6.46	6.67	6.26	6.55	6.57	6.38	6.26	6.61	6.63
FeO	26.21	25.78	25.56	26.10	25.85	25.93	25.67	25.68	26.20	25.99	25.74	25.78	26.01	25.84
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.84	99.56	98.91	99.94	99.95	99.57	99.74	99.54	99.78	99.50	99.18	99.31	99.67	99.35
Cations														
Si	3.022	3.034	3.039	3.022	3.033	3.028	3.017	3.030	3.026	3.014	3.031	3.024	3.014	3.008
Ti	0.005	0.008	0.005	0.007	0.005	0.006	0.006	0.008	0.007	0.011	0.006	0.007	0.007	0.006
Al	1.971	1.947	1.971	1.973	1.968	1.957	1.962	1.967	1.955	1.982	1.968	1.950	1.974	1.982
Cr	0.001	0.001	0.001	0.002	0.000	0.001	0.002	0.003	0.002	0.003	0.001	0.003	0.001	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.211	0.220	0.216	0.216	0.218	0.222	0.223	0.216	0.226	0.224	0.218	0.220	0.225	0.218
Ca	0.573	0.607	0.577	0.589	0.588	0.590	0.607	0.604	0.570	0.552	0.586	0.626	0.572	0.585
Mn	0.446	0.435	0.436	0.430	0.437	0.440	0.454	0.425	0.445	0.448	0.435	0.427	0.450	0.452
Fe^{2+}	1.758	1.732	1.724	1.747	1.728	1.742	1.723	1.722	1.758	1.747	1.734	1.737	1.747	1.742
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.986	7.984	7.969	7.984	7.978	7.986	7.994	7.976	7.989	7.982	7.979	7.993	7.991	7.994
Endmember														
Pyrope	7.1	7.3	7.3	7.2	7.3	7.4	7.4	7.3	7.5	7.6	7.3	7.3	7.5	7.3
Almandine	58.8	57.8	58.4	58.6	58.2	58.2	57.3	58.0	58.6	58.8	58.3	57.7	58.3	58.1
Spessartine	14.9	14.5	14.8	14.4	14.7	14.7	15.1	14.3	14.8	15.1	14.6	14.2	15.0	15.1
Grossular	19.2	20.3	19.5	19.8	19.8	19.7	20.2	20.4	19.0	18.6	19.7	20.8	19.1	19.5

	D7625A F6 Grt63	D7625A F6 Grt64	D7625A F6 Grt65	D7625A F6 Grt66	D7625A F6 Grt67	D7625A F6 Grt68	D7625A F6 Grt69	D7625A F6 Grt70	D7625A F6 Grt71	D7625A F6 Grt72	D7625A F6 Grt73	D7625A F6 Grt74	D7625A F6 Grt75	D7625A F6 Grt76
Analysis														
SiO_2	37.67	37.38	38.01	37.33	37.37	37.40	37.23	37.50	37.92	37.64	37.99	37.83	37.67	37.67
TiO_2	0.09	0.11	0.21	1.45	0.34	0.12	0.10	0.10	0.07	0.12	0.07	0.11	0.08	0.10
Al_2O_3	21.02	20.64	20.77	20.58	20.73	20.81	20.64	20.82	20.94	20.81	21.42	20.90	20.71	20.81
Cr_2O_3	0.00	0.07	0.06	0.00	0.01	0.04	0.00	0.04	0.02	0.03	0.02	0.02	0.02	0.04
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.87	1.80	1.76	1.81	1.73	1.86	1.88	1.98	1.98	1.93	1.95	1.97	1.97	1.93
CaO	7.09	7.11	8.09	7.07	7.78	7.37	6.86	6.89	6.73	7.46	7.01	7.24	6.87	7.04
MnO	6.34	6.13	5.96	6.43	5.91	6.25	6.23	6.23	6.55	6.23	6.07	6.18	6.26	6.09
FeO	26.04	25.78	25.09	25.41	24.52	25.47	25.75	25.76	25.97	25.46	24.88	25.65	25.50	25.44
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.12	99.01	99.95	100.09	98.39	99.31	98.68	99.33	100.18	99.68	99.39	99.90	99.09	99.12
Cations														
Si	3.010	3.020	3.032	2.983	3.023	3.011	3.018	3.017	3.025	3.017	3.032	3.023	3.033	3.030
Ti	0.005	0.007	0.013	0.087	0.021	0.007	0.006	0.006	0.004	0.007	0.004	0.007	0.005	0.006
Al	1.980	1.965	1.952	1.938	1.976	1.974	1.972	1.974	1.969	1.966	2.015	1.968	1.965	1.973
Cr	0.000	0.004	0.004	0.000	0.001	0.002	0.000	0.003	0.001	0.002	0.001	0.001	0.001	0.002
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.223	0.217	0.209	0.215	0.209	0.223	0.227	0.237	0.235	0.231	0.231	0.234	0.237	0.231
Ca	0.607	0.616	0.692	0.605	0.674	0.636	0.595	0.594	0.575	0.641	0.599	0.620	0.593	0.607
Mn	0.429	0.420	0.403	0.435	0.405	0.426	0.427	0.425	0.443	0.423	0.410	0.419	0.427	0.415
Fe^{2+}	1.741	1.741	1.673	1.698	1.659	1.715	1.745	1.733	1.733	1.706	1.661	1.714	1.717	1.712
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.995	7.989	7.977	7.961	7.968	7.994	7.991	7.989	7.986	7.992	7.955	7.986	7.978	7.976
Endmember														
Pyrope	7.4	7.3	7.0	7.3	7.1	7.4	7.6	7.9	7.9	7.7	8.0	7.8	8.0	7.8
Almandine	58.0	58.2	56.2	57.5	56.3	57.2	58.3	58.0	58.0	56.9	57.2	57.4	57.8	57.7
Spessartine	14.3	14.0	13.5	14.7	13.8	14.2	14.3	14.2	14.8	14.1	14.1	14.0	14.4	14.0
Grossular	20.2	20.6	23.2	20.5	22.9	21.2	19.9	19.9	19.3	21.4	20.6	20.8	19.9	20.5

	D7625A F6 Grt77	D7625A F6 Grt78	D7625A F6 Grt79	D7625A F6 Grt80	D7625A F6 Grt81	D7625A F6 Grt82	D7625A F6 Grt83	D7625A F6 Grt84	D7625A F6 Grt85	D7625A F6 Grt86	D7625A F6 Grt87	D7625A F6 Grt88	D7625A F6 Grt89	D7625A F6 Grt90
Analysis														
SiO_2	37.81	37.91	37.70	37.80	37.87	38.08	37.81	37.83	37.56	37.99	37.69	37.77	37.87	37.58
TiO_2	0.11	0.11	0.10	0.11	0.10	0.07	0.12	0.11	0.09	0.11	0.08	0.13	0.15	0.11
Al_2O_3	20.87	20.98	20.64	20.66	20.86	20.87	20.88	20.91	20.93	20.78	20.91	20.66	20.88	20.95
Cr_2O_3	0.03	0.00	0.06	0.03	0.02	0.02	0.00	0.06	0.00	0.03	0.04	0.06	0.05	0.07
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.03	1.98	2.04	2.12	2.04	1.99	2.32	1.97	2.11	2.15	2.25	2.16	2.09	2.23
CaO	7.04	7.56	7.30	7.03	7.38	8.10	7.61	8.24	7.98	8.29	7.76	8.89	8.80	8.39
MnO	6.28	5.79	5.75	5.86	5.51	5.54	5.34	5.08	5.04	5.09	5.21	4.94	4.96	4.86
FeO	25.60	25.38	25.33	26.10	25.68	24.99	25.36	25.19	25.33	25.20	25.66	24.72	24.57	25.21
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.76	99.70	98.91	99.69	99.46	99.65	99.43	99.38	99.05	99.65	99.59	99.33	99.38	99.40
Cations														
Si	3.024	3.028	3.036	3.028	3.032	3.038	3.024	3.026	3.016	3.031	3.014	3.023	3.025	3.007
Ti	0.006	0.007	0.006	0.006	0.006	0.004	0.007	0.006	0.005	0.006	0.005	0.008	0.009	0.007
Al	1.968	1.975	1.959	1.950	1.969	1.962	1.968	1.971	1.981	1.954	1.971	1.949	1.966	1.976
Cr	0.002	0.000	0.004	0.002	0.002	0.001	0.000	0.004	0.000	0.002	0.002	0.004	0.003	0.004
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.242	0.235	0.245	0.253	0.244	0.236	0.276	0.235	0.253	0.256	0.268	0.258	0.249	0.266
Ca	0.603	0.647	0.630	0.603	0.633	0.692	0.652	0.707	0.687	0.709	0.665	0.762	0.753	0.719
Mn	0.426	0.392	0.392	0.397	0.374	0.374	0.362	0.344	0.343	0.344	0.353	0.335	0.335	0.330
Fe^{2+}	1.713	1.695	1.706	1.749	1.719	1.668	1.696	1.685	1.702	1.681	1.716	1.654	1.641	1.687
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.984	7.978	7.977	7.989	7.977	7.976	7.985	7.980	7.987	7.984	7.994	7.993	7.982	7.996
Endmember														
Pyrope	8.1	7.9	8.2	8.4	8.2	8.0	9.2	7.9	8.5	8.6	8.9	8.6	8.4	8.9
Almandine	57.4	57.1	57.4	58.2	57.9	56.1	56.8	56.7	57.0	56.2	57.2	55.0	55.1	56.2
Spessartine	14.3	13.2	13.2	13.2	12.6	12.6	12.1	11.6	11.5	11.5	11.8	11.1	11.3	11.0
Grossular	20.2	21.8	21.2	20.1	21.3	23.3	21.8	23.8	23.0	23.7	22.1	25.3	25.3	24.0

	D7625A F6 Grt91	D7625A F6 Grt92	D7625A F6 Grt93	D7625A F6 Grt94	D7625A F6 Grt95	D7625A F6 Grt96	D7625A F6 Grt97	D7625A F6 Grt98	D7625A F6 Grt99	D7625A F6 Grt100	D7626A F2 Grt1	D7626A F2 Grt2	D7626A F2 Grt3	D7626A F2 Grt4
Analysis														
SiO_2	37.94	38.18	37.89	37.97	37.80	38.24	37.88	37.96	37.88	37.74	37.27	37.30	37.40	37.10
TiO_2	0.07	0.10	0.14	0.11	0.10	0.10	0.08	0.06	0.03	0.03	0.28	0.15	0.07	0.13
Al_2O_3	20.91	20.98	20.73	21.00	21.09	20.97	20.98	20.94	21.04	21.11	20.72	20.89	20.61	20.71
Cr_2O_3	0.03	0.05	0.05	0.03	0.01	0.04	0.05	0.02	0.02	0.02	0.02	0.03	0.00	0.03
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.18	2.15	2.20	2.19	2.22	2.15	2.10	1.90	1.93	1.92	1.55	1.54	1.47	1.40
CaO	8.66	8.90	9.21	9.29	8.56	8.83	8.86	9.12	9.26	9.50	4.04	3.54	3.56	3.59
MnO	5.01	4.94	4.92	5.16	5.63	5.92	6.39	6.65	6.45	6.96	13.83	14.42	15.71	16.31
FeO	24.66	24.75	24.10	24.19	24.11	23.74	23.12	22.67	22.47	21.71	21.86	21.68	20.68	19.82
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.47	100.05	99.24	99.93	99.51	99.99	99.46	99.31	99.08	98.99	99.57	99.56	99.49	99.10
Cations														
Si	3.027	3.029	3.028	3.016	3.015	3.033	3.022	3.032	3.029	3.020	3.017	3.020	3.034	3.021
Ti	0.004	0.006	0.008	0.006	0.006	0.006	0.005	0.003	0.002	0.002	0.017	0.009	0.004	0.008
Al	1.967	1.961	1.952	1.965	1.983	1.961	1.973	1.971	1.983	1.991	1.977	1.993	1.971	1.987
Cr	0.002	0.003	0.003	0.002	0.000	0.002	0.003	0.001	0.001	0.001	0.001	0.002	0.000	0.002
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.259	0.254	0.262	0.260	0.264	0.254	0.250	0.226	0.230	0.228	0.187	0.186	0.177	0.170
Ca	0.741	0.757	0.788	0.790	0.731	0.750	0.757	0.780	0.793	0.815	0.350	0.307	0.309	0.313
Mn	0.339	0.332	0.333	0.347	0.380	0.398	0.432	0.450	0.437	0.472	0.948	0.989	1.080	1.125
Fe^{2+}	1.646	1.642	1.611	1.607	1.608	1.575	1.543	1.515	1.503	1.453	1.480	1.468	1.403	1.350
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.984	7.983	7.986	7.994	7.988	7.979	7.985	7.979	7.978	7.982	7.977	7.973	7.977	7.976
Endmember														
Pyrope	8.7	8.5	8.8	8.6	8.9	8.5	8.4	7.6	7.8	7.7	6.3	6.3	6.0	5.8
Almandine	55.1	55.0	53.8	53.5	53.9	52.9	51.7	51.0	50.7	49.0	49.9	49.8	47.2	45.6
Spessartine	11.4	11.1	11.1	11.6	12.7	13.4	14.5	15.1	14.7	15.9	32.0	33.5	36.4	38.0
Grossular	24.8	25.4	26.3	26.3	24.5	25.2	25.4	26.3	26.8	27.5	11.8	10.4	10.4	10.6

	D7626A F2 Grt5	D7626A F2 Grt6	D7626A F2 Grt7	D7626A F2 Grt8	D7626A F2 Grt9	D7626A F2 Grt10	D7626A F2 Grt11	D7626A F2 Grt12	D7626A F2 Grt13	D7626A F2 Grt14	D7626A F2 Grt15	D7626A F2 Grt16	D7626A F2 Grt17	D7626A F2 Grt18
Analysis														
SiO_2	37.46	37.47	37.05	37.28	37.29	36.90	37.31	37.23	37.41	37.33	37.16	37.24	37.14	37.28
TiO_2	0.10	0.10	0.01	0.04	0.05	0.04	0.03	0.06	0.06	0.05	0.08	0.06	0.09	0.06
Al_2O_3	20.72	20.79	20.84	20.55	20.73	20.62	20.78	20.59	20.73	20.64	20.69	20.43	20.69	20.66
Cr_2O_3	0.01	0.00	0.01	0.03	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.06	0.01
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.32	1.30	1.34	1.25	1.39	1.30	1.40	1.33	1.39	1.47	1.53	1.53	1.55	1.55
CaO	3.73	3.90	3.79	3.45	3.25	3.47	4.36	4.14	4.19	3.93	3.36	3.36	3.18	3.86
MnO	17.09	17.19	17.37	17.68	17.41	17.33	15.95	16.01	15.46	15.10	14.94	14.82	14.43	13.89
FeO	19.30	19.23	18.97	19.06	19.49	19.20	19.75	19.46	20.43	21.08	21.15	21.71	21.63	22.08
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.74	99.98	99.37	99.33	99.60	98.87	99.58	98.84	99.67	99.61	98.91	99.16	98.76	99.40
Cations														
Si	3.031	3.026	3.013	3.034	3.025	3.018	3.021	3.035	3.027	3.026	3.028	3.034	3.030	3.025
Ti	0.006	0.006	0.000	0.002	0.003	0.003	0.002	0.004	0.004	0.003	0.005	0.004	0.005	0.004
Al	1.976	1.979	1.997	1.971	1.983	1.988	1.984	1.977	1.977	1.972	1.988	1.962	1.990	1.976
Cr	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.004	0.001
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.160	0.157	0.162	0.152	0.168	0.158	0.169	0.162	0.167	0.178	0.186	0.186	0.188	0.188
Ca	0.323	0.338	0.330	0.301	0.283	0.304	0.379	0.362	0.363	0.341	0.294	0.293	0.278	0.335
Mn	1.171	1.176	1.196	1.219	1.196	1.201	1.094	1.105	1.060	1.037	1.032	1.022	0.997	0.955
Fe^{2+}	1.306	1.299	1.290	1.297	1.322	1.313	1.337	1.326	1.383	1.429	1.442	1.479	1.476	1.499
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	7.975	7.979	7.988	7.977	7.981	7.985	7.985	7.972	7.981	7.985	7.973	7.981	7.968	7.983
Endmember														
Pyrope	5.4	5.3	5.4	5.1	5.7	5.3	5.7	5.5	5.6	6.0	6.3	6.2	6.4	6.3
Almandine	44.1	43.7	43.3	43.7	44.5	44.1	44.9	44.9	46.5	47.9	48.8	49.6	50.2	50.3
Spessartine	39.6	39.6	40.2	41.0	40.3	40.3	36.7	37.4	35.6	34.7	34.9	34.3	33.9	32.1
Grossular	10.9	11.4	11.1	10.1	9.5	10.2	12.7	12.2	12.2	11.4	9.9	9.8	9.5	11.3

	D7626A F2 Grt19	D7626A F1 Grt1	D7626A F1 Grt2	D7626A F1 Grt3	D7626A F1 Grt4	D7626A F1 Grt5	D7626A F1 Grt6	Q09B F10 Gt 1 2	Q09B F10 Gt 1 3	Q09B F10 Gt 1 4	Q09B F10 Gt 1 5	Q09B F10 Gt 1 6	Q09B F5 Gt5 1 1	Q09B F5 Gt5 1 2
Analysis														
SiO_2	37.10	37.32	37.49	37.37	37.48	37.45	36.96	37.94	37.96	38.86	37.87	37.35	37.66	37.90
TiO_2	0.09	0.16	0.20	0.03	0.24	0.28	0.21	0.11	0.04	0.16	0.07	0.12	0.12	0.09
Al_2O_3	20.59	20.70	20.41	20.98	20.48	20.61	20.51	21.02	21.10	19.22	21.03	20.45	21.18	21.12
Cr_2O_3	0.01	0.04	0.09	0.00	0.07	0.02	0.05	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Fe_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	1.28	0.16	0.28	0.32	0.00
MgO	1.32	1.37	1.33	1.55	1.30	1.28	1.26	2.70	3.81	3.53	3.43	3.04	3.37	2.62
CaO	3.65	5.30	4.79	5.52	5.75	6.58	5.13	11.75	10.85	8.79	11.35	11.26	10.47	11.34
MnO	14.46	17.50	19.04	16.73	17.41	17.19	18.24	0.44	1.15	1.76	1.36	0.38	0.36	0.39
FeO	21.85	16.64	15.87	17.20	16.03	15.86	16.10	24.91	23.49	21.38	23.14	24.55	25.32	25.69
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.27	0.04	0.00	0.01	0.00
Total	99.08	99.04	99.22	99.38	98.75	99.27	98.45	98.87	98.57	96.26	98.46	97.42	98.80	99.14
Cations														
Si	3.025	3.026	3.040	3.016	3.042	3.025	3.020	3.015	3.009	3.136	3.009	3.012	2.992	3.009
Ti	0.006	0.010	0.012	0.002	0.014	0.017	0.013	0.007	0.002	0.010	0.004	0.007	0.007	0.005
Al	1.979	1.978	1.951	1.996	1.959	1.962	1.976	1.968	1.971	1.828	1.969	1.944	1.984	1.976
Cr	0.001	0.003	0.005	0.000	0.004	0.001	0.003	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.077	0.010	0.017	0.019	0.000
Mg	0.160	0.166	0.161	0.187	0.158	0.154	0.153	0.319	0.450	0.425	0.406	0.365	0.399	0.310
Ca	0.319	0.461	0.416	0.478	0.500	0.570	0.449	1.000	0.922	0.760	0.966	0.973	0.891	0.964
Mn	0.999	1.202	1.308	1.144	1.197	1.176	1.262	0.029	0.077	0.120	0.092	0.026	0.024	0.026
Fe^{2+}	1.490	1.129	1.076	1.161	1.088	1.071	1.100	1.655	1.558	1.443	1.537	1.656	1.682	1.706
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.199	0.006	0.000	0.002	0.000
Total	7.979	7.974	7.969	7.984	7.962	7.976	7.977	7.994	8.000	8.000	8.000	8.000	8.000	7.997
Endmember														
Pyrope	5.4	5.6	5.4	6.3	5.4	5.2	5.2	10.6	15.0	15.5	13.5	12.1	13.3	10.3
Almandine	50.2	38.2	36.4	39.1	37.0	36.1	37.1	55.1	51.8	52.5	51.2	54.8	56.1	56.7
Spessartine	33.7	40.6	44.2	38.5	40.7	39.6	42.6	1.0	2.6	4.4	3.1	0.9	0.8	0.9
Grossular	10.7	15.6	14.1	16.1	17.0	19.2	15.2	33.3	30.6	27.6	32.2	32.2	29.7	32.1

	Q09B F5 Gt5 1 3	Q09B F5 Gt5 1 4	Q09B F5 Gt5 1 5	Q09B F5 Gt5 1 6	Q09B F5 Gt5 1 7	Q09B F5 Gt5 1 8	Q09B F5 Gt5 1 9	Q09B F5 Gt5 1 10	Q09B F5 Gt5 1 12	Q09B F5 Gt5 1 13	Q09B F5 Gt5 1 14	Q09B F5 Gt5 1 15	Q09B F5 Gt5 1 16	Q09B F5 Gt5 1 17
Analysis														
SiO_2	37.70	37.71	37.73	38.12	37.86	37.99	37.64	37.52	37.61	37.78	37.44	37.66	37.63	37.30
TiO_2	0.14	0.13	0.15	0.10	0.11	0.09	0.04	0.04	0.10	0.10	0.13	0.21	0.14	0.17
Al_2O_3	20.97	20.45	20.41	20.63	21.15	20.88	20.91	20.48	20.60	20.76	20.47	20.64	20.40	20.57
Cr_2O_3	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00
Fe_2O_3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.30	0.00	0.09	0.10
MgO	2.36	2.00	2.32	2.87	2.79	2.92	2.63	3.07	3.06	3.14	3.03	2.70	2.64	2.35
CaO	11.71	12.39	12.39	11.90	11.44	11.11	11.07	11.00	10.85	11.29	11.40	11.32	11.14	11.59
MnO	0.40	0.65	0.78	0.87	1.11	1.33	2.10	1.33	1.72	1.26	1.39	1.14	1.05	0.82
FeO	25.34	24.88	24.11	23.77	24.25	24.50	23.97	23.97	23.56	23.58	23.30	24.30	25.06	24.88
Na_2O	0.00	0.05	0.00	0.04	0.00	0.00	0.01	0.00	0.09	0.03	0.04	0.00	0.00	0.00
Total	98.63	98.28	97.89	98.30	98.72	98.82	98.36	97.42	97.75	97.94	97.50	97.97	98.16	97.78
Cations														
Si	3.010	3.028	3.032	3.038	3.010	3.021	3.013	3.025	3.021	3.022	3.014	3.022	3.023	3.009
Ti	0.008	0.008	0.009	0.006	0.007	0.005	0.003	0.003	0.006	0.006	0.008	0.013	0.009	0.010
Al	1.973	1.935	1.933	1.938	1.982	1.957	1.972	1.946	1.950	1.958	1.942	1.951	1.932	1.956
Cr	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Fe^{3+}	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.018	0.000	0.006	0.006
Mg	0.281	0.240	0.278	0.341	0.331	0.346	0.313	0.369	0.367	0.374	0.363	0.323	0.317	0.283
Ca	1.002	1.066	1.067	1.016	0.975	0.947	0.949	0.950	0.934	0.968	0.983	0.973	0.959	1.002
Mn	0.027	0.045	0.053	0.059	0.075	0.090	0.143	0.091	0.117	0.085	0.095	0.077	0.071	0.056
Fe^{2+}	1.692	1.671	1.621	1.585	1.612	1.629	1.604	1.616	1.583	1.577	1.569	1.630	1.683	1.678
Na	0.000	0.007	0.000	0.006	0.000	0.000	0.001	0.000	0.013	0.004	0.006	0.000	0.000	0.000
Total	7.995	8.000	7.992	7.990	7.992	7.995	7.999	7.999	8.000	7.995	8.000	7.990	8.000	8.000
Endmember														
Pyrope	9.4	7.9	9.2	11.4	11.1	11.5	10.4	12.2	12.2	12.5	12.1	10.8	10.5	9.4
Almandine	56.4	55.3	53.7	52.8	53.9	54.1	53.3	53.4	52.8	52.5	52.1	54.3	55.5	55.6
Spessartine	0.9	1.5	1.8	2.0	2.5	3.0	4.7	3.0	3.9	2.8	3.2	2.6	2.4	1.9
Grossular	33.4	35.3	35.3	33.9	32.6	31.4	31.5	31.4	31.1	32.2	32.7	32.4	31.6	33.2

	Q09B F5 Gt5 1 18	Q09B F5 Gt5 1 19	Q09B F5 Gt5 1 20	Q09B F1 Gt1 1	Q09B F1 Gt1 2	Q09B F1 Gt1 3	Q09B F1 Gt1 4	Q09B F1 Gt1 5	Q09B F1 Gt1 6	Q09B F1 Gt1 7	Q09B F1 Gt1 8	Q09B F1 Gt1 9	Q09B F1 Gt1 11	Q09B F1 Gt1 12
Analysis														
SiO_2	37.50	37.44	37.03	38.29	38.20	38.08	37.93	37.96	37.46	37.56	37.56	37.38	37.18	37.10
TiO_2	0.11	0.11	0.11	0.10	0.15	0.14	0.12	0.11	0.17	0.14	0.17	0.14	0.16	0.12
Al_2O_3	20.04	20.19	20.14	21.32	21.13	21.19	20.98	21.02	20.81	20.84	20.80	20.73	20.76	20.49
Cr_2O_3	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.01	0.01	0.01
Fe_2O_3	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.15	0.24	0.44	0.11	0.30	0.88	1.24
MgO	2.22	2.54	2.66	3.81	3.68	3.37	2.99	2.67	2.45	2.72	2.88	2.47	2.52	2.23
CaO	11.22	10.97	10.94	10.97	11.02	11.40	11.96	12.36	11.71	11.34	11.74	11.92	12.51	12.36
MnO	0.49	0.33	0.29	0.66	0.64	0.39	0.33	0.55	0.86	1.07	0.94	0.83	0.76	0.77
FeO	25.57	25.52	25.31	24.18	23.86	24.42	24.28	24.22	24.55	24.58	23.66	24.30	23.12	23.89
Na_2O	0.01	0.00	0.00	0.00	0.07	0.03	0.00	0.02	0.03	0.00	0.06	0.00	0.04	0.00
Total	97.15	97.12	96.71	99.33	98.77	99.05	98.62	99.08	98.29	98.70	97.92	98.09	97.93	98.20
Cations														
Si	3.046	3.037	3.019	3.010	3.019	3.009	3.014	3.009	3.002	2.998	3.009	3.001	2.985	2.984
Ti	0.007	0.007	0.007	0.006	0.009	0.008	0.007	0.006	0.010	0.008	0.010	0.009	0.010	0.007
Al	1.919	1.930	1.935	1.975	1.968	1.973	1.965	1.963	1.966	1.961	1.964	1.962	1.964	1.942
Cr	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.001	0.000	0.000	0.000	0.001	0.001	0.000
Fe^{3+}	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.009	0.014	0.027	0.007	0.018	0.053	0.075
Mg	0.269	0.307	0.324	0.447	0.434	0.397	0.354	0.316	0.293	0.323	0.344	0.296	0.302	0.267
Ca	0.976	0.954	0.956	0.924	0.933	0.965	1.018	1.049	1.006	0.970	1.008	1.026	1.076	1.065
Mn	0.034	0.023	0.020	0.044	0.043	0.026	0.022	0.037	0.058	0.072	0.064	0.056	0.052	0.052
Fe^{2+}	1.737	1.731	1.726	1.590	1.577	1.614	1.614	1.606	1.646	1.641	1.585	1.631	1.552	1.607
Na	0.001	0.000	0.000	0.000	0.011	0.004	0.000	0.004	0.005	0.000	0.009	0.000	0.006	0.000
Total	7.988	7.990	8.000	7.996	7.993	7.998	7.996	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	8.9	10.2	10.7	14.9	14.5	13.2	11.8	10.5	9.8	10.8	11.5	9.8	10.1	8.9
Almandine	57.6	57.4	57.0	52.9	52.8	53.7	53.6	53.4	54.8	54.6	52.8	54.2	52.1	53.7
Spessartine	1.1	0.8	0.7	1.5	1.4	0.9	0.7	1.2	1.9	2.4	2.1	1.9	1.7	1.8
Grossular	32.4	31.6	31.6	30.8	31.2	32.2	33.8	34.9	33.5	32.3	33.6	34.1	36.1	35.6

	Q09B F1 Gt1 13	Q09B F1 Gt1 14	Q09B F1 Gt1 15	Q09B F1 Gt1 16	Q09B F1 Gt1 17	Q33B F1 Gt 1 1	Q33B F1 Gt 1 2	Q33B F1 Gt 1 3	Q33B F1 Gt 1 4	Q33B F1 Gt 1 5	Q33B F1 Gt 1 6	Q33B F1 Gt 1 7	Q33B F1 Gt 1 8	Q33B F1 Gt 1 9
Analysis														
SiO_2	36.88	37.04	37.00	37.29	37.06	37.84	37.88	37.97	37.71	37.69	37.93	37.79	37.90	38.06
TiO_2	0.12	0.13	0.16	0.13	0.11	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Al_2O_3	20.51	20.33	20.47	20.36	20.26	21.67	21.37	21.43	21.35	21.51	21.63	21.52	21.43	21.47
Cr_2O_3	0.03	0.01	0.03	0.00	0.01	0.02	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05
Fe_2O_3	0.94	1.00	0.62	0.72	0.73	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
MgO	2.00	2.30	2.52	2.88	3.35	5.35	5.49	5.51	5.41	5.50	5.57	5.52	5.61	5.58
CaO	12.10	11.92	11.50	11.19	10.83	1.39	1.42	1.42	1.43	1.43	1.40	1.41	1.43	1.41
MnO	0.51	0.36	0.30	0.42	0.48	2.67	2.74	2.84	2.73	2.65	2.58	2.64	2.70	2.73
FeO	24.62	24.44	24.56	24.49	24.09	30.48	30.82	30.55	30.97	30.77	30.66	30.59	30.65	30.59
Na_2O	0.00	0.05	0.06	0.07	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.03	0.01
Total	97.72	97.57	97.22	97.54	96.92	99.45	99.76	99.76	99.75	99.57	99.81	99.50	99.79	99.91
Cations														
Si	2.985	2.996	2.998	3.008	3.003	3.002	3.003	3.006	2.994	2.992	2.999	2.999	3.001	3.007
Ti	0.007	0.008	0.010	0.008	0.007	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Al	1.957	1.938	1.955	1.935	1.935	2.026	1.996	2.000	1.998	2.013	2.015	2.013	1.999	1.999
Cr	0.002	0.000	0.002	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.003
Fe^{3+}	0.057	0.061	0.038	0.043	0.045	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000
Mg	0.242	0.277	0.305	0.346	0.405	0.633	0.648	0.650	0.640	0.651	0.657	0.653	0.663	0.657
Ca	1.049	1.033	0.998	0.967	0.940	0.118	0.121	0.121	0.121	0.121	0.119	0.120	0.121	0.119
Mn	0.035	0.024	0.020	0.029	0.033	0.180	0.184	0.190	0.183	0.178	0.172	0.178	0.181	0.183
Fe^{2+}	1.666	1.654	1.664	1.652	1.633	2.022	2.043	2.023	2.056	2.043	2.027	2.030	2.029	2.021
Na	0.000	0.008	0.010	0.011	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.005	0.001
Total	8.000	8.000	8.000	8.000	8.000	7.983	7.999	7.995	8.002	8.000	7.992	7.994	8.001	7.991
Endmember														
Pyrope	8.1	9.3	10.2	11.6	13.4	21.4	21.6	21.8	21.3	21.7	22.1	21.9	22.1	22.0
Almandine	55.7	55.3	55.7	55.2	54.2	68.5	68.2	67.8	68.5	68.3	68.1	68.1	67.8	67.8
Spessartine	1.2	0.8	0.7	1.0	1.1	6.1	6.1	6.4	6.1	6.0	5.8	6.0	6.1	6.1
Grossular	35.1	34.6	33.4	32.3	31.2	4.0	4.0	4.0	4.0	4.1	4.0	4.0	4.1	4.0

	Q33B F1 Gt 1 10	Q33B F1 Gt 1 11	Q33B F1 Gt 1 12	Q33B F1 Gt 1 13	Q33B F1 Gt 1 14	Q33B F1 Gt 1 15	Q33B F1 Gt 1 16	Q33B F1 Gt 1 17	Q33B F1 Gt 1 18	Q33B F1 Gt 1 19	Q33B F1 Gt 1 20	Q33B F1 Gt 1 21	Q33B F1 Gt 1 22	Q33B F1 Gt 1 23
Analysis														
SiO_2	37.59	37.71	37.71	39.04	37.84	37.85	37.00	37.16	36.78	37.16	36.30	36.45	36.29	36.45
TiO_2	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01
Al_2O_3	21.83	21.52	21.38	22.22	21.44	21.65	21.65	21.61	21.25	21.38	21.41	21.40	21.32	21.42
Cr_2O_3	0.02	0.00	0.02	0.02	0.03	0.01	0.03	0.02	0.02	0.04	0.04	0.04	0.03	0.02
Fe_2O_3	0.20	0.00	0.13	0.00	0.06	0.00	0.27	0.39	0.85	0.43	0.66	0.76	0.90	0.42
MgO	5.73	5.49	5.46	5.84	5.53	5.66	5.53	5.68	5.69	5.52	5.63	5.54	5.57	5.39
CaO	1.42	1.38	1.40	1.39	1.48	1.40	1.44	1.42	1.41	1.46	1.41	1.40	1.42	1.43
MnO	2.77	2.78	2.86	2.78	2.80	2.90	2.93	2.87	2.88	2.79	2.67	2.78	2.76	2.69
FeO	30.78	30.50	30.81	30.42	30.74	30.58	30.44	30.40	30.07	30.53	30.14	30.34	30.18	30.46
Na_2O	0.00	0.02	0.00	0.03	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.02	0.00	0.00
Total	100.34	99.43	99.76	101.73	99.92	100.06	99.33	99.58	98.96	99.31	98.28	98.73	98.47	98.28
Cations														
Si	2.964	2.996	2.993	3.015	2.995	2.989	2.953	2.956	2.948	2.966	2.930	2.933	2.928	2.944
Ti	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Al	2.029	2.015	2.000	2.022	2.000	2.015	2.036	2.026	2.007	2.011	2.037	2.029	2.027	2.038
Cr	0.001	0.000	0.001	0.001	0.002	0.000	0.002	0.001	0.001	0.003	0.003	0.003	0.002	0.001
Fe^{3+}	0.012	0.000	0.007	0.000	0.003	0.000	0.016	0.024	0.051	0.026	0.040	0.046	0.055	0.026
Mg	0.674	0.651	0.646	0.672	0.652	0.666	0.658	0.674	0.680	0.657	0.677	0.664	0.670	0.650
Ca	0.120	0.118	0.119	0.115	0.126	0.118	0.123	0.121	0.121	0.125	0.122	0.121	0.122	0.124
Mn	0.185	0.187	0.193	0.182	0.188	0.194	0.198	0.193	0.195	0.188	0.183	0.189	0.189	0.184
Fe^{2+}	2.030	2.026	2.045	1.965	2.035	2.020	2.031	2.022	2.016	2.038	2.035	2.042	2.036	2.057
Na	0.000	0.003	0.000	0.004	0.000	0.000	0.004	0.005	0.000	0.000	0.001	0.003	0.000	0.000
Total	8.015	7.997	8.003	7.976	8.002	8.003	8.022	8.021	8.021	8.014	8.029	8.030	8.030	8.023
Endmember														
Pyrope	22.4	21.8	21.5	22.9	21.7	22.2	21.9	22.4	22.6	21.9	22.5	22.0	22.2	21.5
Almandine	67.5	68.0	68.1	67.0	67.8	67.4	67.5	67.2	66.9	67.7	67.4	67.7	67.5	68.2
Spessartine	6.1	6.3	6.4	6.2	6.3	6.5	6.6	6.4	6.5	6.3	6.0	6.3	6.3	6.1
Grossular	4.0	3.9	4.0	3.9	4.2	3.9	4.1	4.0	4.0	4.1	4.1	4.0	4.1	4.1

	Q33B F1 Gt 1 24	Q33B F1 Gt 1 25	Q61E F8 Gt 1 1	Q61E F8 Gt 1 2	Q61E F8 Gt 1 3	Q61E F8 Gt 1 4	Q61E F8 Gt 1 5	Q61E F8 Gt 1 6	Q61E F8 Gt 1 7	Q61E F8 Gt 1 9	Q61E F8 Gt 1 10	Q61E F8 Gt 1 11	Q61E F8 Gt 1 12	Q61E F8 Gt 1 13
Analysis														
SiO_2	36.09	35.18	36.94	37.00	36.90	37.05	36.76	37.00	36.85	36.75	37.07	36.98	36.93	36.81
TiO_2	0.00	0.01	0.07	0.07	0.06	0.07	0.05	0.08	0.06	0.05	0.09	0.04	0.07	0.07
Al_2O_3	21.51	21.08	21.09	21.18	21.18	21.16	20.98	20.97	21.01	21.10	21.22	21.02	21.09	21.19
Cr_2O_3	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.03
Fe_2O_3	0.91	1.29	0.05	0.03	0.00	0.00	0.12	0.31	0.00	0.30	0.00	0.18	0.20	0.18
MgO	5.46	5.08	3.19	3.26	3.23	3.20	3.17	3.14	3.27	3.32	3.25	3.32	3.41	3.34
CaO	1.41	1.39	1.95	1.91	2.03	2.09	2.36	2.25	2.10	1.99	2.01	2.05	1.97	1.89
MnO	2.79	2.86	1.77	1.84	1.82	1.84	2.06	2.15	2.26	2.65	2.81	2.93	3.18	3.32
FeO	30.42	30.26	34.45	34.41	34.14	34.24	33.46	33.86	33.27	33.29	33.27	32.95	32.70	32.79
Na_2O	0.00	0.00	0.03	0.04	0.00	0.00	0.04	0.00	0.00	0.01	0.01	0.00	0.00	0.03
Total	98.62	97.17	99.55	99.75	99.37	99.64	99.01	99.78	98.84	99.48	99.72	99.48	99.54	99.65
Cations														
Si	2.912	2.893	2.985	2.982	2.983	2.988	2.984	2.984	2.991	2.971	2.986	2.987	2.980	2.971
Ti	0.000	0.001	0.004	0.004	0.004	0.004	0.003	0.005	0.004	0.003	0.005	0.003	0.004	0.004
Al	2.045	2.043	2.008	2.012	2.018	2.011	2.007	1.993	2.011	2.011	2.014	2.001	2.006	2.016
Cr	0.002	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.002
Fe^{3+}	0.055	0.080	0.003	0.002	0.000	0.000	0.007	0.019	0.000	0.018	0.000	0.011	0.012	0.011
Mg	0.657	0.623	0.384	0.392	0.389	0.384	0.384	0.378	0.396	0.400	0.390	0.400	0.410	0.402
Ca	0.122	0.123	0.169	0.165	0.176	0.181	0.205	0.195	0.183	0.173	0.173	0.178	0.170	0.163
Mn	0.190	0.199	0.121	0.126	0.125	0.126	0.142	0.147	0.156	0.182	0.191	0.200	0.217	0.227
Fe^{2+}	2.052	2.081	2.327	2.319	2.308	2.309	2.271	2.283	2.259	2.251	2.241	2.225	2.207	2.213
Na	0.000	0.000	0.005	0.006	0.000	0.000	0.006	0.000	0.000	0.002	0.002	0.000	0.000	0.005
Total	8.037	8.044	8.007	8.009	8.004	8.003	8.009	8.005	7.999	8.012	8.003	8.004	8.006	8.013
Endmember														
Pyrope	21.7	20.6	12.8	13.1	13.0	12.8	12.8	12.6	13.2	13.3	13.0	13.3	13.6	13.4
Almandine	67.9	68.8	77.5	77.3	77.0	77.0	75.7	76.0	75.5	74.9	74.8	74.1	73.5	73.6
Spessartine	6.3	6.6	4.0	4.2	4.2	4.2	4.7	4.9	5.2	6.0	6.4	6.7	7.2	7.5
Grossular	4.0	4.1	5.6	5.5	5.9	6.0	6.8	6.5	6.1	5.7	5.8	5.9	5.7	5.4

	Q61E F8 Gt 1 14	Q61E F8 Gt 1 15	Q61E F8 Gt 1 16	Q61E F8 Gt 1 17	Q61E F8 Gt 1 18	Q61E F8 Gt 1 19	Q61E F8 Gt 1 20	Q61E F8 Gt 1 21	Q61E F8 Gt 1 22	Q61E F8 Gt 1 23	Q61E F8 Gt 1 24	Q61E F8 Gt 1 25	Q61E F8 Gt 1 26	Q61E F8 Gt 1 27
Analysis														
SiO_2	36.83	37.07	36.95	36.72	36.80	36.71	36.76	36.86	36.92	36.82	36.50	36.43	36.22	36.60
TiO_2	0.04	0.10	0.07	0.10	0.08	0.09	0.09	0.05	0.09	0.04	0.06	0.05	0.05	0.03
Al_2O_3	21.04	21.18	21.43	21.20	21.18	21.09	21.19	21.35	21.07	21.03	21.05	20.78	20.93	21.07
Cr_2O_3	0.04	0.01	0.01	0.01	0.03	0.01	0.02	0.02	0.00	0.02	0.02	0.02	0.02	0.00
Fe_2O_3	0.05	0.00	0.00	0.09	0.09	0.34	0.05	0.00	0.00	0.01	0.26	0.21	0.33	0.11
MgO	3.47	3.34	3.41	3.32	3.30	3.46	3.41	3.40	3.43	3.33	3.36	3.42	3.45	3.40
CaO	1.84	1.86	1.83	1.83	1.79	1.78	1.76	1.61	1.55	1.51	1.40	1.15	1.14	1.03
MnO	3.36	3.65	3.69	3.79	4.05	4.10	4.10	4.41	4.29	4.63	4.76	4.75	4.90	4.80
FeO	32.36	32.31	32.36	32.33	32.18	31.86	31.92	32.01	31.87	31.68	31.64	31.49	31.40	31.94
Na_2O	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.03	0.03	0.07	0.00	0.07	0.00	0.06
Total	99.05	99.53	99.76	99.38	99.51	99.46	99.32	99.75	99.25	99.15	99.03	98.36	98.42	99.04
Cations														
Si	2.985	2.989	2.973	2.970	2.974	2.968	2.974	2.971	2.987	2.986	2.968	2.980	2.963	2.975
Ti	0.002	0.006	0.004	0.006	0.005	0.005	0.006	0.003	0.006	0.003	0.003	0.003	0.003	0.002
Al	2.009	2.012	2.032	2.021	2.018	2.009	2.020	2.028	2.009	2.010	2.017	2.003	2.018	2.018
Cr	0.003	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000
Fe^{3+}	0.003	0.000	0.000	0.005	0.005	0.021	0.003	0.000	0.000	0.001	0.016	0.013	0.020	0.007
Mg	0.420	0.402	0.409	0.401	0.398	0.417	0.412	0.408	0.413	0.403	0.407	0.417	0.421	0.411
Ca	0.160	0.161	0.158	0.158	0.155	0.154	0.153	0.139	0.135	0.131	0.122	0.101	0.100	0.090
Mn	0.231	0.249	0.251	0.259	0.277	0.280	0.281	0.301	0.294	0.318	0.327	0.329	0.339	0.331
Fe^{2+}	2.193	2.179	2.177	2.187	2.175	2.154	2.159	2.157	2.157	2.148	2.151	2.155	2.148	2.171
Na	0.000	0.002	0.000	0.000	0.000	0.004	0.000	0.005	0.005	0.011	0.000	0.011	0.000	0.010
Total	8.005	8.000	8.006	8.010	8.009	8.014	8.009	8.014	8.005	8.011	8.012	8.013	8.014	8.015
Endmember														
Pyrope	14.0	13.4	13.7	13.3	13.2	13.9	13.7	13.6	13.8	13.4	13.5	13.9	14.0	13.7
Almandine	73.0	72.9	72.7	72.8	72.4	71.7	71.9	71.8	71.9	71.6	71.5	71.8	71.4	72.3
Spessartine	7.7	8.3	8.4	8.6	9.2	9.3	9.4	10.0	9.8	10.6	10.9	11.0	11.3	11.0
Grossular	5.3	5.4	5.3	5.3	5.2	5.1	5.1	4.6	4.5	4.4	4.1	3.4	3.3	3.0

	Q61E F8 Gt 1 28	Q61E F8 Gt 1 29	Q61E F8 Gt 1 30	Q61E F8 Gt 1 31	Q61E F8 Gt 1 32	Q61E F8 Gt 1 33	Q61E F8 Gt 1 34	Q61E F8 Gt 1 35	Q61E F8 Gt 1 36	Q61E F8 Gt 1 37	Q61E F8 Gt 1 38	Q64D F1 Gt 1 1	Q64D F1 Gt 1 2	Q64D F1 Gt 1 3
Analysis														
SiO_2	36.60	36.71	36.33	36.74	36.46	36.66	36.46	36.43	36.64	37.06	36.61	37.69	37.94	37.89
TiO_2	0.04	0.01	0.02	0.03	0.07	0.05	0.07	0.08	0.08	0.09	0.07	0.02	0.02	0.01
Al_2O_3	21.03	21.15	21.07	21.04	21.05	20.90	20.92	21.09	20.87	21.21	20.96	21.29	21.17	20.94
Cr_2O_3	0.02	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.01	0.00	0.01	0.01
Fe_2O_3	0.33	0.02	0.08	0.17	0.00	0.04	0.32	0.00	0.21	0.00	0.21	0.00	0.17	0.17
MgO	3.42	3.40	3.36	3.38	3.26	3.30	3.39	3.20	3.30	3.26	3.27	4.11	4.31	4.20
CaO	1.06	1.02	1.01	1.03	1.05	1.08	1.32	1.40	1.49	1.53	1.31	1.07	1.11	1.14
MnO	4.79	4.79	4.80	4.72	4.55	4.54	4.37	3.86	3.61	3.00	2.48	2.30	2.12	2.09
FeO	32.01	32.07	31.87	32.19	31.72	32.18	31.96	32.41	32.68	33.59	34.16	33.78	33.79	33.46
Na_2O	0.01	0.03	0.00	0.01	0.00	0.02	0.00	0.02	0.02	0.02	0.03	0.03	0.00	0.00
Total	99.30	99.23	98.57	99.33	98.17	98.78	98.81	98.50	98.92	99.77	99.11	100.29	100.64	99.92
Cations														
Si	2.970	2.977	2.968	2.979	2.984	2.987	2.971	2.975	2.981	2.986	2.976	3.004	3.011	3.026
Ti	0.002	0.001	0.001	0.002	0.004	0.003	0.004	0.005	0.005	0.005	0.005	0.001	0.001	0.001
Al	2.011	2.022	2.029	2.011	2.031	2.008	2.009	2.030	2.002	2.014	2.008	2.000	1.980	1.971
Cr	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.000	0.001	0.001
Fe^{3+}	0.020	0.001	0.005	0.010	0.000	0.002	0.019	0.000	0.013	0.000	0.013	0.000	0.010	0.010
Mg	0.413	0.412	0.409	0.408	0.397	0.400	0.412	0.389	0.401	0.392	0.396	0.489	0.510	0.500
Ca	0.092	0.088	0.088	0.089	0.092	0.094	0.115	0.123	0.130	0.132	0.114	0.092	0.094	0.097
Mn	0.330	0.329	0.332	0.324	0.316	0.313	0.301	0.267	0.249	0.204	0.171	0.155	0.143	0.142
Fe^{2+}	2.172	2.175	2.178	2.183	2.171	2.193	2.178	2.214	2.223	2.263	2.323	2.251	2.242	2.235
Na	0.002	0.004	0.001	0.002	0.000	0.004	0.000	0.003	0.004	0.002	0.005	0.005	0.000	0.000
Total	8.013	8.011	8.013	8.009	7.996	8.006	8.010	8.006	8.008	8.002	8.011	7.997	7.992	7.983
Endmember														
Pyrope	13.7	13.7	13.6	13.6	13.4	13.3	13.7	13.0	13.3	13.1	13.2	16.4	17.1	16.8
Almandine	72.2	72.4	72.4	72.6	72.9	73.1	72.4	74.0	74.0	75.6	77.3	75.4	75.0	75.1
Spessartine	11.0	11.0	11.0	10.8	10.6	10.4	10.0	8.9	8.3	6.8	5.7	5.2	4.8	4.8
Grossular	3.1	2.9	2.9	3.0	3.1	3.1	3.8	4.1	4.3	4.4	3.8	3.1	3.1	3.3

	Q64D F1 Gt 1 4	Q64D F1 Gt 1 5	Q64D F1 Gt 1 6	Q64D F1 Gt 1 7	Q64D F1 Gt 1 8	Q64D F1 Gt 1 9	Q64D F1 Gt 1 10	Q64D F1 Gt 1 11	Q64D F1 Gt 1 12	Q64D F1 Gt 1 13	Q64D F1 Gt 1 14	Q64D F1 Gt 1 15	Q64D F1 Gt 1 16	Q64D F1 Gt 1 17
Analysis														
SiO_2	37.69	38.14	37.65	37.85	37.88	37.95	37.98	37.95	37.74	37.56	37.14	38.33	37.88	37.24
TiO_2	0.01	0.11	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.04	0.03	0.04	0.02	0.02
Al_2O_3	20.89	20.84	20.89	20.40	20.68	20.25	20.00	19.56	20.72	20.45	20.55	20.63	20.81	20.92
Cr_2O_3	0.00	0.02	0.00	0.02	0.03	0.01	0.02	0.03	0.03	0.02	0.03	0.01	0.02	0.02
Fe_2O_3	0.29	0.33	0.19	0.54	0.42	0.71	0.58	1.96	0.26	0.33	0.49	0.36	0.28	0.11
MgO	4.27	4.28	4.08	4.07	4.21	4.01	4.00	3.94	3.84	3.38	3.52	3.76	3.54	3.47
CaO	1.07	1.01	0.98	0.98	0.95	0.94	0.97	0.93	0.96	0.98	0.97	0.95	0.97	0.99
MnO	2.10	2.26	2.21	2.11	2.22	2.20	2.14	2.18	2.25	2.31	2.31	2.30	2.34	2.35
FeO	33.47	33.44	33.65	33.21	33.39	33.19	32.56	32.13	33.85	34.12	34.32	33.91	34.46	34.58
Na_2O	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.04	0.01	0.00
Total	99.79	100.42	99.66	99.19	99.81	99.29	98.26	98.68	99.65	99.21	99.35	100.35	100.33	99.68
Cations														
Si	3.016	3.031	3.020	3.047	3.031	3.053	3.078	3.071	3.031	3.038	3.008	3.054	3.030	3.004
Ti	0.001	0.006	0.001	0.000	0.002	0.000	0.000	0.001	0.000	0.002	0.002	0.002	0.001	0.001
Al	1.970	1.951	1.975	1.935	1.951	1.920	1.911	1.865	1.961	1.950	1.961	1.937	1.961	1.989
Cr	0.000	0.001	0.000	0.001	0.002	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.001
Fe^{3+}	0.018	0.020	0.011	0.033	0.025	0.043	0.035	0.119	0.016	0.020	0.030	0.022	0.017	0.007
Mg	0.509	0.507	0.488	0.489	0.502	0.481	0.484	0.475	0.459	0.408	0.425	0.447	0.423	0.417
Ca	0.092	0.086	0.084	0.085	0.082	0.081	0.084	0.080	0.082	0.085	0.085	0.081	0.083	0.085
Mn	0.143	0.152	0.150	0.144	0.151	0.150	0.147	0.149	0.153	0.158	0.158	0.155	0.159	0.161
Fe^{2+}	2.240	2.222	2.257	2.236	2.234	2.233	2.207	2.174	2.274	2.308	2.324	2.260	2.305	2.333
Na	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.000	0.004	0.000	0.007	0.002	0.000
Total	7.989	7.977	7.987	7.969	7.979	7.966	7.948	7.936	7.979	7.976	7.994	7.967	7.981	7.997
Endmember														
Pyrope	17.1	17.1	16.4	16.5	16.9	16.3	16.6	16.5	15.5	13.8	14.2	15.2	14.2	13.9
Almandine	75.1	74.9	75.7	75.7	75.3	75.8	75.5	75.5	76.6	78.0	77.7	76.8	77.6	77.9
Spessartine	4.8	5.1	5.0	4.9	5.1	5.1	5.0	5.2	5.2	5.4	5.3	5.3	5.3	5.4
Grossular	3.1	2.9	2.8	2.9	2.8	2.8	2.9	2.8	2.8	2.9	2.8	2.8	2.8	2.9

	Q64D F1 Gt 1 18	Q64D F1 Gt 1 19	Q64D F1 Gt 1 20	Q64D F1 Gt 1 21	Q64D F1 Gt 1 22	Q64D F1 Gt 1 23	Q64D F1 Gt 1 24	Q64D F1 Gt 1 25	Line 1 Q64E F7 Gt 1	Line 2 Q64E F7 Gt 1	Line 3 Q64E F7 Gt 1	Line 4 Q64E F7 Gt 1	Line 5 Q64E F7 Gt 1	Line 6 Q64E F7 Gt 1
Analysis														
SiO_2	37.52	37.15	37.66	37.75	37.44	38.06	37.79	37.35	38.50	38.19	37.90	38.16	38.04	38.29
TiO_2	0.01	0.02	0.01	0.01	0.03	0.00	0.02	0.01	0.03	0.07	0.05	0.05	0.04	0.01
Al_2O_3	20.52	20.71	20.52	20.65	20.83	20.84	20.87	20.61	21.27	21.12	21.35	21.31	21.03	21.21
Cr_2O_3	0.02	0.02	0.03	0.01	0.04	0.00	0.03	0.02	0.01	0.00	0.02	0.04	0.02	0.02
Fe_2O_3	0.67	0.28	0.57	0.29	0.02	0.39	0.16	0.64	0.37	0.18	0.93	0.29	0.49	0.43
MgO	3.48	3.43	3.93	3.87	3.88	4.49	4.59	4.55	3.82	3.35	3.40	3.46	3.68	3.81
CaO	1.01	0.98	0.95	0.99	0.98	1.04	1.08	1.13	9.25	9.94	9.81	9.59	9.17	7.97
MnO	2.24	2.35	2.24	2.19	2.22	1.87	1.90	2.03	0.96	0.89	0.94	0.92	0.81	0.81
FeO	34.56	34.47	33.70	33.69	33.76	33.36	32.90	32.88	26.44	26.11	25.57	26.22	26.39	27.91
Na_2O	0.03	0.00	0.02	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.04	0.01	0.00	0.01
Total	100.07	99.40	99.64	99.45	99.20	100.11	99.33	99.23	100.62	99.86	100.03	100.05	99.66	100.48
Cations														
Si	3.017	3.007	3.027	3.036	3.020	3.029	3.026	3.006	3.008	3.010	2.982	3.001	3.004	3.005
Ti	0.001	0.001	0.000	0.001	0.002	0.000	0.001	0.001	0.002	0.004	0.003	0.003	0.002	0.001
Al	1.945	1.976	1.944	1.957	1.980	1.955	1.970	1.955	1.958	1.962	1.980	1.975	1.957	1.963
Cr	0.001	0.001	0.002	0.001	0.003	0.000	0.002	0.002	0.000	0.000	0.001	0.002	0.001	0.001
Fe^{3+}	0.041	0.017	0.035	0.018	0.001	0.023	0.009	0.039	0.022	0.011	0.055	0.017	0.029	0.026
Mg	0.417	0.413	0.471	0.464	0.467	0.533	0.548	0.546	0.445	0.394	0.399	0.406	0.434	0.446
Ca	0.087	0.085	0.082	0.085	0.084	0.089	0.093	0.097	0.774	0.840	0.827	0.808	0.776	0.670
Mn	0.153	0.161	0.152	0.150	0.151	0.126	0.129	0.138	0.063	0.059	0.063	0.061	0.054	0.054
Fe^{2+}	2.324	2.333	2.266	2.266	2.277	2.221	2.204	2.213	1.728	1.721	1.682	1.724	1.743	1.832
Na	0.005	0.000	0.004	0.000	0.000	0.009	0.000	0.001	0.000	0.000	0.007	0.002	0.000	0.002
Total	7.991	7.995	7.984	7.976	7.986	7.986	7.982	7.996	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	14.0	13.8	15.9	15.6	15.7	17.9	18.4	18.2	14.8	13.1	13.4	13.5	14.4	14.8
Almandine	78.0	78.0	76.2	76.4	76.4	74.8	74.1	73.9	57.4	57.1	56.6	57.5	58.0	61.0
Spessartine	5.1	5.4	5.1	5.0	5.1	4.3	4.3	4.6	2.1	2.0	2.1	2.0	1.8	1.8
Grossular	2.9	2.8	2.8	2.9	2.8	3.0	3.1	3.3	25.7	27.9	27.8	26.9	25.8	22.3

	Line 7 Q64E F7 Gt 1	Line 9 Q64E F7 Gt 1	Line 10 Q64E F7 Gt 1	Line 11 Q64E F7 Gt 1	Line 12 Q64E F7 Gt 1	Line 13 Q64E F7 Gt 1	Line 15 Q64E F7 Gt 1	Line 16 Q64E F7 Gt 1	Line 17 Q64E F7 Gt 1	Line 18 Q64E F7 Gt 1	Line 19 Q64E F7 Gt 1	Line 20 Q64E F7 Gt 1	Line 21 Q64E F7 Gt 1	Line 22 Q64E F7 Gt 1
Analysis														
SiO_2	38.09	38.31	38.27	38.07	37.96	37.44	37.62	38.18	37.08	37.76	37.65	37.65	37.65	37.70
TiO_2	0.03	0.04	0.02	0.03	0.02	0.03	0.03	0.04	0.08	0.07	0.08	0.10	0.06	0.09
Al_2O_3	21.13	21.39	21.14	21.00	21.14	20.78	21.02	21.23	20.53	21.11	20.93	20.87	20.90	20.93
Cr_2O_3	0.03	0.02	0.00	0.02	0.02	0.01	0.03	0.00	0.01	0.00	0.02	0.02	0.02	0.03
Fe_2O_3	0.25	0.00	0.00	0.00	0.22	0.19	0.45	0.00	1.17	0.76	0.63	0.39	0.32	0.26
MgO	3.67	3.07	2.80	2.42	2.49	2.29	1.82	1.86	1.56	1.59	1.54	1.47	1.49	1.51
CaO	7.60	7.68	7.94	8.32	8.49	8.47	9.29	9.30	9.89	10.18	10.19	10.25	10.37	10.26
MnO	0.80	0.69	0.70	0.85	0.83	0.96	1.36	1.37	1.63	1.71	1.69	1.81	1.94	1.90
FeO	28.48	29.55	29.49	29.24	29.26	28.88	28.49	28.61	27.20	27.60	27.58	27.54	27.16	27.35
Na_2O	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.01
Total	100.08	100.80	100.35	99.95	100.42	99.06	100.11	100.61	99.18	100.79	100.32	100.09	99.91	100.03
Cations														
Si	3.007	3.011	3.024	3.025	3.006	3.008	2.997	3.018	2.987	2.989	2.994	3.001	3.003	3.004
Ti	0.002	0.003	0.001	0.002	0.001	0.002	0.002	0.002	0.005	0.004	0.005	0.006	0.003	0.005
Al	1.966	1.981	1.969	1.966	1.972	1.968	1.974	1.978	1.949	1.969	1.962	1.961	1.966	1.965
Cr	0.002	0.001	0.000	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.001	0.001	0.002
Fe^{3+}	0.015	0.000	0.000	0.000	0.013	0.012	0.027	0.000	0.071	0.045	0.038	0.024	0.019	0.015
Mg	0.432	0.360	0.329	0.287	0.293	0.275	0.217	0.219	0.187	0.188	0.183	0.174	0.177	0.179
Ca	0.643	0.646	0.672	0.709	0.720	0.729	0.792	0.788	0.853	0.864	0.868	0.875	0.887	0.876
Mn	0.054	0.046	0.047	0.057	0.056	0.066	0.092	0.092	0.111	0.115	0.114	0.122	0.131	0.128
Fe^{2+}	1.880	1.942	1.949	1.943	1.937	1.940	1.898	1.891	1.832	1.827	1.834	1.836	1.812	1.823
Na	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.001
Total	8.000	7.999	7.991	7.990	8.000	8.000	8.000	7.992	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	14.4	12.0	11.0	9.6	9.8	9.1	7.2	7.3	6.3	6.3	6.1	5.8	5.9	6.0
Almandine	62.5	64.9	65.0	64.9	64.4	64.5	63.3	63.3	61.4	61.0	61.2	61.0	60.3	60.6
Spessartine	1.8	1.5	1.6	1.9	1.9	2.2	3.1	3.1	3.7	3.8	3.8	4.1	4.4	4.3
Grossular	21.4	21.6	22.4	23.7	24.0	24.2	26.4	26.3	28.6	28.9	28.9	29.1	29.5	29.1

	Line 23 Q64E F7 Gt 1	Line 24 Q64E F7 Gt 1	Line 25 Q64E F7 Gt 1	Line 26 Q64E F7 Gt 1	Line 27 Q64E F7 Gt 1	Line 28 Q64E F7 Gt 1	Line 29 Q64E F7 Gt 1	Line 30 Q64E F7 Gt 1	Line 31 Q64E F7 Gt 1	Line 32 Q64E F7 Gt 1	Line 33 Q64E F7 Gt 1	Line 34 Q64E F7 Gt 1	Line 35 Q64E F7 Gt 1	Line 36 Q64E F7 Gt 1
Analysis														
SiO_2	37.66	37.42	37.71	37.92	37.78	37.87	38.39	37.02	36.22	36.95	37.07	37.55	37.70	37.54
TiO_2	0.07	0.06	0.06	0.04	0.05	0.05	0.04	0.06	0.06	0.08	0.04	0.04	0.02	0.02
Al_2O_3	21.10	20.80	20.88	21.02	20.96	21.05	21.29	20.49	20.03	20.59	20.72	21.10	21.39	21.11
Cr_2O_3	0.01	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00
Fe_2O_3	0.66	0.90	0.36	0.02	0.00	0.21	0.00	1.39	1.73	0.76	1.08	0.36	0.52	0.58
MgO	1.48	1.45	1.44	1.47	1.52	1.65	1.62	1.64	1.65	1.84	2.14	2.26	2.43	2.61
CaO	10.49	10.32	10.10	9.95	9.78	9.50	9.44	9.43	9.00	8.66	8.42	8.37	8.09	7.86
MnO	2.16	1.91	2.07	1.97	1.94	1.82	1.74	1.62	1.34	1.22	1.15	0.99	0.87	0.82
FeO	26.82	27.06	27.56	28.01	27.75	28.38	28.88	27.69	27.54	28.65	28.56	29.17	29.52	29.16
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04
Total	100.45	99.92	100.18	100.42	99.80	100.53	101.40	99.34	97.57	98.76	99.20	99.85	100.55	99.75
Cations														
Si	2.989	2.990	3.005	3.013	3.016	3.006	3.018	2.982	2.974	2.990	2.983	2.995	2.985	2.993
Ti	0.004	0.004	0.003	0.003	0.003	0.003	0.002	0.004	0.004	0.005	0.003	0.002	0.001	0.001
Al	1.974	1.959	1.960	1.968	1.972	1.969	1.973	1.945	1.938	1.964	1.965	1.983	1.996	1.984
Cr	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Fe^{3+}	0.039	0.054	0.022	0.001	0.000	0.012	0.000	0.084	0.107	0.047	0.066	0.022	0.031	0.035
Mg	0.176	0.172	0.171	0.175	0.180	0.195	0.190	0.197	0.202	0.221	0.257	0.269	0.287	0.310
Ca	0.892	0.884	0.862	0.847	0.837	0.808	0.795	0.813	0.791	0.751	0.726	0.716	0.686	0.671
Mn	0.145	0.130	0.139	0.132	0.131	0.122	0.116	0.111	0.093	0.084	0.078	0.067	0.058	0.056
Fe^{2+}	1.780	1.808	1.836	1.861	1.852	1.884	1.899	1.865	1.891	1.939	1.921	1.946	1.955	1.944
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.007
Total	8.000	8.000	8.000	8.000	7.994	8.000	7.993	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	5.9	5.8	5.7	5.8	6.0	6.5	6.3	6.6	6.8	7.4	8.6	9.0	9.6	10.4
Almandine	59.5	60.4	61.0	61.7	61.7	62.6	63.3	62.5	63.5	64.7	64.4	64.9	65.5	65.2
Spessartine	4.8	4.3	4.6	4.4	4.4	4.1	3.9	3.7	3.1	2.8	2.6	2.2	2.0	1.9
Grossular	29.8	29.5	28.7	28.1	27.9	26.9	26.5	27.2	26.6	25.1	24.3	23.9	23.0	22.5

	Line 37 Q64E F7 Gt 1	Line 38 Q64E F7 Gt 1	Line 39 Q64E F7 Gt 1	Line 40 Q64E F7 Gt 1	Line 41 Q64E F7 Gt 1	Line 42 Q64E F7 Gt 1	Q67F F8 Gt 1 1	Q67F F8 Gt 1 2	Q67F F8 Gt 1 3	Q67F F8 Gt 1 4	Q67F F8 Gt 1 5	Q67F F8 Gt 1 6	Q67F F8 Gt 1 7	Q67F F8 Gt 1 9
Analysis														
SiO_2	37.79	37.89	37.78	37.91	37.71	37.89	37.46	37.08	33.49	36.87	36.85	36.94	36.67	36.90
TiO_2	0.04	0.06	0.03	0.01	0.05	0.05	0.07	0.07	0.10	0.10	0.09	0.09	0.07	0.15
Al_2O_3	21.15	21.40	21.30	21.13	21.17	21.01	21.29	21.31	18.93	21.31	21.16	21.18	21.12	21.19
Cr_2O_3	0.00	0.02	0.01	0.02	0.04	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0.01	0.00
Fe_2O_3	0.63	0.28	0.57	0.00	0.77	0.12	0.00	0.38	7.14	1.10	0.98	0.00	0.79	0.40
MgO	2.91	3.17	3.49	3.74	3.56	3.67	2.90	2.83	2.41	2.80	2.59	2.48	2.41	2.21
CaO	7.73	7.66	7.45	7.26	6.95	6.85	5.26	4.93	4.89	5.03	5.61	5.73	5.84	6.42
MnO	0.76	0.75	0.73	0.83	1.07	1.09	1.75	1.81	1.58	2.11	2.15	2.17	2.49	2.80
FeO	29.36	29.13	28.66	28.43	28.80	28.94	31.17	31.21	27.98	30.59	30.17	30.52	29.60	29.17
Na_2O	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Total	100.37	100.36	100.01	99.35	100.13	99.64	99.91	99.65	96.56	99.94	99.61	99.12	98.99	99.27
Cations														
Si	2.992	2.992	2.989	3.012	2.985	3.009	2.993	2.976	2.825	2.954	2.963	2.982	2.965	2.974
Ti	0.003	0.004	0.002	0.001	0.003	0.003	0.004	0.004	0.006	0.006	0.005	0.005	0.004	0.009
Al	1.973	1.992	1.986	1.978	1.975	1.967	2.005	2.015	1.882	2.012	2.004	2.015	2.013	2.012
Cr	0.000	0.001	0.000	0.002	0.002	0.001	0.000	0.001	0.002	0.002	0.001	0.001	0.001	0.000
Fe^{3+}	0.037	0.017	0.034	0.000	0.046	0.007	0.000	0.023	0.453	0.066	0.059	0.000	0.048	0.024
Mg	0.344	0.373	0.412	0.443	0.420	0.434	0.345	0.339	0.303	0.335	0.310	0.298	0.291	0.266
Ca	0.656	0.648	0.631	0.618	0.589	0.583	0.450	0.424	0.442	0.432	0.483	0.496	0.506	0.555
Mn	0.051	0.050	0.049	0.056	0.072	0.073	0.119	0.123	0.113	0.143	0.146	0.148	0.170	0.191
Fe^{2+}	1.944	1.924	1.896	1.889	1.907	1.922	2.083	2.095	1.974	2.050	2.029	2.060	2.002	1.966
Na	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total	8.000	8.000	8.000	7.999	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.005	8.000	8.000
Endmember														
Pyrope	11.5	12.4	13.8	14.7	14.0	14.4	11.5	11.4	10.7	11.3	10.5	9.9	9.8	8.9
Almandine	64.9	64.2	63.4	62.8	63.8	63.8	69.5	70.3	69.7	69.3	68.4	68.6	67.4	66.0
Spessartine	1.7	1.7	1.6	1.9	2.4	2.4	4.0	4.1	4.0	4.8	4.9	4.9	5.7	6.4
Grossular	21.9	21.6	21.1	20.6	19.7	19.3	15.0	14.2	15.6	14.6	16.3	16.5	17.0	18.6

	Q67F F8 Gt 1 10	Q67F F8 Gt 1 11	Q67F F8 Gt 1 12	Q67F F8 Gt 1 13	Q67F F8 Gt 1 14	Q67F F8 Gt 1 15	Q67F F8 Gt 1 16	Q67F F8 Gt 1 17	Q67F F8 Gt 1 18	Q67F F8 Gt 1 19	Q67F F8 Gt 1 20	Q67F F8 Gt 1 21	Q67F F8 Gt 1 22	Q67F F8 Gt 1 23
Analysis														
SiO_2	36.47	36.46	36.62	36.54	36.44	36.47	36.50	36.73	36.78	36.93	37.04	36.63	36.87	36.70
TiO_2	0.10	0.19	0.11	0.15	0.14	0.09	0.10	0.11	0.14	0.24	0.65	0.20	0.14	0.13
Al_2O_3	21.10	21.13	21.09	21.00	21.12	20.96	21.08	21.27	21.40	21.34	21.28	20.88	21.10	21.09
Cr_2O_3	0.03	0.03	0.02	0.01	0.03	0.01	0.03	0.02	0.01	0.03	0.00	0.02	0.02	0.02
Fe_2O_3	1.19	0.83	1.10	1.31	0.76	1.30	0.95	1.27	1.02	0.75	0.09	1.07	1.18	1.39
MgO	2.15	2.00	2.18	2.09	1.94	1.95	1.91	2.08	2.06	2.13	2.13	1.91	1.78	1.74
CaO	6.02	6.75	6.92	6.48	6.71	6.79	6.63	6.68	6.69	6.27	6.59	6.99	7.46	7.42
MnO	3.16	3.21	2.99	3.39	3.57	3.67	3.72	3.82	3.81	3.71	3.82	4.38	4.65	4.81
FeO	28.95	28.30	28.07	28.36	28.03	27.79	28.08	27.88	28.01	28.76	28.77	27.18	26.76	26.52
Na_2O	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Total	99.17	98.91	99.12	99.32	98.73	99.03	98.99	99.86	99.92	100.16	100.38	99.27	99.96	99.82
Cations														
Si	2.951	2.953	2.956	2.952	2.957	2.954	2.958	2.948	2.949	2.956	2.957	2.960	2.958	2.950
Ti	0.006	0.012	0.007	0.009	0.009	0.006	0.006	0.007	0.009	0.014	0.039	0.012	0.008	0.008
Al	2.012	2.018	2.007	1.999	2.020	2.001	2.013	2.012	2.023	2.013	2.002	1.989	1.995	1.999
Cr	0.002	0.002	0.001	0.001	0.002	0.001	0.002	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Fe^{3+}	0.072	0.051	0.067	0.079	0.046	0.079	0.058	0.076	0.061	0.045	0.006	0.065	0.071	0.084
Mg	0.260	0.241	0.263	0.251	0.234	0.235	0.230	0.249	0.246	0.254	0.253	0.230	0.213	0.209
Ca	0.522	0.586	0.599	0.561	0.584	0.590	0.575	0.574	0.575	0.537	0.563	0.605	0.642	0.639
Mn	0.217	0.220	0.205	0.232	0.245	0.252	0.255	0.260	0.259	0.252	0.259	0.300	0.316	0.328
Fe^{2+}	1.959	1.917	1.895	1.916	1.902	1.883	1.903	1.871	1.878	1.925	1.921	1.837	1.795	1.783
Na	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	8.8	8.1	8.9	8.5	7.9	7.9	7.8	8.4	8.3	8.5	8.5	7.7	7.2	7.1
Almandine	66.2	64.7	64.0	64.7	64.1	63.6	64.2	63.3	63.5	64.9	64.1	61.8	60.5	60.3
Spessartine	7.3	7.4	6.9	7.8	8.3	8.5	8.6	8.8	8.8	8.5	8.6	10.1	10.7	11.1
Grossular	17.6	19.8	20.2	18.9	19.7	19.9	19.4	19.4	19.4	18.1	18.8	20.4	21.6	21.6

	Q67F F8 Gt 1 24	Q67F F8 Gt 1 25	Q67F F8 Gt 1 26	Q67F F8 Gt 1 27	Q67F F8 Gt 1 28	Q67F F8 Gt 1 29	Q67F F8 Gt 1 30	Q67F F8 Gt 1 31	Q67F F8 Gt 1 32	Q67F F8 Gt 1 33	Q67F F8 Gt 1 34	Q67F F8 Gt 1 35	Q67F F8 Gt 1 36	Q67F F8 Gt 1 37
Analysis														
SiO_2	36.43	36.50	36.50	36.62	36.50	36.41	36.33	36.57	36.35	36.09	36.55	36.32	36.34	36.54
TiO_2	0.16	0.13	0.13	0.14	0.14	0.16	0.10	0.14	0.13	0.14	0.14	0.14	0.20	0.21
Al_2O_3	21.12	21.14	21.15	20.95	21.18	20.98	21.11	21.08	21.04	20.89	21.13	20.89	21.30	21.07
Cr_2O_3	0.03	0.02	0.02	0.04	0.02	0.02	0.01	0.02	0.01	0.02	0.03	0.05	0.03	0.01
Fe_2O_3	2.01	1.24	1.73	1.14	1.36	1.69	1.87	1.18	1.07	1.56	1.42	1.39	1.66	1.61
MgO	1.77	1.69	1.63	1.60	1.55	1.54	1.57	1.56	1.57	1.47	1.53	1.53	1.53	1.50
CaO	7.53	7.45	7.26	7.17	7.51	7.66	7.45	7.55	7.52	7.58	7.52	7.24	7.41	7.51
MnO	5.01	4.89	5.19	5.32	5.40	5.50	5.46	5.35	5.40	5.48	5.59	5.69	5.58	5.49
FeO	25.84	26.25	26.22	26.47	25.91	25.57	25.62	25.98	25.68	25.41	25.80	25.78	25.76	26.03
Na_2O	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.89	99.31	99.84	99.45	99.56	99.51	99.51	99.43	98.77	98.64	99.71	99.03	99.82	99.98
Cations														
Si	2.929	2.947	2.938	2.959	2.943	2.940	2.934	2.952	2.952	2.940	2.944	2.948	2.926	2.939
Ti	0.009	0.008	0.008	0.009	0.008	0.010	0.006	0.008	0.008	0.008	0.009	0.009	0.012	0.013
Al	2.001	2.012	2.006	1.994	2.013	1.997	2.009	2.005	2.014	2.006	2.006	1.998	2.021	1.998
Cr	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.002	0.003	0.002	0.001
Fe^{3+}	0.122	0.075	0.105	0.069	0.082	0.103	0.113	0.072	0.065	0.096	0.086	0.085	0.100	0.098
Mg	0.212	0.204	0.196	0.193	0.186	0.185	0.189	0.188	0.190	0.178	0.184	0.185	0.184	0.180
Ca	0.649	0.645	0.626	0.621	0.649	0.662	0.644	0.653	0.655	0.661	0.650	0.630	0.639	0.647
Mn	0.341	0.334	0.354	0.364	0.369	0.376	0.373	0.366	0.371	0.378	0.381	0.391	0.381	0.374
Fe^{2+}	1.737	1.773	1.764	1.788	1.748	1.726	1.730	1.754	1.744	1.731	1.738	1.750	1.735	1.751
Na	0.000	0.000	0.003	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	7.2	6.9	6.7	6.5	6.3	6.3	6.4	6.3	6.4	6.0	6.2	6.3	6.3	6.1
Almandine	59.1	60.0	60.0	60.3	59.2	58.5	58.9	59.2	58.9	58.7	58.9	59.2	59.0	59.3
Spessartine	11.6	11.3	12.0	12.3	12.5	12.8	12.7	12.4	12.5	12.8	12.9	13.2	13.0	12.7
Grossular	22.1	21.8	21.3	20.9	22.0	22.5	21.9	22.1	22.1	22.4	22.0	21.3	21.7	21.9

	Q67F F8 Gt 1 38	Q67F F8 Gt 1 39	Q67F F8 Gt 1 40	Q67F F8 Gt 1 41	Q67F F8 Gt 1 42	Q67F F8 Gt 1 43	Q67F F8 Gt 1 44	Q67F F8 Gt 1 45	Q67F F8 Gt 1 46	Q67F F8 Gt 1 47	Q67F F8 Gt 1 48	Q67F F8 Gt 1 49	Q67F F8 Gt 1 50	Q67F F8 Gt 1 51
Analysis														
SiO_2	36.30	36.25	36.31	36.28	36.42	37.19	37.08	36.94	36.90	37.07	37.01	36.88	36.99	36.81
TiO_2	0.13	0.14	0.16	0.13	0.16	0.15	0.13	0.13	0.16	0.14	0.13	0.15	0.16	0.14
Al_2O_3	21.10	20.96	20.95	20.93	21.14	21.13	21.34	21.26	21.05	21.24	21.18	20.92	21.11	21.32
Cr_2O_3	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.00	0.01	0.02	0.01	0.02	0.02	0.03
Fe_2O_3	1.57	1.37	1.27	1.31	1.52	0.41	0.86	1.16	1.03	1.08	0.66	1.10	1.07	1.30
MgO	1.55	1.48	1.51	1.53	1.53	1.43	1.50	1.58	1.57	1.54	1.60	1.55	1.61	1.69
CaO	7.63	7.44	7.34	7.26	7.47	7.39	7.67	7.39	7.69	7.40	7.49	7.47	7.42	7.58
MnO	5.57	5.66	5.68	5.60	5.58	5.50	5.52	5.50	5.42	5.56	5.27	5.37	5.23	5.12
FeO	25.35	25.57	25.70	25.78	25.75	27.01	26.34	26.28	26.13	26.57	26.49	26.28	26.64	26.21
Na_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.04	0.01	0.00
Total	99.22	98.90	98.94	98.84	99.59	100.23	100.48	100.28	99.95	100.62	99.85	99.78	100.26	100.21
Cations														
Si	2.938	2.945	2.948	2.949	2.938	2.980	2.962	2.957	2.963	2.959	2.971	2.968	2.962	2.946
Ti	0.008	0.009	0.010	0.008	0.010	0.009	0.008	0.008	0.009	0.008	0.008	0.009	0.010	0.008
Al	2.013	2.007	2.005	2.005	2.010	1.995	2.009	2.005	1.992	1.999	2.004	1.985	1.993	2.011
Cr	0.001	0.001	0.002	0.001	0.002	0.001	0.002	0.000	0.001	0.001	0.000	0.001	0.001	0.002
Fe^{3+}	0.096	0.084	0.077	0.080	0.092	0.025	0.052	0.070	0.062	0.065	0.040	0.066	0.064	0.078
Mg	0.187	0.179	0.183	0.185	0.184	0.171	0.179	0.189	0.188	0.184	0.192	0.186	0.192	0.202
Ca	0.661	0.648	0.639	0.632	0.646	0.635	0.656	0.634	0.661	0.633	0.644	0.644	0.637	0.650
Mn	0.382	0.389	0.391	0.386	0.381	0.374	0.373	0.373	0.369	0.376	0.358	0.366	0.355	0.347
Fe^{2+}	1.715	1.737	1.745	1.752	1.737	1.810	1.759	1.759	1.755	1.774	1.779	1.769	1.784	1.754
Na	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.005	0.000	0.000	0.003	0.006	0.002	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	6.3	6.1	6.2	6.3	6.2	5.7	6.0	6.4	6.3	6.2	6.4	6.3	6.5	6.8
Almandine	58.2	58.8	59.0	59.3	58.9	60.6	59.3	59.5	59.0	59.8	59.8	59.7	60.1	59.4
Spessartine	13.0	13.2	13.2	13.1	12.9	12.5	12.6	12.6	12.4	12.7	12.1	12.3	12.0	11.8
Grossular	22.5	21.9	21.6	21.4	21.9	21.2	22.1	21.5	22.2	21.3	21.7	21.7	21.5	22.0

	Q67F F8 Gt 1 52	Q67F F8 Gt 1 53	Q67F F8 Gt 1 54	Q67F F8 Gt 1 55	Q67F F8 Gt 1 56	Q67F F8 Gt 1 57	Q67F F8 Gt 1 58	Q67F F8 Gt 1 59	Q67F F8 Gt 1 60	Q67F F8 Gt 1 61	Q67F F8 Gt 1 62	Q67F F8 Gt 1 64	Q67F F8 Gt 1 65	Q67F F8 Gt 1 66
Analysis														
SiO_2	36.89	37.19	37.06	36.91	36.94	36.96	36.84	36.93	36.99	37.10	36.81	36.79	36.84	36.98
TiO_2	0.18	0.18	0.13	0.12	0.13	0.14	0.14	0.07	0.12	0.13	0.14	0.11	0.11	0.09
Al_2O_3	21.21	21.25	21.21	21.47	21.09	21.27	21.22	21.21	21.13	21.18	21.11	21.37	21.20	21.19
Cr_2O_3	0.02	0.03	0.03	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.03	0.01	0.02	0.01
Fe_2O_3	1.08	0.97	0.82	1.26	1.32	1.41	1.32	1.33	1.43	0.91	1.18	1.68	1.13	1.51
MgO	1.74	1.82	1.79	1.95	1.88	1.98	1.99	2.02	1.96	1.89	1.92	2.33	2.25	2.39
CaO	7.61	7.51	7.33	6.81	6.97	7.02	7.07	6.56	6.85	7.14	7.09	6.43	6.43	5.98
MnO	4.80	4.80	4.63	4.58	4.43	4.30	4.17	4.25	4.24	4.00	3.83	3.21	3.06	2.69
FeO	26.55	26.90	27.16	27.38	27.23	27.44	27.36	27.82	27.62	27.90	27.75	28.43	28.81	29.65
Na_2O	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.00	0.00
Total	100.08	100.65	100.17	100.49	100.05	100.53	100.12	100.23	100.39	100.26	99.86	100.37	99.85	100.48
Cations														
Si	2.955	2.962	2.966	2.945	2.961	2.949	2.950	2.956	2.957	2.967	2.956	2.937	2.956	2.953
Ti	0.011	0.011	0.008	0.007	0.008	0.008	0.008	0.004	0.007	0.008	0.009	0.007	0.007	0.005
Al	2.002	1.995	2.001	2.019	1.992	2.000	2.002	2.001	1.990	1.996	1.998	2.011	2.005	1.994
Cr	0.001	0.002	0.002	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.000
Fe^{3+}	0.065	0.058	0.049	0.076	0.080	0.085	0.079	0.080	0.086	0.055	0.071	0.101	0.068	0.091
Mg	0.208	0.216	0.213	0.232	0.225	0.236	0.237	0.241	0.234	0.225	0.230	0.277	0.269	0.284
Ca	0.653	0.641	0.628	0.582	0.598	0.600	0.607	0.563	0.587	0.612	0.610	0.550	0.553	0.512
Mn	0.326	0.324	0.314	0.310	0.301	0.291	0.283	0.288	0.287	0.271	0.261	0.217	0.208	0.182
Fe^{2+}	1.779	1.792	1.818	1.828	1.826	1.831	1.832	1.862	1.846	1.866	1.864	1.898	1.933	1.980
Na	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.002	0.005	0.000	0.000	0.001	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Endmember														
Pyrope	7.0	7.3	7.2	7.9	7.6	8.0	8.0	8.2	7.9	7.6	7.8	9.4	9.1	9.6
Almandine	60.0	60.3	61.1	61.9	61.9	61.9	61.9	63.0	62.5	62.7	62.9	64.5	65.2	66.9
Spessartine	11.0	10.9	10.6	10.5	10.2	9.8	9.6	9.8	9.7	9.1	8.8	7.4	7.0	6.2
Grossular	22.0	21.6	21.1	19.7	20.3	20.3	20.5	19.0	19.9	20.6	20.6	18.7	18.7	17.3

	Q67F F8 Gt 1 67	Q67F F8 Gt 1 68	Q67F F8 Gt 1 69	Q67F F8 Gt 1 70	Q67F F8 Gt 1 71	Q67F F8 Gt 1 72
Analysis						
SiO_2	36.81	36.99	36.94	37.05	36.91	36.81
TiO_2	0.07	0.07	0.08	0.06	0.08	0.07
Al_2O_3	21.21	21.18	21.27	21.16	21.49	20.98
Cr_2O_3	0.04	0.01	0.02	0.02	0.00	0.02
Fe_2O_3	1.24	1.01	1.23	1.43	1.79	1.90
MgO	2.71	2.75	2.88	2.94	3.01	3.02
CaO	5.00	5.34	5.37	5.25	5.23	5.22
MnO	2.30	2.14	1.78	1.72	1.58	1.56
FeO	30.50	30.27	30.29	30.53	30.53	30.43
Na_2O	0.00	0.02	0.03	0.03	0.00	0.00
Total	99.88	99.80	99.89	100.19	100.63	100.01
Cations						
Si	2.954	2.966	2.957	2.959	2.935	2.948
Ti	0.004	0.004	0.005	0.004	0.005	0.004
Al	2.006	2.001	2.006	1.991	2.014	1.980
Cr	0.002	0.001	0.002	0.001	0.000	0.002
Fe^{3+}	0.075	0.061	0.074	0.086	0.107	0.114
Mg	0.325	0.329	0.344	0.350	0.357	0.361
Ca	0.430	0.459	0.461	0.449	0.446	0.448
Mn	0.156	0.145	0.120	0.116	0.107	0.106
Fe^{2+}	2.047	2.030	2.027	2.039	2.030	2.038
Na	0.000	0.004	0.005	0.004	0.000	0.000
Total	8.000	8.000	8.000	8.000	8.000	8.000
Endmember						
Pyrope	11.0	11.1	11.6	11.9	12.1	12.2
Almandine	69.2	68.5	68.7	69.0	69.1	69.0
Spessartine	5.3	4.9	4.1	3.9	3.6	3.6
Grossular	14.5	15.5	15.6	15.2	15.2	15.2

Ilmenite

Electron microprobe analyses of ilmenite. Cations based on a 3 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

	75261C Ilm	75262C Ilm	76163F F9 Ilm2	76163F F9 Ilm3	76163F F9 Ilm4	76163F F9 Ilm5	D7625A F6 Ilm1	D7625A F6 Ilm2	D7625A F6 Ilm3	D7625A F6 Ilm4	Q 64D F2 Ilm 1 1	Q 64D F2 Ilm 1 3	Q 64D F2 Ilm 1 4	Q 64D F2 Ilm 1 5
Analysis														
SiO_2	0.63	2.21	0.02	0.03	0.03	0.05	0.03	0.02	0.02	0.00	0.00	0.01	0.06	0.01
TiO_2	53.88	51.63	51.03	50.29	50.84	50.72	51.85	52.06	52.25	52.06	54.89	54.24	54.15	54.16
Al_2O_3	0.38	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01
Cr_2O_3	0.00	0.00	0.04	0.03	0.06	0.02	0.09	0.05	0.07	0.08	0.01	0.00	0.02	0.00
Fe_2O_3	0.00	0.00	3.22	3.38	2.79	3.10	2.01	0.50	1.12	0.99	0.00	0.00	0.00	0.00
MgO	0.00	0.00	0.05	0.05	0.07	0.04	0.22	0.25	0.23	0.24	0.14	0.12	0.14	0.12
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	1.18	1.11	4.87	4.53	4.49	4.51	1.81	1.80	1.93	1.73	0.86	0.94	0.96	0.92
FeO	43.80	42.82	40.91	40.62	41.11	41.05	44.45	44.66	44.66	44.64	45.96	45.92	45.98	45.86
Total	100.00	100.00	100.13	98.92	99.39	99.49	100.45	99.34	100.29	99.74	101.89	101.24	101.31	101.09
X position														
Si	0.016	0.054	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.000
Ti	1.007	0.953	0.968	0.966	0.972	0.969	0.979	0.994	0.988	0.990	1.015	1.011	1.009	1.011
Al	0.011	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.001	0.001	0.001	0.000	0.002	0.001	0.001	0.002	0.000	0.000	0.000	0.000
Fe^{3+}	0.000	0.000	0.031	0.033	0.027	0.030	0.020	0.005	0.011	0.010	0.000	0.000	0.000	0.000
Y position														
Mg	0.000	0.000	0.002	0.002	0.002	0.002	0.008	0.009	0.009	0.009	0.005	0.004	0.005	0.004
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.025	0.023	0.104	0.098	0.097	0.097	0.038	0.039	0.041	0.037	0.018	0.020	0.020	0.019
Fe^{2+}	0.910	0.878	0.863	0.868	0.874	0.872	0.933	0.948	0.939	0.944	0.945	0.952	0.953	0.952
Fe^{3+}	0.000	0.000	0.030	0.032	0.026	0.030	0.018	0.005	0.010	0.009	0.000	0.000	0.000	0.000
Total	1.974	1.974	2.000	2.000	2.000	2.000	2.000	2.001	2.000	2.000	1.985	1.988	1.989	1.989
Endmember														
Ilmenite	0.973	0.974	0.864	0.868	0.875	0.872	0.935	0.947	0.940	0.945	0.976	0.975	0.974	0.976
Pyrophanite	0.027	0.026	0.104	0.098	0.097	0.097	0.038	0.039	0.041	0.037	0.018	0.020	0.021	0.020
Perowskite	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.005	0.004
Geikielite	0.000	0.000	0.002	0.002	0.002	0.002	0.008	0.009	0.009	0.009	0.000	0.000	0.000	0.000
Hematite	0.000	0.000	0.030	0.032	0.026	0.030	0.018	0.005	0.010	0.009	0.000	0.000	0.000	0.000

	Q64E F14 Ilm 3 2	Q64E F14 Ilm 3 3	Q64E F14 Ilm 3 4	Q64E F14 Ilm 3 5	Q67 F F4 Ilm 1 1	Q67 F F4 Ilm 1 2	Q67 F F4 Ilm 1 3	Q67 F F4 Ilm 1 4	Q67 F F4 Ilm 1 5
Analysis									
SiO_2	0.04	0.02	0.03	0.01	0.04	0.03	0.31	0.03	0.02
TiO_2	52.06	52.04	52.65	52.06	54.86	55.31	55.08	54.84	54.59
Al_2O_3	0.00	0.00	0.01	0.00	0.04	0.01	0.27	0.01	0.03
Cr_2O_3	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.01
Fe_2O_3	2.58	3.10	2.65	2.72	0.00	0.00	0.00	0.00	0.00
MgO	0.10	0.11	0.10	0.10	0.26	0.28	0.22	0.25	0.26
CaO	0.07	0.03	0.04	0.10	0.00	0.00	0.00	0.00	0.23
MnO	0.71	0.73	0.69	0.73	0.34	0.45	0.38	0.47	0.39
FeO	45.89	45.88	46.50	45.81	45.04	45.07	44.77	44.12	44.62
Total	101.46	101.90	102.67	101.53	100.59	101.17	101.04	99.73	100.14
X position									
Si	0.001	0.000	0.001	0.000	0.001	0.001	0.008	0.001	0.000
Ti	0.975	0.971	0.974	0.974	1.023	1.025	1.018	1.029	1.022
Al	0.000	0.000	0.000	0.000	0.001	0.000	0.008	0.000	0.001
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Fe^{3+}	0.023	0.028	0.024	0.025	0.000	0.000	0.000	0.000	0.000
Cations									
Mg	0.004	0.004	0.004	0.004	0.010	0.010	0.008	0.009	0.010
Ca	0.002	0.001	0.001	0.003	0.000	0.000	0.000	0.000	0.006
Mn	0.015	0.015	0.014	0.015	0.007	0.009	0.008	0.010	0.008
Fe^{2+}	0.955	0.951	0.957	0.953	0.934	0.928	0.920	0.920	0.929
Fe^{3+}	0.025	0.029	0.026	0.026	0.000	0.000	0.000	0.000	0.000
Total	2.000	2.000	2.000	2.000	1.976	1.975	1.973	1.970	1.977
Endmember									
Ilmenite	0.954	0.950	0.956	0.952	0.982	0.979	0.983	0.980	0.975
Pyrophanite	0.015	0.015	0.014	0.015	0.008	0.010	0.009	0.010	0.009
Perowskite	0.004	0.004	0.003	0.004	0.010	0.011	0.009	0.010	0.010
Geikielite	0.002	0.001	0.001	0.003	0.000	0.000	0.000	0.000	0.006
Hematite	0.025	0.029	0.026	0.026	0.000	0.000	0.000	0.000	0.000

Muscovite, phengite, and paragonite

Electron microprobe analyses of muscovite, phengite, and paragonite. Cations based on a 12 oxygen basis. End-members follow Schliestedt (1980).

	75223A F2 Hgl incl2	75223A F2 Hgl incl3	75223A F4 Hgl1	75223A F4 Hgl2	75223A F4 Hgl3	75223A F4 Hgl5	75223A F4 Hgl6	75223A F4 Hgl8	75223A F4 Hgl9	75223A F4 Hgl10	75223A F4 Hgl11	75223A F4 Hgl12	75223A F4 Hgl13	75223A F4 Hgl14
Analysis														
SiO_2	47.25	47.65	48.93	49.19	49.80	49.10	48.20	48.08	48.91	49.07	48.97	49.27	48.59	48.51
TiO_2	0.48	0.34	1.08	0.96	0.90	0.90	1.28	1.27	0.93	1.09	1.07	1.20	1.23	1.26
Al_2O_3	33.46	35.97	28.49	28.68	29.17	28.56	28.89	28.94	28.21	28.81	28.54	28.79	28.68	29.08
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.98	0.67	2.35	2.37	2.29	2.32	2.24	2.07	2.43	2.31	2.36	2.41	2.17	2.22
CaO	0.03	0.00	0.05	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.04	0.01	0.00	0.00
MnO	0.03	0.00	0.04	0.01	0.03	0.04	0.00	0.02	0.00	0.01	0.03	0.00	0.00	0.01
FeO	2.90	1.56	3.31	3.08	3.20	3.25	3.17	3.35	3.43	3.24	3.18	3.14	3.23	3.36
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.35	0.55	0.46	0.46	0.43	0.53	0.38	0.38	0.46	0.35	0.41	0.40	0.39	0.43
K_2O	10.27	10.02	9.66	9.69	9.74	9.47	9.82	9.84	9.53	9.71	9.64	9.81	9.93	9.79
Total	95.74	96.75	94.36	94.43	95.56	94.20	94.00	93.95	93.90	94.59	94.23	95.03	94.21	94.66
Cations														
Si	3.146	3.108	3.306	3.314	3.315	3.317	3.272	3.269	3.319	3.304	3.309	3.302	3.292	3.271
Ti	0.024	0.017	0.055	0.049	0.045	0.046	0.065	0.065	0.047	0.055	0.054	0.061	0.062	0.064
Al	2.626	2.766	2.269	2.278	2.288	2.274	2.312	2.319	2.256	2.285	2.273	2.274	2.290	2.311
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.097	0.065	0.236	0.238	0.227	0.233	0.227	0.210	0.246	0.231	0.238	0.241	0.219	0.224
Ca	0.002	0.000	0.004	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.003	0.001	0.000	0.000
Mn	0.002	0.000	0.002	0.001	0.001	0.002	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.001
Fe^{2+}	0.161	0.085	0.187	0.173	0.178	0.184	0.180	0.191	0.194	0.183	0.180	0.176	0.183	0.189
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.045	0.069	0.060	0.060	0.056	0.069	0.050	0.050	0.061	0.046	0.053	0.052	0.051	0.056
K	0.872	0.834	0.832	0.833	0.827	0.816	0.851	0.853	0.825	0.834	0.831	0.839	0.858	0.842
Total	6.975	6.944	6.951	6.945	6.938	6.943	6.957	6.958	6.949	6.938	6.942	6.945	6.955	6.958
Endmembers														
Margarite	0.2	0.0	0.4	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0
Paragonite	4.9	7.7	6.7	6.8	6.3	7.8	5.5	5.5	6.9	5.2	6.0	5.8	5.6	6.2
Celadonite	14.6	10.8	30.6	31.4	31.5	31.7	27.2	26.9	31.9	30.4	30.9	30.2	29.2	27.1
Muscovite	80.3	81.5	62.3	61.8	62.2	60.3	67.2	67.6	61.2	64.5	62.8	63.9	65.2	66.6
X_{Mg}	0.375	0.433	0.558	0.578	0.561	0.560	0.557	0.524	0.559	0.559	0.569	0.577	0.545	0.541

	75223A F4 Hgl15	75223A F5 Hglin	75248C F1 Wm	75248C F1 Wm	75248C F1 Wm	75248C F1 Wm	75248C F1 Wm	75248C F1 Wm	75248C F1 Wm	75251E F1 Hgl3	75251E F1 Hgl4	75251E F1 Hgl6	75251E F1 Hgl7	75251E F3 Hgl3
Analysis														
SiO_2	48.50	49.57	45.29	45.62	45.53	45.76	45.74	45.26	45.05	45.95	45.58	44.77	46.56	47.02
TiO_2	1.25	0.84	0.93	1.07	0.98	0.86	0.88	0.89	0.94	0.57	0.38	0.37	0.68	0.88
Al_2O_3	28.54	28.89	35.46	35.78	35.88	35.87	35.89	36.14	36.14	38.13	36.67	36.71	36.24	36.14
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.18	2.36	0.49	0.49	0.48	0.47	0.43	0.43	0.44	0.35	0.43	0.63	0.43	0.53
CaO	0.07	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01
MnO	0.00	0.02	0.02	0.01	0.05	0.00	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.01
FeO	3.30	2.99	1.35	1.19	1.21	1.15	1.16	1.22	1.22	0.72	1.40	1.93	0.83	1.04
BaO	0.00	0.00	0.13	0.15	0.13	0.12	0.12	0.13	0.10	0.00	0.00	0.00	0.00	0.00
Na_2O	0.46	0.37	0.36	0.44	0.49	0.50	0.48	0.47	0.48	0.38	0.39	0.33	0.39	0.45
K_2O	9.58	9.81	10.15	10.94	10.90	10.96	11.04	11.04	10.98	10.28	10.66	10.79	10.79	10.78
Total	93.88	94.86	94.17	95.69	95.65	95.68	95.77	95.58	95.35	96.41	95.52	95.53	95.94	96.85
Cations														
Si	3.294	3.322	3.049	3.036	3.032	3.043	3.041	3.018	3.011	3.004	3.029	2.989	3.070	3.074
Ti	0.064	0.042	0.047	0.054	0.049	0.043	0.044	0.045	0.047	0.028	0.019	0.018	0.034	0.043
Al	2.284	2.282	2.814	2.806	2.815	2.812	2.812	2.840	2.847	2.938	2.871	2.889	2.817	2.785
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.221	0.235	0.049	0.049	0.048	0.046	0.043	0.042	0.044	0.034	0.043	0.063	0.042	0.051
Ca	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Mn	0.000	0.001	0.001	0.000	0.003	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.001
Fe^{2+}	0.188	0.168	0.076	0.066	0.067	0.064	0.064	0.068	0.068	0.040	0.078	0.108	0.046	0.057
Ba	0.000	0.000	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.000	0.000	0.000	0.000	0.000
Na	0.060	0.047	0.046	0.057	0.063	0.064	0.061	0.061	0.062	0.048	0.050	0.043	0.050	0.057
K	0.830	0.838	0.872	0.929	0.926	0.930	0.936	0.939	0.936	0.857	0.903	0.919	0.908	0.900
Total	6.945	6.938	6.957	7.000	7.006	7.005	7.008	7.017	7.018	6.952	6.994	7.029	6.967	6.969
Endmembers														
Margarite	0.5	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Paragonite	6.7	5.3	5.0	5.8	6.4	6.4	6.1	6.1	6.2	5.3	5.3	4.5	5.3	6.0
Celadonite	29.4	32.2	4.9	3.6	3.2	4.3	4.1	1.8	1.1	0.4	2.9	0.0	7.0	7.4
Muscovite	63.4	62.3	90.1	90.6	90.4	89.2	89.8	92.1	92.7	94.1	91.8	95.5	87.7	86.5
X_{Mg}	0.541	0.584	0.392	0.424	0.415	0.419	0.400	0.383	0.391	0.463	0.354	0.368	0.479	0.474

	75251E F3 Hgl4	75251E F3 Hgl5	75261C F24 Wm	75261C F24 Wm	75261C F24 Wm	75261C F24 Wm	75261C F24 Wm	75261C F23 Wm	75261C F23 Wm	75261C F23 Wm	75261C F22 Wm	75261C F22 Wm	75261C F22 Wm	75261C F22 Wm
Analysis														
SiO_2	46.76	46.35	46.43	46.89	46.48	46.36	46.61	46.99	46.76	46.75	47.25	47.22	47.65	46.43
TiO_2	1.04	0.98	0.36	0.35	0.40	0.37	0.37	0.40	0.34	0.38	0.33	0.28	0.39	0.39
Al_2O_3	35.49	35.08	36.25	36.64	35.60	36.56	36.07	36.03	36.54	36.57	35.98	36.01	36.50	36.48
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.62	0.58	0.53	0.63	0.72	0.50	0.57	0.70	0.53	0.49	0.73	0.66	0.74	0.50
CaO	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.00
MnO	0.00	0.04	0.03	0.02	0.03	0.00	0.00	0.02	0.02	0.02	0.01	0.00	0.00	0.00
FeO	1.26	1.44	0.66	0.67	0.78	0.66	0.74	0.83	0.83	0.68	0.81	0.77	0.80	0.61
BaO	0.00	0.00	0.35	0.30	0.44	0.40	0.17	0.33	0.29	0.38	0.21	0.24	0.41	0.45
Na_2O	0.37	0.42	2.00	1.95	1.75	1.93	1.81	1.66	1.97	2.07	1.69	1.61	1.52	2.02
K_2O	10.54	10.65	8.46	8.61	8.76	8.52	8.82	9.05	8.47	8.37	8.78	9.08	8.99	8.58
Total	96.10	95.52	95.07	96.04	94.95	95.30	95.16	96.00	95.74	95.71	95.78	95.86	97.02	95.45
Cations														
Si	3.082	3.081	3.071	3.069	3.085	3.060	3.080	3.085	3.070	3.070	3.099	3.099	3.091	3.062
Ti	0.051	0.049	0.018	0.017	0.020	0.018	0.018	0.020	0.017	0.019	0.016	0.014	0.019	0.019
Al	2.757	2.748	2.825	2.826	2.785	2.844	2.809	2.788	2.827	2.830	2.782	2.785	2.790	2.836
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.061	0.057	0.052	0.061	0.071	0.049	0.056	0.068	0.052	0.048	0.071	0.064	0.071	0.049
Ca	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000
Mn	0.000	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Fe^{2+}	0.069	0.080	0.037	0.036	0.043	0.036	0.041	0.046	0.046	0.037	0.044	0.042	0.043	0.034
Ba	0.000	0.000	0.009	0.008	0.011	0.010	0.004	0.008	0.007	0.010	0.005	0.006	0.010	0.012
Na	0.048	0.054	0.256	0.247	0.225	0.247	0.232	0.211	0.250	0.264	0.215	0.205	0.191	0.258
K	0.886	0.903	0.714	0.719	0.742	0.717	0.744	0.758	0.709	0.701	0.735	0.760	0.744	0.722
Total	6.955	6.974	6.984	6.984	6.985	6.982	6.985	6.985	6.980	6.979	6.968	6.976	6.963	6.991
Endmembers														
Margarite	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0
Paragonite	5.1	5.6	26.4	25.6	23.2	25.6	23.8	21.7	26.1	27.3	22.6	21.2	20.4	26.3
Celadonite	8.2	8.1	7.1	6.9	8.5	6.0	8.0	8.5	7.0	7.0	9.9	9.9	9.1	6.2
Muscovite	86.6	86.3	66.5	67.5	68.1	68.4	68.2	69.7	66.9	65.7	67.4	68.8	70.3	67.5
X_{Mg}	0.467	0.418	0.588	0.628	0.622	0.572	0.582	0.600	0.533	0.565	0.616	0.604	0.621	0.591

	75261C F22 Wm	75261C F22 Wm	75261C F22 Wm	75261C F21 Wm	75261C F21 Wm	75302A F1 Hgl	75302A F4 Hgl1	75302A F4 Hgl1	75302A F4 Hgl1	75302A F4 Hgl2	75312B F4Hgl2	75312B F4Hgl4	75312B F4Hgl5	75312B F4Hgl6
Analysis														
SiO_2	46.12	46.97	46.76	47.13	46.74	49.57	49.60	50.49	50.01	49.55	52.10	52.07	52.19	50.87
TiO_2	0.41	0.37	0.35	0.36	0.38	0.86	0.90	0.65	0.68	0.86	0.31	0.46	0.84	0.56
Al_2O_3	36.46	36.58	36.40	35.94	36.42	34.07	34.03	33.89	34.83	33.69	24.71	23.34	24.55	24.07
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.02	0.00	0.02	0.04	0.06	0.03	0.02
MgO	0.57	0.50	0.53	0.75	0.53	1.29	1.34	1.43	1.30	1.51	3.12	3.34	3.10	3.16
CaO	0.01	0.00	0.01	0.00	0.00	0.03	0.03	0.10	0.04	0.06	0.09	0.06	0.05	0.07
MnO	0.00	0.01	0.01	0.05	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.04	0.02	0.08
FeO	0.70	0.70	0.69	0.73	0.66	1.78	2.07	1.66	2.16	2.05	4.62	6.06	4.84	6.24
BaO	0.38	0.46	0.28	0.52	0.25	0.16	0.20	0.14	0.16	0.21	0.01	0.02	0.00	0.07
Na_2O	1.85	1.91	1.86	1.54	1.69	0.36	0.33	0.28	0.24	0.31	0.11	0.07	0.09	0.10
K_2O	8.81	8.65	8.61	8.81	8.54	9.59	9.34	7.83	7.48	9.53	10.51	10.54	10.41	10.47
Total	95.31	96.14	95.48	95.82	95.23	97.74	97.86	96.49	96.91	97.80	95.61	96.05	96.10	95.70
Cations														
Si	3.050	3.075	3.077	3.097	3.079	3.195	3.194	3.251	3.208	3.197	3.498	3.512	3.489	3.454
Ti	0.020	0.018	0.017	0.018	0.019	0.041	0.043	0.031	0.033	0.042	0.016	0.023	0.042	0.029
Al	2.842	2.822	2.823	2.783	2.828	2.588	2.582	2.572	2.633	2.562	1.956	1.855	1.934	1.926
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.002	0.003	0.001	0.001
Mg	0.057	0.049	0.052	0.074	0.052	0.124	0.129	0.137	0.125	0.145	0.312	0.335	0.308	0.320
Ca	0.001	0.000	0.001	0.000	0.000	0.002	0.002	0.007	0.003	0.004	0.007	0.004	0.004	0.005
Mn	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.004
Fe^{2+}	0.039	0.038	0.038	0.040	0.036	0.096	0.111	0.089	0.116	0.111	0.259	0.342	0.270	0.354
Ba	0.010	0.012	0.007	0.013	0.006	0.004	0.005	0.004	0.004	0.005	0.000	0.001	0.000	0.002
Na	0.237	0.242	0.237	0.196	0.216	0.045	0.041	0.034	0.030	0.039	0.014	0.009	0.012	0.013
K	0.743	0.723	0.722	0.739	0.718	0.789	0.767	0.643	0.612	0.785	0.900	0.907	0.888	0.906
Total	6.999	6.979	6.974	6.961	6.955	6.886	6.876	6.770	6.763	6.891	6.964	6.993	6.950	7.014
Endmembers														
Margarite	0.1	0.0	0.1	0.0	0.0	0.2	0.2	1.0	0.4	0.5	0.7	0.5	0.4	0.5
Paragonite	24.2	25.1	24.7	21.0	23.2	5.4	5.1	5.0	4.7	4.7	1.6	0.9	1.3	1.4
Celadonite	5.0	7.5	7.7	9.7	7.9	19.5	19.4	25.1	20.8	19.7	49.8	51.2	48.9	45.4
Muscovite	70.7	67.4	67.6	69.4	68.9	74.9	75.3	68.9	74.1	75.1	47.9	47.4	49.3	52.7
X_{Mg}	0.594	0.561	0.579	0.648	0.586	0.565	0.537	0.605	0.518	0.567	0.546	0.495	0.533	0.474

	75312B F4Hgl7	75312B F4Hgl23	76017A F6 Ms	76017A F6 Ms	76017A F6 Ms	76017A F5 Ms	76017A F5 Ms	76017A F5 Ms	76017A F3 Ms	76017A F3 Ms	76017A F3 Ms	76017B F4 Phg	76017B F4 Phg	76017B F4 Phg
Analysis														
SiO_2	50.27	51.86	49.07	48.37	48.83	48.05	48.38	48.54	49.05	48.90	48.68	49.08	49.05	48.99
TiO_2	0.42	1.02	0.44	0.47	0.40	0.42	0.40	0.39	0.36	0.34	0.30	0.44	0.42	0.38
Al_2O_3	24.40	24.73	27.99	27.83	27.91	28.58	28.30	28.53	27.98	27.92	28.09	28.67	29.07	28.95
Cr_2O_3	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.93	3.05	1.91	1.90	1.91	1.86	1.88	1.90	1.92	2.00	1.92	2.39	2.40	2.35
CaO	0.06	0.06	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
MnO	0.04	0.00	0.01	0.02	0.00	0.00	0.03	0.00	0.04	0.01	0.04	0.04	0.00	0.00
FeO	6.66	4.71	4.50	4.67	4.76	4.30	4.30	4.34	4.23	4.41	4.35	3.83	3.70	3.70
BaO	0.12	0.09	0.32	0.28	0.36	0.40	0.47	0.27	0.33	0.35	0.29	0.50	0.47	0.55
Na_2O	0.11	0.10	0.36	0.40	0.45	0.42	0.40	0.41	0.32	0.34	0.37	0.57	0.64	0.61
K_2O	10.33	10.31	10.47	10.46	10.46	10.58	10.65	10.43	10.62	10.57	10.50	10.23	10.19	10.14
Total	95.35	95.95	95.07	94.41	95.09	94.61	94.79	94.82	94.86	94.82	94.54	95.75	95.94	95.67
Cations														
Si	3.433	3.473	3.331	3.313	3.322	3.284	3.302	3.301	3.336	3.330	3.322	3.301	3.288	3.294
Ti	0.022	0.052	0.022	0.024	0.021	0.021	0.020	0.020	0.019	0.017	0.016	0.022	0.021	0.019
Al	1.964	1.952	2.239	2.247	2.238	2.302	2.276	2.287	2.242	2.241	2.259	2.272	2.297	2.294
Cr	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.298	0.304	0.193	0.194	0.193	0.189	0.191	0.192	0.195	0.203	0.195	0.239	0.240	0.236
Ca	0.005	0.004	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.002	0.000	0.001	0.001	0.000	0.000	0.002	0.000	0.002	0.000	0.002	0.002	0.000	0.000
Fe^{2+}	0.380	0.264	0.255	0.267	0.271	0.246	0.245	0.247	0.241	0.251	0.248	0.216	0.208	0.208
Ba	0.003	0.002	0.009	0.007	0.010	0.011	0.012	0.007	0.009	0.009	0.008	0.013	0.012	0.015
Na	0.015	0.013	0.047	0.053	0.059	0.055	0.053	0.054	0.042	0.044	0.049	0.074	0.083	0.079
K	0.899	0.881	0.906	0.914	0.908	0.922	0.927	0.905	0.921	0.918	0.914	0.878	0.871	0.870
Total	7.021	6.946	7.004	7.023	7.022	7.032	7.029	7.015	7.007	7.014	7.014	7.017	7.020	7.015
Endmembers														
Margarite	0.5	0.5	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Paragonite	1.6	1.4	4.9	5.5	6.1	5.7	5.4	5.6	4.4	4.6	5.1	7.8	8.7	8.3
Celadonite	43.3	47.3	33.1	31.3	32.2	28.4	30.2	30.1	33.6	33.0	32.2	30.1	28.8	29.4
Muscovite	54.6	50.8	62.0	63.2	61.6	65.9	64.4	64.2	62.0	62.4	62.7	62.2	62.5	62.3
X_{Mg}	0.439	0.535	0.431	0.420	0.417	0.435	0.438	0.438	0.448	0.448	0.440	0.526	0.536	0.531

	76017B F4 Phg	76017B F4 Phg	76017B F4 Phg	76022B F2 Phg	76027B F1 Phg	76027B F1 Phg	76027B F4 Phg	76027B F4 Phg	76027B F4 Phg	76027B F4 Phg	76027B F4 Phg	76027B F4xt Phg	76027D F2 Phg	76027D F4 Phg
Analysis														
SiO_2	49.42	49.07	49.40	49.94	50.83	50.64	50.18	50.39	50.17	49.47	50.68	50.51	50.28	50.28
TiO_2	0.29	0.37	0.31	0.12	0.22	0.23	0.21	2.56	0.22	0.26	0.18	0.22	0.26	0.20
Al_2O_3	28.19	28.63	27.55	25.71	22.16	23.45	22.69	20.99	23.19	22.64	23.89	23.49	23.72	23.22
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.55	2.44	2.73	3.45	3.71	3.47	3.51	3.24	3.77	3.52	3.60	3.35	3.28	3.34
CaO	0.00	0.01	0.01	0.11	0.01	0.01	0.11	1.86	0.06	0.03	0.00	0.01	0.00	0.01
MnO	0.03	0.01	0.00	0.06	0.04	0.03	0.01	0.03	0.04	0.01	0.04	0.02	0.03	0.05
FeO	3.86	3.90	3.99	3.59	6.93	5.48	6.56	6.01	6.54	6.68	4.79	5.93	5.93	6.06
BaO	0.37	0.46	0.44	0.67	0.02	0.13	0.06	0.13	0.04	0.10	0.15	0.17	0.26	0.13
Na_2O	0.49	0.50	0.42	0.16	0.12	0.21	0.26	0.23	0.20	0.13	0.14	0.22	0.17	0.18
K_2O	10.35	10.08	10.26	10.48	10.82	10.39	10.19	9.35	10.42	10.67	10.93	10.79	10.96	10.96
Total	95.54	95.46	95.12	94.28	94.86	94.03	93.78	94.80	94.65	93.50	94.41	94.70	94.87	94.43
Cations														
Si	3.328	3.305	3.344	3.413	3.504	3.487	3.484	3.468	3.455	3.462	3.475	3.472	3.457	3.473
Ti	0.014	0.019	0.016	0.006	0.012	0.012	0.011	0.132	0.011	0.014	0.009	0.012	0.014	0.011
Al	2.237	2.273	2.198	2.071	1.800	1.903	1.857	1.702	1.883	1.867	1.930	1.903	1.922	1.890
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.256	0.245	0.276	0.352	0.381	0.356	0.363	0.332	0.387	0.368	0.368	0.343	0.336	0.344
Ca	0.000	0.001	0.001	0.008	0.001	0.000	0.008	0.137	0.005	0.002	0.000	0.000	0.000	0.000
Mn	0.002	0.001	0.000	0.003	0.002	0.002	0.001	0.002	0.002	0.000	0.003	0.001	0.002	0.003
Fe^{2+}	0.218	0.220	0.226	0.205	0.400	0.315	0.381	0.346	0.376	0.391	0.275	0.341	0.341	0.350
Ba	0.010	0.012	0.012	0.018	0.001	0.003	0.002	0.004	0.001	0.003	0.004	0.005	0.007	0.003
Na	0.064	0.065	0.055	0.021	0.016	0.028	0.035	0.031	0.026	0.018	0.018	0.029	0.022	0.025
K	0.889	0.866	0.886	0.914	0.952	0.913	0.903	0.821	0.915	0.952	0.956	0.946	0.961	0.966
Total	7.016	7.005	7.013	7.012	7.068	7.020	7.045	6.975	7.063	7.076	7.038	7.052	7.060	7.066
Endmembers														
Margarite	0.0	0.1	0.1	0.9	0.1	0.0	0.9	13.9	0.5	0.2	0.0	0.0	0.0	0.0
Paragonite	6.7	7.0	5.9	2.2	1.6	3.0	3.7	3.1	2.8	1.9	1.9	2.9	2.2	2.5
Celadonite	32.8	30.5	34.4	41.3	50.4	48.7	48.4	46.8	45.5	46.2	47.5	47.2	45.7	47.3
Muscovite	60.5	62.5	59.7	55.6	47.9	48.3	47.0	36.2	51.2	51.8	50.6	49.8	52.1	50.1
X_{Mg}	0.540	0.527	0.550	0.632	0.488	0.530	0.488	0.490	0.507	0.485	0.572	0.502	0.496	0.496

	76027D F4 Phg	76027D F4 Phg	76032C F2 Ms	76032C F2 Ms	76032C F2 Ms	76032C F2 Ms	76032C F2 Ms	76032C F6 Ms	76032C F6 Ms	76032C F6 Ms	76032C F6 Ms	76032C F6 Ms	76032C F6 Ms	76045G F2 Phg1
Analysis														
SiO_2	49.20	50.26	47.27	48.27	48.69	49.27	46.93	49.02	49.21	48.91	49.19	49.10	49.63	53.72
TiO_2	0.21	0.26	0.27	0.28	0.29	0.31	0.23	0.28	0.38	0.32	0.29	0.30	0.34	0.06
Al_2O_3	21.24	21.94	26.23	27.23	27.09	27.95	26.43	27.55	27.37	27.50	27.47	27.55	27.53	24.95
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	3.94	3.47	2.27	2.33	2.23	2.22	2.96	2.08	2.28	2.26	2.23	2.25	2.32	2.06
CaO	0.26	0.08	0.04	0.04	0.02	0.00	0.09	0.01	0.03	0.01	0.01	0.00	0.00	0.08
MnO	0.07	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.05	0.04	0.00	0.00	0.01	0.07
FeO	7.74	7.38	5.43	4.91	4.91	4.52	6.88	4.71	4.50	4.85	4.59	4.85	4.51	3.98
BaO	0.08	0.01	0.23	0.17	0.29	0.27	0.20	0.19	0.08	0.19	0.24	0.22	0.19	0.38
Na_2O	0.35	0.40	0.19	0.29	0.24	0.27	0.26	0.24	0.22	0.28	0.29	0.26	0.24	2.84
K_2O	9.54	10.29	10.01	10.28	10.28	10.52	9.36	10.37	10.43	10.39	10.33	10.24	10.54	8.38
Total	92.61	94.09	91.97	93.82	94.05	95.35	93.35	94.45	94.53	94.74	94.64	94.78	95.31	96.49
Cations														
Si	3.483	3.497	3.334	3.326	3.346	3.333	3.278	3.346	3.352	3.334	3.350	3.342	3.355	3.551
Ti	0.011	0.013	0.014	0.015	0.015	0.016	0.012	0.014	0.019	0.016	0.015	0.015	0.017	0.003
Al	1.772	1.799	2.180	2.211	2.194	2.228	2.175	2.216	2.197	2.210	2.205	2.209	2.194	1.944
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.415	0.360	0.239	0.239	0.228	0.224	0.309	0.211	0.231	0.229	0.226	0.228	0.234	0.203
Ca	0.019	0.006	0.003	0.003	0.001	0.000	0.007	0.000	0.002	0.001	0.000	0.000	0.000	0.005
Mn	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.000	0.000	0.000	0.004
Fe^{2+}	0.458	0.430	0.320	0.283	0.282	0.256	0.402	0.269	0.256	0.276	0.261	0.276	0.255	0.220
Ba	0.002	0.000	0.006	0.005	0.008	0.007	0.005	0.005	0.002	0.005	0.006	0.006	0.005	0.010
Na	0.049	0.054	0.026	0.039	0.032	0.036	0.035	0.032	0.029	0.037	0.038	0.035	0.032	0.364
K	0.861	0.913	0.900	0.904	0.902	0.908	0.834	0.904	0.906	0.904	0.898	0.889	0.909	0.707
Total	7.075	7.074	7.025	7.025	7.009	7.009	7.057	6.999	6.998	7.015	7.000	7.000	7.001	7.010
Endmembers														
Margarite	2.1	0.6	0.3	0.3	0.1	0.0	0.8	0.0	0.2	0.1	0.0	0.0	0.0	0.5
Paragonite	5.2	5.6	2.8	4.1	3.4	3.8	4.0	3.4	3.1	3.9	4.1	3.8	3.4	33.8
Celadonite	48.3	49.7	33.4	32.6	34.6	33.3	27.8	34.6	35.2	33.4	35.0	34.2	35.5	55.1
Muscovite	44.4	44.1	63.5	62.9	61.8	62.9	67.5	62.0	61.5	62.6	60.8	62.1	61.1	10.6
X_{Mg}	0.476	0.456	0.428	0.458	0.447	0.467	0.434	0.440	0.475	0.453	0.464	0.452	0.479	0.480

	76045G F2 Phg2	76045G F2 Phg3	76045G F2 Phg4	76045G F2 Phg5	76045G F3 Phg1	76045G F3 Phg2	76045G F3 Phg3	76045G F3 Phg4	76045G F3 Phg5	76045G F3 Phg6	76045G F3 Phg7	76045G F3 Phg8	76045G F3 Phg9	76045G F3 Phg10
Analysis														
SiO_2	49.27	49.43	49.46	49.04	49.93	49.70	50.38	49.46	49.72	49.80	49.29	50.93	50.94	50.36
TiO_2	0.01	0.07	0.10	0.05	0.09	0.21	0.16	0.15	0.16	0.12	0.14	0.09	0.13	0.14
Al_2O_3	26.93	25.09	25.17	27.71	26.69	26.22	27.52	26.34	26.51	26.45	25.77	27.54	27.60	27.31
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.66	2.73	2.70	2.94	2.69	2.75	2.72	2.76	3.35	2.90	2.95	2.78	2.78	2.84
CaO	0.01	0.03	0.01	0.01	0.02	0.07	0.04	0.07	0.02	0.01	0.07	0.02	0.02	0.06
MnO	0.05	0.07	0.03	0.08	0.11	0.09	0.06	0.08	0.12	0.08	0.09	0.10	0.07	0.06
FeO	5.01	5.94	5.51	4.53	5.95	6.36	6.27	6.90	7.38	6.54	6.82	5.84	6.27	6.93
BaO	0.49	0.60	0.54	0.70	0.46	0.39	0.39	0.41	0.55	0.32	0.51	0.35	0.38	0.41
Na_2O	0.10	0.08	0.05	0.13	0.03	0.03	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03
K_2O	10.68	10.54	10.67	10.59	7.45	7.80	6.90	7.85	7.01	6.77	7.23	6.56	6.81	6.86
Total	95.20	94.58	94.23	95.78	93.41	93.62	94.47	94.05	94.85	93.03	92.89	94.24	95.02	95.00
Cations														
Si	3.356	3.410	3.415	3.319	3.407	3.400	3.387	3.380	3.365	3.405	3.401	3.413	3.399	3.380
Ti	0.001	0.004	0.005	0.002	0.005	0.011	0.008	0.007	0.008	0.006	0.007	0.004	0.006	0.007
Al	2.162	2.039	2.049	2.210	2.146	2.114	2.180	2.122	2.114	2.131	2.096	2.175	2.170	2.160
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.270	0.281	0.278	0.297	0.273	0.281	0.273	0.282	0.337	0.296	0.303	0.278	0.277	0.284
Ca	0.000	0.002	0.000	0.001	0.001	0.005	0.003	0.005	0.001	0.001	0.005	0.001	0.001	0.004
Mn	0.003	0.004	0.002	0.005	0.006	0.005	0.004	0.005	0.007	0.005	0.005	0.006	0.004	0.003
Fe^{2+}	0.285	0.342	0.318	0.257	0.340	0.364	0.353	0.394	0.417	0.374	0.393	0.327	0.350	0.389
Ba	0.013	0.016	0.015	0.019	0.012	0.010	0.010	0.011	0.015	0.009	0.014	0.009	0.010	0.011
Na	0.013	0.010	0.007	0.016	0.003	0.005	0.004	0.005	0.006	0.003	0.004	0.004	0.004	0.004
K	0.928	0.928	0.940	0.915	0.649	0.681	0.591	0.684	0.605	0.590	0.636	0.561	0.580	0.588
Total	7.033	7.036	7.029	7.039	6.842	6.875	6.813	6.896	6.876	6.820	6.864	6.778	6.801	6.829
Endmembers														
Margarite	0.0	0.2	0.0	0.1	0.2	0.8	0.5	0.7	0.2	0.2	0.8	0.3	0.2	0.7
Paragonite	1.4	1.1	0.7	1.8	0.5	0.7	0.7	0.7	1.0	0.4	0.6	0.8	0.6	0.7
Celadonite	35.6	41.0	41.5	31.9	40.7	40.0	38.7	38.0	36.5	40.5	40.1	41.3	39.9	38.0
Muscovite	62.9	57.7	57.7	66.3	58.6	58.6	60.2	60.5	62.3	58.9	58.6	57.7	59.2	60.6
X_{Mg}	0.487	0.451	0.466	0.536	0.446	0.436	0.436	0.417	0.447	0.442	0.435	0.459	0.442	0.422

	76053A F1 Phg	76053A F2 Phg1	76053A F2 Phg2	76053A F2 Phg3	76053A F2 Phg4	76053A F2 Phg5	76053A F1 Phg	76057B F1 Phg1	76057B F2 Phg1	76057B F2 Phg2	76111A F12 Hgl2	76111A F12 Hgl3	76111A F12 Hgl4	76111A F12 Hgl5
Analysis														
SiO_2	50.03	49.78	48.55	49.86	48.71	48.41	48.99	48.53	47.61	47.49	50.71	48.53	51.02	50.73
TiO_2	0.15	0.10	0.15	0.13	0.20	0.20	0.22	0.31	0.08	0.38	0.79	0.72	0.85	0.81
Al_2O_3	26.36	26.51	26.42	26.46	27.13	26.90	26.43	24.55	27.57	25.52	28.70	31.34	28.29	28.68
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.03	0.03
MgO	3.24	3.20	3.15	3.20	2.86	2.81	2.93	3.09	2.35	2.88	2.62	1.90	2.85	2.88
CaO	0.05	0.04	0.00	0.02	0.03	0.04	0.02	0.04	0.03	0.04	0.00	0.01	0.00	0.00
MnO	0.03	0.02	0.04	0.00	0.03	0.03	0.02	0.04	0.03	0.04	0.02	0.00	0.00	0.03
FeO	3.77	3.90	4.30	4.27	4.17	4.50	4.26	6.30	5.73	6.39	1.92	1.81	1.88	1.93
BaO	0.79	0.71	0.67	0.90	0.80	0.69	0.89	0.50	0.46	0.48	0.11	0.16	0.06	0.06
Na_2O	0.20	0.21	0.24	0.23	0.25	0.24	0.26	0.22	0.18	0.27	0.58	0.52	0.55	0.51
K_2O	10.28	10.18	10.17	10.20	10.22	9.97	10.21	10.31	10.45	10.26	10.20	10.47	10.26	10.26
Total	94.88	94.65	93.68	95.26	94.41	93.77	94.23	93.89	94.50	93.74	95.68	95.47	95.78	95.92
Cations														
Si	3.397	3.388	3.352	3.383	3.337	3.338	3.366	3.382	3.284	3.319	3.360	3.232	3.375	3.353
Ti	0.007	0.005	0.008	0.007	0.010	0.010	0.011	0.016	0.004	0.020	0.040	0.036	0.042	0.040
Al	2.110	2.126	2.150	2.116	2.190	2.186	2.140	2.016	2.241	2.102	2.241	2.460	2.206	2.234
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.002
Mg	0.328	0.325	0.324	0.323	0.292	0.289	0.300	0.320	0.242	0.300	0.259	0.188	0.281	0.284
Ca	0.003	0.003	0.000	0.001	0.002	0.003	0.001	0.003	0.003	0.003	0.000	0.001	0.000	0.000
Mn	0.001	0.001	0.002	0.000	0.002	0.002	0.001	0.002	0.002	0.003	0.001	0.000	0.000	0.002
Fe^{2+}	0.214	0.222	0.248	0.242	0.239	0.260	0.245	0.367	0.330	0.373	0.106	0.101	0.104	0.107
Ba	0.021	0.019	0.018	0.024	0.021	0.019	0.024	0.014	0.012	0.013	0.003	0.004	0.001	0.001
Na	0.026	0.027	0.031	0.030	0.034	0.032	0.035	0.030	0.024	0.036	0.075	0.068	0.070	0.065
K	0.890	0.884	0.896	0.882	0.893	0.877	0.895	0.917	0.920	0.915	0.862	0.889	0.866	0.865
Total	6.999	6.999	7.029	7.009	7.021	7.014	7.018	7.067	7.062	7.085	6.948	6.980	6.947	6.954
Endmembers														
Margarite	0.4	0.3	0.0	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.000	0.060	0.000	0.000
Paragonite	2.9	3.0	3.4	3.3	3.6	3.5	3.8	3.2	2.5	3.8	7.978	7.066	7.483	7.039
Celadonite	39.7	38.8	35.2	38.3	33.7	33.8	36.6	38.2	28.4	31.9	35.972	23.213	37.523	35.305
Muscovite	57.0	57.9	61.4	58.3	62.5	62.4	59.5	58.4	68.8	64.0	56.050	69.662	54.994	57.656
X_{Mg}	0.605	0.594	0.567	0.572	0.550	0.526	0.551	0.466	0.423	0.446	0.709	0.651	0.731	0.727

	76111A F12 Hgl6	76111A F12 Hgl8	76111A F12 Hgl10	753011A F4 Phg1	753011A F4 Phg2	753011A F4 Phg3	753011A F4 Phg4	753011A F4 Phg5	753011A F4 Phg21	753011A F4 Phg22	753011A F4 Phg23	753011A F4 Phg25	753011A F6 Phg1	753011A F6 Phg3
Analysis														
SiO_2	50.53	51.33	50.43	48.66	48.72	48.40	48.36	48.52	47.74	47.52	48.23	48.41	48.35	48.72
TiO_2	0.82	0.79	0.90	0.30	0.33	0.39	0.41	0.41	0.29	0.35	0.25	0.38	0.42	0.33
Al_2O_3	28.78	27.90	29.15	30.65	29.74	29.49	29.82	29.43	29.62	29.30	28.82	29.63	30.56	30.03
Cr_2O_3	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.63	3.03	2.63	1.69	2.03	2.04	2.04	2.10	1.95	2.15	2.09	1.99	1.83	1.93
CaO	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.03	0.03	0.05	0.02	0.00	0.00	0.02
MnO	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.03	0.00	0.01	0.00
FeO	1.77	1.98	1.84	4.01	4.35	4.71	4.76	4.46	4.59	4.81	4.34	4.52	3.99	4.02
BaO	0.09	0.06	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.59	0.58	0.59	0.33	0.35	0.30	0.32	0.25	0.30	0.34	0.23	0.35	0.36	0.33
K_2O	10.41	10.23	10.42	10.57	10.06	10.15	10.49	10.49	10.25	10.16	10.44	10.64	10.42	10.69
Total	95.71	95.92	96.04	96.21	95.58	95.48	96.21	95.70	94.81	94.69	94.45	95.90	95.94	96.06
Cations														
Si	3.350	3.392	3.332	3.246	3.269	3.261	3.242	3.264	3.243	3.238	3.286	3.254	3.235	3.259
Ti	0.041	0.039	0.045	0.015	0.016	0.020	0.021	0.021	0.015	0.018	0.013	0.019	0.021	0.017
Al	2.249	2.173	2.270	2.410	2.352	2.341	2.356	2.334	2.372	2.352	2.314	2.347	2.410	2.368
Cr	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.260	0.299	0.259	0.168	0.203	0.205	0.204	0.210	0.197	0.218	0.213	0.199	0.182	0.192
Ca	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.002	0.002	0.003	0.001	0.000	0.000	0.002
Mn	0.005	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.001	0.000
Fe^{2+}	0.098	0.109	0.102	0.224	0.244	0.265	0.267	0.251	0.261	0.274	0.247	0.254	0.223	0.225
Ba	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.076	0.074	0.076	0.043	0.046	0.039	0.042	0.033	0.040	0.045	0.030	0.045	0.047	0.043
K	0.880	0.862	0.878	0.899	0.861	0.872	0.897	0.901	0.888	0.883	0.908	0.913	0.890	0.912
Total	6.962	6.950	6.964	7.005	6.992	7.004	7.029	7.015	7.020	7.032	7.013	7.032	7.008	7.018
Endmembers														
Margarite	0.000	0.000	0.000	0.0	0.1	0.1	0.0	0.2	0.2	0.4	0.1	0.0	0.0	0.2
Paragonite	7.944	7.923	7.977	4.6	5.0	4.2	4.4	3.5	4.3	4.9	3.2	4.7	5.0	4.5
Celadonite	35.013	39.174	33.228	24.6	26.9	26.1	24.2	26.4	24.3	23.8	28.6	25.4	23.5	25.9
Muscovite	57.043	52.903	58.796	70.8	68.0	69.6	71.3	69.9	71.2	71.0	68.1	69.9	71.5	69.4
X_{Mg}	0.726	0.732	0.717	0.428	0.454	0.435	0.433	0.456	0.431	0.443	0.463	0.440	0.450	0.461

	753011A F6 Phg4	753011A F6 Phg5	753011A F6 Phg6	753011A F6 Phg7	753011A F6 Phg8	753011A F6 Phg9	753011A F6 Phg10	753011A F7 Phg1	753011A F7 Phg2	753011A F7 Phg3	753011A F7 Phg4	753011A F7 Phg5	753011A F7 Phg6	753011A F7 Phg7
Analysis														
SiO_2	48.48	48.95	48.72	48.17	48.20	48.94	48.06	48.33	48.00	48.06	48.76	47.82	48.77	48.66
TiO_2	0.38	0.37	0.35	0.33	0.35	0.37	0.35	0.41	0.32	0.31	0.32	0.36	0.30	0.35
Al_2O_3	29.76	30.08	29.68	30.27	30.13	29.01	30.08	29.53	30.02	29.88	28.41	29.79	29.47	29.58
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.00	2.05	2.03	1.88	1.88	2.31	1.77	2.11	1.75	1.78	2.28	1.85	2.08	2.16
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.00
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.01	0.01	0.00	0.05	0.00
FeO	4.40	3.93	4.13	4.43	3.80	4.07	3.83	3.97	3.60	3.76	4.11	3.63	3.61	4.25
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.26	0.36	0.31	0.33	0.33	0.19	0.32	0.28	0.32	0.32	0.24	0.44	0.27	0.23
K_2O	10.63	10.54	10.69	10.73	10.67	10.63	10.37	10.67	10.47	10.59	10.67	10.42	10.32	10.69
Total	95.90	96.28	95.90	96.14	95.35	95.51	94.78	95.36	94.49	94.71	94.79	94.34	94.89	95.91
Cations														
Si	3.255	3.262	3.267	3.230	3.247	3.292	3.251	3.260	3.256	3.258	3.309	3.252	3.289	3.265
Ti	0.019	0.019	0.018	0.017	0.018	0.019	0.018	0.021	0.016	0.016	0.016	0.018	0.015	0.018
Al	2.355	2.362	2.346	2.393	2.392	2.300	2.399	2.348	2.400	2.387	2.272	2.388	2.342	2.339
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.200	0.204	0.203	0.188	0.189	0.232	0.179	0.213	0.177	0.180	0.230	0.187	0.209	0.216
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.002	0.000	0.000
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.003	0.000
Fe^{2+}	0.247	0.219	0.232	0.248	0.214	0.229	0.217	0.224	0.204	0.213	0.233	0.207	0.204	0.239
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.034	0.046	0.040	0.043	0.042	0.025	0.042	0.037	0.042	0.042	0.032	0.058	0.035	0.030
K	0.910	0.896	0.914	0.918	0.917	0.912	0.895	0.918	0.906	0.916	0.923	0.904	0.888	0.915
Total	7.020	7.009	7.020	7.037	7.019	7.008	7.000	7.023	7.002	7.012	7.017	7.017	6.986	7.020
Endmembers														
Margarite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.2	0.0	0.0
Paragonite	3.6	4.9	4.2	4.5	4.4	2.7	4.5	3.8	4.4	4.4	3.3	6.0	3.8	3.2
Celadonite	25.5	26.2	26.7	23.0	24.7	29.2	25.1	26.0	25.6	25.8	30.9	25.2	28.9	26.5
Muscovite	70.9	68.9	69.1	72.5	70.9	68.1	70.4	70.0	70.0	69.8	65.8	68.5	67.3	70.3
X_{Mg}	0.447	0.482	0.467	0.431	0.468	0.503	0.452	0.487	0.464	0.458	0.497	0.475	0.507	0.475

	753011A F7 Phg8	760210A F1 Phg 3	760210A F1 Phg 4	760210A F1 Phg 5	760210A F1 Phg 6	760210A F2 Phg1	760210A F2 Phg2	760210A F2 Phg3	760210A F2 Phg4	760210A F2 Phg5	760210A F2 Phg7	760210A F3tg Phg3	760210A F3tg Phg4	760210A F3tg Phg5
Analysis														
SiO_2	48.81	49.20	48.82	49.67	49.31	48.77	48.87	49.45	48.89	49.18	49.41	49.71	49.54	49.21
TiO_2	0.27	0.15	0.26	0.15	0.15	0.22	0.22	0.18	0.17	0.25	0.23	0.09	0.16	0.11
Al_2O_3	30.48	23.83	24.25	24.05	23.85	24.16	24.72	24.37	23.01	24.52	24.16	23.93	23.57	23.22
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.71	3.22	3.06	3.17	3.29	3.03	3.05	3.16	3.45	3.15	3.25	3.38	3.46	3.54
CaO	0.00	0.04	0.02	0.00	0.01	0.00	0.03	0.02	0.01	0.01	0.03	0.00	0.00	0.01
MnO	0.00	0.03	0.01	0.05	0.05	0.04	0.05	0.00	0.04	0.01	0.06	0.03	0.04	0.00
FeO	3.50	6.38	6.44	6.17	6.14	6.56	6.30	6.10	6.89	6.33	6.31	6.00	6.47	6.13
BaO	0.00	0.27	0.33	0.39	0.32	0.32	0.41	0.22	0.25	0.34	0.30	0.27	0.26	0.23
Na_2O	0.38	0.19	0.24	0.19	0.18	0.17	0.22	0.22	0.13	0.20	0.20	0.14	0.10	0.12
K_2O	10.45	10.58	10.39	10.55	10.49	10.53	10.30	10.58	10.53	10.61	10.60	10.42	10.42	10.68
Total	95.59	93.88	93.82	94.37	93.79	93.79	94.17	94.30	93.37	94.58	94.56	93.97	94.03	93.26
Cations														
Si	3.266	3.425	3.402	3.435	3.431	3.404	3.390	3.418	3.434	3.399	3.414	3.443	3.439	3.446
Ti	0.014	0.008	0.014	0.008	0.008	0.011	0.012	0.009	0.009	0.013	0.012	0.005	0.008	0.006
Al	2.403	1.955	1.992	1.960	1.956	1.987	2.020	1.985	1.905	1.997	1.968	1.953	1.929	1.917
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.170	0.335	0.318	0.326	0.342	0.315	0.316	0.326	0.361	0.324	0.335	0.349	0.358	0.370
Ca	0.000	0.003	0.001	0.000	0.001	0.000	0.002	0.002	0.001	0.001	0.002	0.000	0.000	0.001
Mn	0.000	0.002	0.000	0.003	0.003	0.002	0.003	0.000	0.002	0.000	0.003	0.002	0.002	0.000
Fe^{2+}	0.196	0.372	0.375	0.357	0.357	0.383	0.365	0.353	0.405	0.366	0.365	0.347	0.376	0.359
Ba	0.000	0.007	0.009	0.010	0.009	0.009	0.011	0.006	0.007	0.009	0.008	0.007	0.007	0.006
Na	0.049	0.025	0.033	0.025	0.024	0.023	0.030	0.029	0.018	0.026	0.027	0.019	0.013	0.016
K	0.892	0.940	0.923	0.931	0.931	0.937	0.911	0.933	0.944	0.935	0.935	0.921	0.923	0.954
Total	6.990	7.072	7.067	7.055	7.061	7.071	7.059	7.061	7.085	7.071	7.071	7.046	7.056	7.075
Endmembers														
Margarite	0.0	0.3	0.2	0.0	0.1	0.0	0.2	0.2	0.1	0.1	0.2	0.0	0.0	0.1
Paragonite	5.3	2.6	3.4	2.6	2.5	2.4	3.1	3.0	1.8	2.7	2.8	2.1	1.4	1.7
Celadonite	26.6	42.5	40.2	43.5	43.1	40.4	39.0	41.8	43.4	39.9	41.4	44.3	43.9	44.6
Muscovite	68.2	54.5	56.3	53.9	54.3	57.2	57.7	55.0	54.7	57.3	55.5	53.7	54.6	53.6
X_{Mg}	0.466	0.474	0.459	0.478	0.489	0.451	0.464	0.480	0.471	0.470	0.479	0.501	0.488	0.507

	760210A F3tg Phg7	760210A F3tg Phg8	811042C F4 Phg	811065A F1 Phg	811065A F1 Phg	811065A F1 Phg	811065A F1 Phg	811065A F2 Phg	811081A F1 Phg1	811081A F1 Phg3	811081A F1 Phg4	811081A F1 Phg21	811081A F1 Phg31	811081A F1 Phg32
Analysis														
SiO_2	48.44	49.14	48.92	48.41	49.89	48.16	51.01	49.08	51.81	52.18	52.38	51.45	51.67	51.47
TiO_2	0.20	0.21	0.16	0.07	0.07	0.13	0.04	0.06	1.24	0.79	0.88	1.22	1.12	1.09
Al_2O_3	24.31	24.58	23.91	29.46	28.17	27.41	28.72	28.49	28.93	29.35	28.71	28.55	28.66	28.44
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.96	3.01	3.70	2.27	2.46	3.06	1.92	2.83	2.83	2.58	2.87	2.65	2.90	2.98
CaO	0.00	0.00	0.37	0.07	0.15	0.17	0.11	0.11	0.00	0.05	0.00	0.00	0.00	0.00
MnO	0.03	0.00	0.04	0.00	0.03	0.05	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00
FeO	6.40	6.53	6.86	2.93	2.93	4.19	2.26	2.98	2.32	2.10	2.35	2.08	2.27	2.29
BaO	0.28	0.19	0.46	0.62	0.73	0.77	0.16	0.95	0.76	0.36	0.35	0.64	0.50	0.48
Na_2O	0.19	0.23	0.14	0.30	0.88	0.30	1.39	0.35	0.71	0.76	0.78	0.70	0.69	0.75
K_2O	10.60	10.60	10.08	10.32	9.80	9.76	9.94	10.34	9.83	9.96	9.94	9.82	9.79	10.04
Total	93.40	94.48	94.63	94.44	95.10	93.99	95.54	95.19	98.44	98.15	98.28	97.09	97.60	97.53
Cations														
Si	3.394	3.399	3.389	3.287	3.359	3.309	3.391	3.317	3.351	3.370	3.383	3.367	3.363	3.360
Ti	0.010	0.011	0.008	0.004	0.003	0.007	0.002	0.003	0.060	0.038	0.043	0.060	0.055	0.054
Al	2.007	2.003	1.952	2.357	2.235	2.220	2.250	2.270	2.205	2.234	2.185	2.202	2.198	2.188
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.309	0.310	0.382	0.230	0.247	0.313	0.190	0.285	0.273	0.249	0.276	0.258	0.281	0.290
Ca	0.000	0.000	0.027	0.005	0.011	0.013	0.008	0.008	0.000	0.004	0.000	0.000	0.000	0.000
Mn	0.002	0.000	0.002	0.000	0.002	0.003	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Fe^{2+}	0.375	0.377	0.397	0.166	0.165	0.241	0.126	0.168	0.125	0.113	0.127	0.114	0.124	0.125
Ba	0.008	0.005	0.012	0.017	0.019	0.021	0.004	0.025	0.019	0.009	0.009	0.016	0.013	0.012
Na	0.026	0.031	0.018	0.039	0.114	0.041	0.179	0.045	0.089	0.096	0.098	0.089	0.087	0.095
K	0.947	0.935	0.891	0.894	0.842	0.856	0.843	0.892	0.811	0.820	0.819	0.819	0.812	0.836
Total	7.078	7.072	7.081	6.998	6.998	7.022	6.993	7.014	6.936	6.933	6.941	6.926	6.933	6.958
Endmembers														
Margarite	0.0	0.0	2.9	0.5	1.1	1.4	0.8	0.9	0.0	0.4	0.0	0.0	0.0	0.0
Paragonite	2.6	3.2	2.0	4.2	11.8	4.5	17.4	4.8	9.9	10.4	10.7	9.8	9.6	10.2
Celadonite	39.4	39.9	38.9	28.7	35.9	30.9	39.1	31.7	35.1	37.0	38.3	36.7	36.3	36.0
Muscovite	57.9	56.9	56.2	66.6	51.1	63.2	42.8	62.6	55.0	52.2	51.1	53.5	54.1	53.9
X_{Mg}	0.452	0.451	0.490	0.580	0.600	0.566	0.602	0.628	0.686	0.687	0.686	0.694	0.695	0.699

	811081A F1 Phg33	811081A F1 Phg34	D7626A F4 Phg1	D7626A F4 Phg2	D7626A F4 Phg5	D7626A F4 Phg6	D7626A F4 Phg7	D7626A F4 Phg8	D7626A F4 Phg9	D7626A F4 Phg19	D7626A F4 Phg21	D7626A F4 Phg30	D7626A F4 Phg3	D7626A F4 Phg10
Analysis														
SiO_2	51.61	52.21	46.37	49.45	46.06	45.65	46.17	50.21	46.05	45.90	45.76	46.48	46.49	46.97
TiO_2	1.15	1.23	0.04	0.02	0.01	0.03	0.12	0.00	0.06	0.17	0.09	0.10	0.14	0.11
Al_2O_3	28.45	28.68	39.67	37.03	38.85	41.04	40.34	37.14	39.76	40.22	39.41	39.98	36.94	36.92
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	2.88	2.76	0.06	0.08	0.26	0.04	0.09	0.05	0.12	0.09	0.15	0.10	0.56	0.61
CaO	0.00	0.01	0.34	0.27	0.29	0.29	0.27	0.31	0.28	0.31	0.30	0.34	0.00	0.00
MnO	0.07	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.02	0.00
FeO	2.26	2.16	0.21	0.19	0.27	0.22	0.43	0.21	0.35	0.30	0.33	0.17	0.81	0.87
BaO	0.53	0.57	0.00	0.10	0.10	0.01	0.01	0.03	0.00	0.06	0.00	0.07	0.04	0.15
Na_2O	0.74	0.75	6.95	6.29	6.39	7.62	6.69	6.48	6.47	6.60	6.03	6.71	1.56	1.80
K_2O	10.20	9.99	1.05	1.48	1.12	0.35	1.94	0.99	1.68	1.83	2.31	1.59	8.66	8.48
Total	97.87	98.35	94.70	94.91	93.35	95.24	96.08	95.41	94.76	95.53	94.38	95.56	95.22	95.90
Cations														
Si	3.361	3.374	2.983	3.162	3.004	2.919	2.947	3.182	2.969	2.944	2.970	2.973	3.061	3.072
Ti	0.056	0.060	0.002	0.001	0.000	0.001	0.006	0.000	0.003	0.008	0.005	0.005	0.007	0.005
Al	2.184	2.184	3.008	2.790	2.986	3.092	3.034	2.774	3.021	3.040	3.015	3.013	2.866	2.845
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.279	0.265	0.005	0.008	0.025	0.003	0.009	0.005	0.012	0.009	0.014	0.009	0.055	0.059
Ca	0.000	0.000	0.024	0.018	0.020	0.020	0.019	0.021	0.019	0.022	0.021	0.023	0.000	0.000
Mn	0.004	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.000
Fe^{2+}	0.123	0.117	0.011	0.010	0.014	0.012	0.023	0.011	0.019	0.016	0.018	0.009	0.044	0.048
Ba	0.013	0.015	0.000	0.003	0.003	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.004
Na	0.094	0.094	0.866	0.779	0.807	0.944	0.828	0.796	0.808	0.820	0.758	0.833	0.199	0.228
K	0.847	0.824	0.086	0.120	0.093	0.028	0.158	0.080	0.139	0.150	0.192	0.130	0.728	0.708
Total	6.961	6.933	6.987	6.892	6.953	7.020	7.023	6.869	6.991	7.013	6.993	6.997	6.963	6.968
Endmembers														
Margarite	0.0	0.0	2.4	2.0	2.2	2.0	1.9	2.3	2.0	2.2	2.1	2.3	0.0	0.0
Paragonite	10.0	10.3	88.7	84.9	87.7	95.2	82.4	88.7	83.7	82.7	78.1	84.5	21.5	24.4
Celadonite	36.1	37.4	0.0	16.2	0.4	0.0	0.0	18.2	0.0	0.0	0.0	0.0	6.1	7.2
Muscovite	53.9	52.3	8.8	3.0	9.7	2.8	15.7	9.3	14.3	15.1	19.7	13.2	72.4	68.5
X_{Mg}	0.694	0.695	0.328	0.437	0.638	0.228	0.276	0.298	0.379	0.351	0.446	0.501	0.554	0.554

	D7626A F4 Phg11	D7626A F4 Phg12	D7626A F4 Phg13	D7626A F4 Phg14	D7626A F4 Phg15	D7626A F4 Phg16	D7626A F4 Phg17	D7626A F4 Phg18	D7626A F4 Phg22	D7626A F4 Phg23	D7626A F4 Phg25	D7626A F4 Phg26	D7626A F4 Phg27	D7626A F4 Phg28
Analysis														
SiO_2	46.01	46.34	45.91	46.16	45.98	46.07	46.37	45.78	46.42	45.61	46.25	46.22	46.71	46.77
TiO_2	0.20	0.32	0.41	0.16	0.14	0.31	0.22	0.34	0.11	0.11	0.14	0.21	0.19	0.12
Al_2O_3	37.09	36.82	36.16	36.58	36.65	36.33	36.97	36.01	36.92	36.38	35.96	36.33	36.29	36.64
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.38	0.52	0.52	0.51	0.61	0.62	0.55	0.59	0.59	0.58	0.71	0.65	0.67	0.63
CaO	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
MnO	0.03	0.03	0.00	0.00	0.00	0.01	0.04	0.04	0.00	0.00	0.01	0.05	0.00	0.00
FeO	0.75	0.74	0.82	0.72	0.83	0.80	0.76	0.70	0.76	0.69	0.75	0.75	0.80	0.74
BaO	0.12	0.07	0.04	0.19	0.06	0.09	0.13	0.15	0.12	0.03	0.04	0.13	0.05	0.00
Na_2O	1.94	1.77	1.62	1.75	1.59	1.60	1.59	1.49	1.83	1.78	1.52	1.72	1.60	1.67
K_2O	8.41	8.56	8.03	8.54	8.62	8.72	8.81	8.81	8.37	8.42	8.70	8.62	8.55	8.67
Total	94.94	95.18	93.54	94.60	94.46	94.55	95.44	93.91	95.11	93.61	94.08	94.66	94.87	95.24
Cations														
Si	3.041	3.054	3.069	3.063	3.054	3.060	3.052	3.064	3.058	3.055	3.083	3.066	3.085	3.077
Ti	0.010	0.016	0.021	0.008	0.007	0.016	0.011	0.017	0.005	0.006	0.007	0.010	0.009	0.006
Al	2.889	2.860	2.849	2.860	2.869	2.844	2.868	2.841	2.867	2.871	2.825	2.840	2.824	2.841
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.037	0.051	0.052	0.051	0.061	0.062	0.054	0.059	0.057	0.058	0.071	0.064	0.066	0.061
Ca	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Mn	0.002	0.002	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.003	0.000	0.000
Fe^{2+}	0.042	0.041	0.046	0.040	0.046	0.045	0.042	0.039	0.042	0.039	0.042	0.042	0.044	0.041
Ba	0.003	0.002	0.001	0.005	0.001	0.002	0.003	0.004	0.003	0.001	0.001	0.003	0.001	0.000
Na	0.249	0.226	0.209	0.224	0.204	0.207	0.202	0.193	0.234	0.231	0.196	0.221	0.205	0.212
K	0.709	0.720	0.684	0.723	0.730	0.739	0.739	0.752	0.703	0.719	0.739	0.730	0.721	0.728
Total	6.983	6.973	6.933	6.973	6.972	6.974	6.974	6.971	6.971	6.980	6.965	6.979	6.956	6.967
Endmembers														
Margarite	0.1	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Paragonite	26.0	23.9	23.4	23.7	21.8	21.9	21.5	20.4	25.0	24.3	21.0	23.3	22.1	22.6
Celadonite	4.1	5.4	6.9	6.3	5.4	6.0	5.2	6.4	5.8	5.5	8.3	6.6	8.5	7.7
Muscovite	69.8	70.6	69.5	70.0	72.8	72.1	73.3	73.2	69.1	70.2	70.7	70.1	69.3	69.7
X_{Mg}	0.473	0.559	0.530	0.562	0.567	0.580	0.563	0.600	0.579	0.599	0.628	0.605	0.598	0.600

	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $12Ms*	Q61E $17Ms*	Q61E $17Ms*	Q61E $17Ms*	Q61E $17Ms*	Q61E $17Ms*	Q61E $17Ms*
Analysis														
SiO_2	46.14	46.33	46.22	46.34	46.70	46.29	45.23	46.18	44.95	45.61	44.50	44.20	44.46	44.90
TiO_2	0.79	0.88	0.61	0.69	0.96	0.58	0.74	0.89	0.50	0.41	0.41	0.41	0.49	0.40
Al_2O_3	35.65	35.76	36.54	36.52	35.82	36.54	36.10	35.92	36.53	36.49	36.54	37.01	36.71	36.08
Cr_2O_3	0.04	0.04	0.02	0.06	0.06	0.01	0.03	0.03	0.00	0.07	0.06	0.04	0.05	0.07
MgO	0.84	0.84	0.69	0.57	0.80	0.63	0.63	0.69	0.53	0.47	0.49	0.48	0.48	0.50
CaO	0.02	0.00	0.07	0.00	0.00	0.01	0.03	0.00	0.03	0.06	0.05	0.03	0.00	0.01
MnO	0.00	0.02	0.04	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
FeO	1.18	1.21	1.01	0.96	1.17	0.99	1.00	0.89	0.88	0.84	0.86	0.84	0.77	0.90
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	1.71	1.64	1.82	1.71	1.66	1.97	1.49	1.71	1.75	1.34	2.17	2.12	1.96	1.95
K_2O	8.87	8.98	8.98	9.03	9.12	8.83	9.11	8.85	8.88	9.61	8.27	8.37	8.61	8.65
Total	95.24	95.69	96.00	95.87	96.33	95.85	94.35	95.15	94.05	94.91	93.35	93.53	93.52	93.47
Cations														
Si	3.056	3.055	3.036	3.045	3.060	3.042	3.025	3.054	3.012	3.034	3.000	2.976	2.994	3.027
Ti	0.039	0.044	0.030	0.034	0.047	0.029	0.037	0.044	0.025	0.021	0.021	0.021	0.025	0.021
Al	2.783	2.779	2.828	2.828	2.766	2.830	2.845	2.800	2.885	2.862	2.903	2.937	2.913	2.866
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.083	0.082	0.067	0.056	0.078	0.061	0.063	0.068	0.053	0.046	0.049	0.048	0.049	0.050
Ca	0.001	0.000	0.005	0.000	0.000	0.001	0.002	0.000	0.002	0.004	0.004	0.002	0.000	0.001
Mn	0.000	0.001	0.002	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Fe^{2+}	0.065	0.067	0.056	0.053	0.064	0.054	0.056	0.049	0.049	0.047	0.048	0.047	0.043	0.051
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.220	0.210	0.232	0.218	0.211	0.251	0.193	0.220	0.227	0.173	0.283	0.277	0.255	0.255
K	0.749	0.755	0.752	0.757	0.762	0.740	0.777	0.747	0.759	0.815	0.711	0.719	0.739	0.743
Total	6.996	6.992	7.010	6.990	6.991	7.009	6.999	6.982	7.013	7.003	7.020	7.030	7.019	7.013
Endmembers														
Margarite	0.1	0.0	0.5	0.0	0.0	0.1	0.2	0.0	0.2	0.4	0.4	0.2	0.0	0.1
Paragonite	22.6	21.7	23.5	22.4	21.7	25.3	19.9	22.8	23.0	17.5	28.4	27.8	25.7	25.5
Celadonite	5.6	5.5	3.6	4.5	6.0	4.2	2.5	5.4	1.2	3.4	0.0	0.0	0.0	2.7
Muscovite	71.7	72.8	72.4	73.2	72.3	70.4	77.4	71.8	75.6	78.7	71.2	72.0	74.3	71.7
X_{Mg}	0.560	0.552	0.547	0.513	0.549	0.530	0.531	0.579	0.520	0.497	0.506	0.503	0.528	0.497

* kindly provided by Bradley R. Hacker

	Q61E $17Ms*	Q61E $17Ms*	Q61E $18Ms*	Q61E $18Ms*	Q61E $18Ms*	Q61E $18Ms*	Q61E $18Ms*	Q61E $18Ms	Q67F F3 HGI 1 2	Q67F F3 HGI 1 3	Q67F F3 HGI 2 1	Q67F F3 HGI 2 2	Q67F F3 HGI 2 3	Q67F F3 HGI 2 4
Analysis														
SiO_2	45.72	44.77	45.24	45.06	45.39	45.70	45.43	45.41	46.63	46.96	46.31	46.66	46.68	46.11
TiO_2	0.34	0.33	0.73	0.69	0.56	0.62	0.52	0.65	0.42	0.47	0.40	0.60	0.52	0.55
Al_2O_3	36.97	37.08	35.87	36.19	36.67	35.95	36.43	36.65	36.88	36.83	36.40	36.94	36.20	36.45
Cr_2O_3	0.04	0.00	0.07	0.07	0.05	0.06	0.01	0.10	0.05	0.02	0.02	0.02	0.02	0.00
MgO	0.38	0.48	0.67	0.60	0.49	0.65	0.62	0.62	0.71	0.80	0.83	0.76	0.80	0.78
CaO	0.03	0.09	0.05	0.02	0.02	0.04	0.14	0.09	0.02	0.02	0.00	0.02	0.03	0.00
MnO	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.00	0.00
FeO	0.71	0.85	0.85	0.98	0.82	0.86	0.88	0.89	0.96	1.05	1.21	1.08	1.06	0.97
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	2.24	1.92	1.73	1.87	2.00	1.77	1.54	1.68	0.66	0.73	0.63	0.70	0.62	0.59
K_2O	8.27	8.00	8.66	8.58	8.36	8.72	8.59	8.65	9.00	9.08	8.88	8.91	9.08	9.01
Total	94.70	93.53	93.87	94.07	94.36	94.38	94.15	94.74	95.41	96.03	94.75	95.78	95.07	94.53
Cations														
Si	3.030	3.002	3.034	3.018	3.022	3.047	3.032	3.016	3.063	3.069	3.067	3.055	3.081	3.060
Ti	0.017	0.017	0.037	0.035	0.028	0.031	0.026	0.033	0.021	0.023	0.020	0.029	0.026	0.028
Al	2.887	2.930	2.835	2.857	2.878	2.825	2.865	2.868	2.856	2.836	2.841	2.850	2.816	2.851
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.001	0.001	0.000
Mg	0.037	0.048	0.067	0.060	0.049	0.065	0.061	0.062	0.070	0.078	0.082	0.074	0.079	0.077
Ca	0.002	0.007	0.003	0.002	0.002	0.003	0.010	0.006	0.002	0.001	0.000	0.001	0.002	0.000
Mn	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000
Fe^{2+}	0.039	0.048	0.048	0.055	0.045	0.048	0.049	0.050	0.053	0.058	0.067	0.059	0.058	0.054
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.288	0.249	0.225	0.243	0.258	0.228	0.199	0.217	0.084	0.093	0.080	0.089	0.080	0.076
K	0.699	0.684	0.741	0.733	0.710	0.742	0.731	0.733	0.754	0.757	0.750	0.744	0.764	0.762
Total	7.001	6.984	6.989	7.001	6.992	6.989	6.974	6.984	6.906	6.915	6.908	6.906	6.907	6.906
Endmembers														
Margarite	0.2	0.7	0.3	0.2	0.2	0.3	1.0	0.7	0.2	0.1	0.0	0.1	0.2	0.0
Paragonite	29.1	26.5	23.2	24.8	26.6	23.5	21.2	22.7	10.0	10.9	9.7	10.6	9.4	9.0
Celadonite	3.0	0.2	3.4	1.8	2.2	4.7	3.2	1.6	6.3	6.9	6.7	5.5	8.1	6.0
Muscovite	67.7	72.6	73.1	73.2	71.1	71.5	74.6	75.1	83.4	82.1	83.7	83.7	82.2	85.0
X_{Mg}	0.488	0.502	0.582	0.521	0.517	0.575	0.556	0.555	0.570	0.574	0.552	0.556	0.576	0.589

	Q67F F3 HGI 2 5	Q67F F3 HGI 2 6	Q67F F7 HGI 3 2	Q67F F7 HGI 3 3	Q67F F7 HGI 3 4	Q67F F7 HGI 3 5	Q68B F1 Hgl1	Q68B F1 Hgl2	Q68B F1 Hgl3	Q68B F1 Hgl4	Q68B F1 Hgl5	Q68B F1 Hgl6	Q68B F1 Hgl7	Q68B F1 Hgl21
Analysis														
SiO_2	46.56	45.72	46.44	46.64	46.47	46.38	47.53	47.06	47.13	48.70	47.60	47.34	47.54	46.24
TiO_2	0.52	0.44	0.52	0.58	0.46	0.62	0.28	0.29	0.27	0.29	0.29	0.27	0.24	0.88
Al_2O_3	37.23	36.66	37.05	36.97	36.88	36.22	34.70	34.64	34.25	35.58	35.73	34.93	36.22	36.14
Cr_2O_3	0.00	0.02	0.02	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.71	0.69	0.63	0.80	0.77	0.76	0.90	0.84	0.94	0.79	0.73	0.80	0.72	0.50
CaO	0.00	0.02	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.01	0.00
MnO	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.01	0.02	0.00	0.02
FeO	1.02	1.06	1.08	1.01	1.04	1.01	1.73	1.71	1.80	1.37	1.43	1.53	1.33	1.09
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.72	0.69	0.79	0.68	0.69	0.61	0.77	0.95	0.80	1.11	1.15	1.11	0.95	1.09
K_2O	9.02	8.93	9.03	9.11	9.02	8.89	10.02	9.84	9.86	9.30	9.32	9.40	9.59	9.48
Total	95.83	94.33	95.63	95.87	95.43	94.60	95.95	95.36	95.05	97.18	96.25	95.40	96.59	95.44
Cations														
Si	3.047	3.044	3.048	3.053	3.055	3.073	3.135	3.124	3.139	3.149	3.114	3.129	3.100	3.056
Ti	0.026	0.022	0.026	0.029	0.023	0.031	0.014	0.014	0.014	0.014	0.014	0.014	0.012	0.044
Al	2.871	2.876	2.867	2.852	2.858	2.828	2.698	2.711	2.688	2.712	2.755	2.722	2.784	2.814
Cr	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.069	0.069	0.062	0.078	0.076	0.075	0.088	0.083	0.093	0.076	0.071	0.079	0.070	0.049
Ca	0.000	0.002	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.001
Fe^{2+}	0.056	0.059	0.060	0.055	0.057	0.056	0.095	0.095	0.100	0.074	0.078	0.084	0.073	0.060
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.091	0.090	0.100	0.086	0.088	0.078	0.099	0.122	0.104	0.140	0.146	0.142	0.120	0.140
K	0.753	0.758	0.757	0.760	0.757	0.751	0.843	0.833	0.838	0.767	0.778	0.793	0.798	0.799
Total	6.914	6.920	6.921	6.916	6.915	6.896	6.973	6.984	6.975	6.934	6.956	6.963	6.955	6.963
Endmembers														
Margarite	0.0	0.2	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Paragonite	10.8	10.5	11.7	10.2	10.4	9.5	10.5	12.8	11.0	15.3	15.8	15.2	13.1	14.9
Celadonite	4.7	4.4	4.8	5.3	5.5	7.3	13.5	12.4	13.9	14.9	11.4	12.9	10.0	5.6
Muscovite	84.5	84.9	83.4	84.3	84.0	83.2	75.9	74.8	75.1	69.5	72.8	71.9	76.9	79.5
X_{Mg}	0.554	0.537	0.509	0.584	0.570	0.575	0.480	0.466	0.482	0.509	0.475	0.482	0.489	0.452

* kindly provided by Bradley R. Hacker

	Q68B F1 Hgl22	Q68B F1 Hgl23	Q68B F1 Hgl24	Q68B F1 Hgl25	Q68B F1 Hgl26	Q68B F1 Hgl27	Q68B F1 Hgl28	Q68B F1 Hgl29	Q68B F3 Hgl1	Q68B F3 Hgl2	Q68B F3 Hgl3	Q68B F3 Hgl4	Q68B F3 Hgl5	Q68B F3 Hgl6
Analysis														
SiO_2	46.72	46.20	46.63	46.52	46.23	48.52	47.42	47.52	47.25	47.27	46.84	47.36	46.52	46.69
TiO_2	0.92	0.99	0.86	0.82	0.79	0.26	0.28	0.23	0.33	0.68	0.64	0.40	0.72	0.66
Al_2O_3	35.68	35.60	36.11	35.83	35.87	34.12	36.08	36.17	36.10	36.53	36.19	35.78	36.06	36.03
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.60	0.58	0.53	0.57	0.53	1.07	0.64	0.63	0.57	0.43	0.48	0.57	0.44	0.47
CaO	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00
MnO	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
FeO	0.99	1.14	1.12	1.11	1.15	1.51	1.27	1.39	1.12	1.05	1.13	1.09	1.07	1.08
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.98	0.90	0.95	1.00	1.11	0.89	1.25	1.25	1.23	1.26	1.28	1.15	0.91	0.90
K_2O	9.74	9.94	9.85	9.74	9.56	9.39	9.09	9.09	9.10	8.96	9.40	9.08	10.01	9.78
Total	95.63	95.34	96.05	95.60	95.26	95.75	96.02	96.28	95.70	96.20	95.96	95.45	95.72	95.61
Cations														
Si	3.082	3.064	3.065	3.072	3.063	3.187	3.104	3.103	3.101	3.084	3.076	3.114	3.070	3.079
Ti	0.046	0.049	0.043	0.041	0.040	0.013	0.014	0.011	0.016	0.033	0.032	0.020	0.036	0.033
Al	2.774	2.783	2.798	2.789	2.801	2.642	2.783	2.784	2.793	2.809	2.801	2.773	2.805	2.801
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.059	0.057	0.052	0.056	0.052	0.104	0.063	0.062	0.055	0.041	0.047	0.056	0.043	0.046
Ca	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	0.055	0.063	0.062	0.061	0.063	0.083	0.069	0.076	0.062	0.057	0.062	0.060	0.059	0.060
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.125	0.116	0.121	0.129	0.143	0.113	0.158	0.158	0.156	0.160	0.163	0.147	0.117	0.115
K	0.819	0.841	0.826	0.820	0.808	0.787	0.759	0.757	0.762	0.746	0.787	0.762	0.842	0.823
Total	6.958	6.974	6.967	6.968	6.972	6.929	6.950	6.951	6.946	6.931	6.967	6.933	6.972	6.956
Endmembers														
Margarite	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Paragonite	13.2	12.1	12.8	13.5	15.0	12.6	17.3	17.2	17.0	17.6	17.2	16.1	12.2	12.2
Celadonite	8.2	6.4	6.5	7.2	6.3	18.7	10.4	10.3	10.1	8.4	7.6	11.4	7.0	7.9
Muscovite	78.6	81.4	80.6	79.3	78.5	68.6	72.3	72.4	72.8	73.9	75.2	72.4	80.8	79.8
X_{Mg}	0.517	0.476	0.459	0.478	0.452	0.558	0.475	0.448	0.474	0.420	0.432	0.483	0.422	0.435

	Q68B F3 Hgl7	Q68B F3 Hgl8	Q68B F3 Hgl9	Q68B F3 Hgl10	Q68B F3 Hgl21	Q68B F3 Hgl22	Q68B F3 Hgl23
Analysis							
SiO_2	46.67	46.70	46.72	46.74	47.13	46.97	47.72
TiO_2	0.67	0.60	0.73	0.62	0.45	0.47	0.46
Al_2O_3	35.95	36.35	35.79	36.36	36.46	36.50	36.37
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.55	0.60	0.54	0.53	0.51	0.49	0.51
CaO	0.01	0.00	0.00	0.01	0.00	0.00	0.00
MnO	0.01	0.00	0.01	0.00	0.00	0.00	0.00
FeO	1.04	0.94	1.03	1.09	1.08	1.02	1.03
BaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.72	0.65	0.95	0.91	1.31	1.37	1.37
K_2O	10.30	10.35	9.87	9.95	9.42	9.22	9.03
Total	95.90	96.17	95.64	96.21	96.35	96.03	96.47
Cations							
Si	3.077	3.068	3.083	3.067	3.080	3.076	3.104
Ti	0.033	0.030	0.036	0.031	0.022	0.023	0.022
Al	2.794	2.814	2.783	2.812	2.808	2.817	2.788
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.054	0.058	0.053	0.052	0.049	0.048	0.050
Ca	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe^{2+}	0.057	0.052	0.057	0.060	0.059	0.056	0.056
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Na	0.092	0.082	0.121	0.116	0.166	0.174	0.172
K	0.866	0.867	0.831	0.833	0.785	0.770	0.749
Total	6.973	6.971	6.965	6.970	6.970	6.964	6.940
Endmembers							
Margarite	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Paragonite	9.6	8.7	12.7	12.2	17.5	18.4	18.7
Celadonite	7.7	6.8	8.3	6.7	8.0	7.6	10.4
Muscovite	82.7	84.6	79.0	81.1	74.5	74.0	70.9
X_{Mg}	0.485	0.531	0.484	0.465	0.455	0.461	0.471

Olivine

Electron microprobe analyses of olivine. Cations based on a 4 oxygen basis.

	75257A F3 Ol4	75257A F3 Ol5	75257A F3 Ol12	75257A F3 Ol13	75257A F4 Ol1	75257A F4 Ol2	75257A F4 Ol3	75257A F5 Ol1	75257A F5 Ol2	75257A F5 Ol3	75257A F5 Ol4	75257A F5 Ol5	75257A F5 Ol12	75257A F5 Ol13
Analysis														
SiO_2	40.67	40.95	41.05	40.59	40.60	40.74	40.67	40.90	40.98	40.78	41.21	41.06	40.72	40.99
TiO_2	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02
Al_2O_3	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cr_2O_3	0.05	0.02	0.00	0.03	0.03	0.00	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00
MgO	48.34	48.60	48.45	48.49	48.43	48.18	48.20	48.48	47.95	48.03	48.33	48.47	47.96	48.61
CaO	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.03	0.00	0.02	0.00	0.01	0.00	0.02
MnO	0.18	0.15	0.18	0.18	0.11	0.15	0.13	0.10	0.18	0.11	0.18	0.12	0.16	0.16
FeO	10.58	10.24	10.64	10.65	10.84	10.65	10.11	9.66	9.77	9.84	10.07	9.83	9.79	10.02
NiO	0.42	0.42	0.51	0.50	0.43	0.48	0.49	0.53	0.43	0.42	0.44	0.48	0.47	0.45
Total	100.26	100.40	100.85	100.44	100.46	100.24	99.65	99.70	99.31	99.20	100.27	100.00	99.10	100.27
Cations														
Si	0.999	1.002	1.002	0.996	0.997	1.001	1.003	1.005	1.011	1.008	1.009	1.007	1.008	1.004
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.770	1.773	1.763	1.774	1.772	1.765	1.772	1.777	1.764	1.769	1.763	1.772	1.769	1.774
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001
Mn	0.004	0.003	0.004	0.004	0.002	0.003	0.003	0.002	0.004	0.002	0.004	0.003	0.003	0.003
Fe^{2+}	0.217	0.210	0.217	0.219	0.223	0.219	0.209	0.199	0.202	0.203	0.206	0.201	0.203	0.205
Ni	0.008	0.008	0.010	0.010	0.008	0.009	0.010	0.010	0.008	0.008	0.009	0.010	0.009	0.009
Total	3.000	2.997	2.997	3.003	3.003	2.998	2.997	2.994	2.989	2.992	2.991	2.993	2.992	2.996
X_{Mg}	0.891	0.894	0.890	0.890	0.888	0.890	0.895	0.899	0.897	0.897	0.895	0.898	0.897	0.896

	75257A F5 Ol14	75257A F5 Ol15	75295A F2 Ol1	75295A F2 Ol3	75295A F2 Ol4	75295A F2 Ol5	75295A F2 Ol6	75295A F2 Ol7	75295A F3 Ol1	75295A F3 Ol2	75295A F3 Ol3	75295A F3 Ol4	75295A F3 Ol5	75295A F3 Ol6
Analysis														
SiO_2	41.21	41.41	41.28	40.93	41.11	41.29	41.20	41.29	41.03	41.33	41.12	41.19	41.13	41.35
TiO_2	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Al_2O_3	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01
Cr_2O_3	0.00	0.00	0.01	0.02	0.03	0.02	0.00	0.00	0.04	0.00	0.05	0.02	0.02	0.00
MgO	48.67	49.01	49.72	49.47	49.56	49.66	49.51	49.66	49.49	49.53	49.87	49.68	49.73	49.46
CaO	0.01	0.02	0.00	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.02	0.00	0.00
MnO	0.13	0.15	0.12	0.11	0.16	0.17	0.13	0.08	0.14	0.14	0.16	0.22	0.13	0.17
FeO	9.89	9.89	8.83	8.93	9.04	9.28	9.03	9.04	9.05	8.88	9.15	9.00	9.01	9.04
NiO	0.45	0.51	0.39	0.37	0.39	0.39	0.33	0.33	0.32	0.36	0.36	0.39	0.41	0.31
Total	100.34	101.00	100.37	99.84	100.29	100.82	100.25	100.42	100.08	100.26	100.72	100.54	100.44	100.35
Cations														
Si	1.007	1.005	1.004	1.001	1.002	1.002	1.004	1.004	1.002	1.006	0.998	1.001	1.001	1.006
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Mg	1.773	1.774	1.802	1.804	1.800	1.796	1.798	1.800	1.801	1.797	1.805	1.800	1.804	1.794
Ca	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.004	0.003	0.004
Fe^{2+}	0.202	0.201	0.180	0.183	0.184	0.188	0.184	0.184	0.185	0.181	0.186	0.183	0.183	0.184
Ni	0.009	0.010	0.008	0.007	0.008	0.008	0.007	0.006	0.006	0.007	0.007	0.008	0.008	0.006
Total	2.993	2.994	2.996	2.998	2.998	2.998	2.996	2.996	2.998	2.994	3.001	2.998	2.999	2.994
X_{Mg}	0.898	0.898	0.909	0.908	0.907	0.905	0.907	0.907	0.907	0.909	0.907	0.908	0.908	0.907

	75295A F3 Ol7	75295A F3 Ol8	75295A F3 Ol10	75295A F5 Ol2	75295A F5 Ol3	75295A F5 Ol4	75295A F5 Ol5	75295A F5 Ol6	75295A F5 Ol7	75295A F5 Ol8	75295A F5 Ol9	75295A F5 Ol10	75295A F5 Ol11	75295A F5 Ol12
Analysis														
SiO_2	41.18	41.91	41.28	41.95	41.76	41.87	41.67	41.60	41.90	41.63	41.54	41.64	41.83	41.60
TiO_2	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.01
Al_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Cr_2O_3	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.01	0.01	0.03	0.02
MgO	49.68	47.22	49.64	49.47	49.54	49.59	49.44	49.62	49.37	49.47	49.27	49.54	49.72	49.41
CaO	0.02	0.05	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.27	0.00	0.01	0.00
MnO	0.20	0.15	0.13	0.14	0.14	0.11	0.14	0.12	0.14	0.13	0.12	0.11	0.16	0.14
FeO	8.97	8.45	8.93	8.99	9.35	9.09	9.36	9.41	9.11	9.09	9.23	9.03	9.41	9.40
NiO	0.41	0.30	0.38	0.40	0.39	0.39	0.40	0.33	0.47	0.35	0.41	0.45	0.30	0.43
Total	100.45	98.10	100.37	100.97	101.18	101.08	101.01	101.09	101.04	100.67	100.84	100.79	101.46	101.00
Cations														
Si	1.002	1.037	1.004	1.013	1.008	1.011	1.008	1.006	1.012	1.009	1.007	1.009	1.007	1.007
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	1.802	1.741	1.800	1.781	1.784	1.784	1.784	1.788	1.778	1.788	1.781	1.789	1.785	1.783
Ca	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000
Mn	0.004	0.003	0.003	0.003	0.003	0.002	0.003	0.002	0.003	0.003	0.002	0.002	0.003	0.003
Fe^{2+}	0.182	0.175	0.182	0.181	0.189	0.183	0.189	0.190	0.184	0.184	0.187	0.183	0.190	0.190
Ni	0.008	0.006	0.007	0.008	0.008	0.008	0.008	0.006	0.009	0.007	0.008	0.009	0.006	0.008
Total	2.998	2.963	2.996	2.987	2.991	2.989	2.992	2.994	2.987	2.991	2.993	2.991	2.992	2.992
X_{Mg}	0.908	0.909	0.908	0.908	0.904	0.907	0.904	0.904	0.906	0.907	0.905	0.907	0.904	0.904

	75295A F5 Ol13	75295A F5 Ol14	75295A F5 Ol15	75295B F4 Ol1	75295B F4 Ol2	75295B F4 Ol3	75295B F4 Ol4	75295B F4 Ol5	75295B F4 Ol6	75295B F4 Ol7	75295B F4 Ol8	75295B F4 Opx1	75295B F4 Opx2	75295B F4 Opx3
Analysis														
SiO_2	41.77	41.87	41.63	41.36	41.16	41.30	41.14	41.15	41.20	41.09	41.32	41.71	41.70	43.75
TiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.02
Al_2O_3	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.01
Cr_2O_3	0.00	0.00	0.10	0.01	0.00	0.02	0.00	0.03	0.05	0.00	0.02	0.00	0.03	0.02
MgO	49.64	49.70	49.55	49.90	50.03	49.76	49.85	49.59	50.05	49.79	49.94	50.13	49.91	45.90
CaO	0.00	0.01	0.00	0.01	0.01	0.00	0.03	0.04	0.00	0.01	0.00	0.03	0.02	3.70
MnO	0.13	0.15	0.14	0.26	0.21	0.24	0.21	0.22	0.15	0.18	0.18	0.19	0.20	0.14
FeO	9.12	9.09	9.15	8.89	8.86	8.89	8.99	8.98	8.98	8.93	8.78	8.54	8.74	7.49
NiO	0.36	0.40	0.35	0.32	0.23	0.23	0.32	0.27	0.24	0.30	0.28	0.27	0.26	0.24
Total	101.02	101.23	100.91	100.75	100.51	100.45	100.54	100.28	100.69	100.32	100.53	100.88	100.84	101.27
Cations														
Si	1.009	1.009	1.007	1.002	1.000	1.003	1.000	1.002	0.999	1.000	1.002	1.007	1.008	1.051
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000
Mg	1.788	1.786	1.788	1.803	1.811	1.802	1.806	1.801	1.809	1.807	1.806	1.804	1.798	1.644
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.095
Mn	0.003	0.003	0.003	0.005	0.004	0.005	0.004	0.005	0.003	0.004	0.004	0.004	0.004	0.003
Fe^{2+}	0.184	0.183	0.185	0.180	0.180	0.181	0.183	0.183	0.182	0.182	0.178	0.172	0.177	0.151
Ni	0.007	0.008	0.007	0.006	0.005	0.004	0.006	0.005	0.005	0.006	0.005	0.005	0.005	0.005
Total	2.991	2.990	2.992	2.997	3.000	2.996	3.000	2.997	3.000	2.999	2.997	2.993	2.992	2.949
X_{Mg}	0.907	0.907	0.906	0.909	0.910	0.909	0.908	0.908	0.909	0.909	0.910	0.913	0.911	0.916

	75295B F4 Opx4	75295B F4 Opx5	75295B F4 Opx6	75295B F4 Opx7	75295B F4 Opx8	75295B F4 Opx9	75295B F4 Opx10	75295B F4 Opx11	75295B F4 Opx12	75295B F4 Opx13	75295B F4 Opx14	75295B F4 Opx15	75295B F4 Opx16
Analysis													
SiO_2	41.85	41.70	41.74	41.64	41.61	41.48	41.48	41.73	41.89	41.54	41.60	41.57	41.55
TiO_2	0.02	0.00	0.01	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.00
Al_2O_3	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Cr_2O_3	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.00	0.05	0.00
MgO	50.31	50.26	50.40	50.32	50.46	50.40	50.26	50.45	50.45	50.33	50.05	50.10	49.82
CaO	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.04	0.02	0.02	0.02	0.00	0.00
MnO	0.18	0.19	0.16	0.21	0.20	0.18	0.14	0.15	0.14	0.18	0.20	0.19	0.16
FeO	8.46	8.12	8.44	8.26	8.20	8.26	8.84	8.21	8.49	8.44	8.58	8.68	8.68
NiO	0.36	0.22	0.29	0.34	0.28	0.34	0.33	0.33	0.44	0.38	0.32	0.32	0.32
Total	101.19	100.50	101.06	100.79	100.79	100.69	101.07	100.91	101.49	100.89	100.76	100.94	100.52
Cations													
Si	1.007	1.008	1.005	1.005	1.004	1.003	1.001	1.006	1.005	1.003	1.006	1.004	1.007
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Mg	1.804	1.811	1.810	1.811	1.815	1.816	1.809	1.813	1.805	1.812	1.804	1.804	1.800
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Mn	0.004	0.004	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.004	0.004	0.004	0.003
Fe^{2+}	0.170	0.164	0.170	0.167	0.166	0.167	0.179	0.166	0.170	0.170	0.173	0.175	0.176
Ni	0.007	0.004	0.006	0.007	0.005	0.007	0.006	0.006	0.008	0.007	0.006	0.006	0.006
Total	2.993	2.992	2.994	2.995	2.995	2.997	2.999	2.994	2.994	2.997	2.994	2.995	2.993
X_{Mg}	0.914	0.917	0.914	0.916	0.916	0.916	0.910	0.916	0.914	0.914	0.912	0.911	0.911

	75257A F5 Opx4	75257A F5 Opx5	75257A F5 Opx6	75257A F5 Opx7	75257A F5 Opx8	75257A F5 Opx9	75257A F5 Opx21	75257A F5 Opx22	75257A F5 Opx23	75257A F5 Opx24	75257A F5 Opx25	75257A F5 Opx26	75257A F5 Opx27	75257A F5 Opx28
Analysis														
SiO_2	58.68	58.59	58.61	57.90	58.79	58.72	58.86	58.75	58.81	58.43	58.52	58.25	57.98	58.19
TiO_2	0.01	0.01	0.00	0.04	0.03	0.04	0.01	0.03	0.04	0.00	0.00	0.01	0.00	0.00
Al_2O_3	0.09	0.10	0.12	0.11	0.09	0.12	0.14	0.13	0.13	0.14	0.16	0.16	0.16	0.12
Cr_2O_3	0.06	0.06	0.04	0.04	0.07	0.05	0.09	0.12	0.07	0.11	0.12	0.12	0.10	0.05
Fe_2O_3	0.00	0.08	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.18
MgO	34.89	34.95	34.71	34.72	34.89	34.88	34.90	34.98	35.08	34.77	34.94	34.66	34.86	34.76
CaO	0.08	0.19	0.20	0.18	0.13	0.12	0.26	0.19	0.17	0.21	0.19	0.25	0.19	0.22
MnO	0.25	0.20	0.20	0.20	0.14	0.23	0.17	0.21	0.16	0.15	0.17	0.21	0.18	0.18
FeO	7.15	7.11	7.27	6.87	7.17	7.29	6.88	6.88	6.85	6.87	6.99	6.99	6.68	6.94
NiO	0.06	0.04	0.01	0.07	0.03	0.04	0.10	0.08	0.13	0.04	0.07	0.06	0.09	0.12
Na_2O	0.01	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Total	101.27	101.37	101.17	100.65	101.36	101.47	101.41	101.36	101.47	100.71	101.16	100.71	100.43	100.77
Cations														
Si	2.001	1.997	2.001	1.990	2.002	2.000	2.002	2.000	2.000	2.001	1.997	1.998	1.993	1.995
Ti	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Al	0.003	0.004	0.005	0.004	0.004	0.005	0.006	0.005	0.005	0.006	0.007	0.007	0.006	0.005
Fe^{3+}	0.000	0.002	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005
Fe^{3+}	0.002	0.002	0.001	0.001	0.002	0.001	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.001
Mg	1.774	1.776	1.767	1.779	1.771	1.770	1.770	1.775	1.778	1.775	1.778	1.772	1.786	1.777
Ca	0.003	0.007	0.007	0.007	0.005	0.004	0.009	0.007	0.006	0.008	0.007	0.009	0.007	0.008
Mn	0.007	0.006	0.006	0.006	0.004	0.007	0.005	0.006	0.005	0.004	0.005	0.006	0.005	0.005
Fe^{2+}	0.204	0.203	0.208	0.197	0.204	0.208	0.196	0.196	0.195	0.197	0.199	0.200	0.192	0.199
Ni	0.002	0.001	0.000	0.002	0.001	0.001	0.003	0.002	0.004	0.001	0.002	0.002	0.002	0.003
Na	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Total	3.996	4.000	3.996	4.000	3.995	3.996	3.993	3.995	3.997	3.995	3.998	3.997	4.000	4.000
X_{Mg}	0.897	0.898	0.895	0.900	0.897	0.895	0.900	0.901	0.901	0.900	0.899	0.898	0.903	0.899

	75257A F5 Opx29	75257A F5 Opx30	75257A F5 Opx31	75257A F5 Opx32	75257A F5 Opx33	75257A F5 Opx34	75257A F5 Opx35	75295B F1 Cpx1	75295B F1 Cpx2	75295B F1 Cpx3	75295B F1 Cpx4	75295B F1 Cpx5	75295B F1 Cpx6	75295B F1 Cpx7
Analysis														
SiO_2	58.62	58.65	58.36	58.18	58.10	58.20	57.72	55.16	55.59	55.64	55.45	55.70	56.13	55.83
TiO_2	0.04	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.00
Al_2O_3	0.10	0.12	0.13	0.13	0.10	0.12	0.11	0.52	0.07	0.05	0.01	0.05	0.06	0.11
Cr_2O_3	0.07	0.09	0.07	0.07	0.06	0.03	0.07	0.38	0.03	0.09	0.16	0.23	0.09	0.14
Fe_2O_3	0.00	0.00	0.00	0.16	0.00	0.35	0.32	0.66	0.28	0.49	1.24	0.54	0.00	0.00
MgO	34.80	34.71	34.87	34.86	34.75	34.81	34.57	18.24	18.20	18.36	17.73	17.79	18.35	18.38
CaO	0.24	0.20	0.17	0.21	0.20	0.26	0.19	25.04	25.99	25.82	25.48	25.34	25.91	25.64
MnO	0.18	0.17	0.21	0.16	0.19	0.22	0.19	0.08	0.06	0.02	0.06	0.08	0.04	0.03
FeO	7.22	7.03	7.03	6.86	6.95	6.80	6.89	0.71	0.55	0.50	0.71	1.27	0.83	0.95
NiO	0.08	0.08	0.09	0.10	0.11	0.11	0.08	n.d.	n.d	n.d	n.d	n.d	n.d	n.d
Na_2O	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.13	0.03	0.04	0.28	0.24	0.03	0.02
Total	101.36	101.03	100.93	100.75	100.49	100.92	100.12	100.93	100.80	101.01	101.13	101.24	101.45	101.10
Cations														
Si	1.999	2.003	1.997	1.994	1.997	1.993	1.993	1.979	1.995	1.993	1.990	1.996	2.000	1.997
Ti	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Al	0.004	0.005	0.005	0.005	0.004	0.005	0.004	0.022	0.003	0.002	0.000	0.002	0.002	0.005
Fe^{3+}	0.000	0.000	0.000	0.004	0.000	0.009	0.008	0.018	0.007	0.013	0.034	0.015	0.000	0.000
Fe^{3+}	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.011	0.001	0.002	0.004	0.006	0.003	0.004
Mg	1.769	1.768	1.779	1.782	1.781	1.777	1.779	0.975	0.974	0.980	0.949	0.951	0.975	0.980
Ca	0.009	0.007	0.006	0.008	0.007	0.010	0.007	0.963	1.000	0.991	0.980	0.973	0.989	0.983
Mn	0.005	0.005	0.006	0.005	0.005	0.006	0.006	0.003	0.002	0.001	0.002	0.002	0.001	0.001
Fe^{2+}	0.206	0.201	0.201	0.197	0.200	0.195	0.199	0.021	0.017	0.015	0.021	0.038	0.025	0.028
Ni	0.002	0.002	0.002	0.003	0.003	0.003	0.002	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Na	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.009	0.002	0.003	0.019	0.016	0.002	0.001
Total	3.997	3.993	3.999	4.000	3.999	4.000	4.000	4.000	4.000	4.000	4.000	4.000	3.997	3.999
X_{Mg}	0.896	0.898	0.898	0.901	0.899	0.901	0.899	0.979	0.983	0.985	0.978	0.962	0.975	0.972

	75295B F1 Cpx8	75295B F1 Cpx9	75295B F1 Cpx10	75295B F1 Cpx11	75295B F1 Cpx12	75295B F1 Cpx13	75295B F3 Cpx1	75295B F3 Cpx3	75295B F3 Cpx4	75295B F3 Cpx5	75295B F3 Cpx6	75295B F3 Cpx7	75295B F3 Cpx8	75295B F3 Cpx9
Analysis														
SiO_2	55.82	55.70	55.72	55.73	55.83	55.56	55.33	55.21	55.46	55.18	55.45	55.36	55.34	55.36
TiO_2	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.00	0.02	0.00
Al_2O_3	0.11	0.09	0.09	0.14	0.10	0.10	0.46	0.34	0.48	0.33	0.08	0.04	0.12	0.03
Cr_2O_3	0.21	0.23	0.14	0.11	0.17	0.29	0.29	0.32	0.34	0.23	0.24	0.23	0.29	0.17
Fe_2O_3	0.00	0.49	0.08	0.27	0.41	0.44	0.09	1.06	0.18	0.57	0.89	1.46	0.96	1.18
MgO	18.25	17.99	18.30	18.35	17.87	17.58	17.85	17.56	18.20	17.95	17.78	17.79	17.78	17.72
CaO	25.54	25.25	25.68	25.63	25.45	25.12	24.44	25.26	24.48	25.14	25.62	25.56	25.54	25.64
MnO	0.04	0.04	0.01	0.03	0.08	0.10	0.04	0.11	0.02	0.06	0.08	0.09	0.07	0.05
FeO	0.92	1.14	0.84	0.78	1.29	1.46	1.98	1.06	1.54	1.14	0.89	0.54	0.68	0.72
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	0.07	0.22	0.06	0.06	0.20	0.30	0.22	0.26	0.21	0.13	0.18	0.25	0.22	0.21
Total	100.95	101.15	100.91	101.10	101.41	100.96	100.72	101.18	100.90	100.72	101.22	101.31	101.02	101.09
Cations														
Si	1.999	1.996	1.997	1.994	1.997	1.998	1.992	1.983	1.990	1.986	1.989	1.984	1.987	1.988
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Al	0.004	0.004	0.004	0.006	0.004	0.004	0.019	0.014	0.020	0.014	0.003	0.002	0.005	0.001
Fe^{3+}	0.000	0.013	0.002	0.007	0.011	0.012	0.002	0.029	0.005	0.015	0.024	0.039	0.026	0.032
Fe^{3+}	0.006	0.006	0.004	0.003	0.005	0.008	0.008	0.009	0.010	0.007	0.007	0.007	0.008	0.005
Mg	0.975	0.961	0.978	0.979	0.953	0.942	0.958	0.940	0.973	0.963	0.951	0.951	0.952	0.949
Ca	0.980	0.969	0.986	0.983	0.975	0.968	0.943	0.972	0.941	0.970	0.984	0.982	0.983	0.987
Mn	0.001	0.001	0.000	0.001	0.002	0.003	0.001	0.003	0.000	0.002	0.002	0.003	0.002	0.002
Fe^{2+}	0.028	0.034	0.025	0.023	0.039	0.044	0.060	0.032	0.046	0.034	0.027	0.016	0.021	0.022
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.005	0.015	0.004	0.004	0.014	0.021	0.016	0.018	0.014	0.009	0.012	0.017	0.015	0.015
Total	3.998	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.972	0.966	0.975	0.977	0.961	0.956	0.941	0.967	0.955	0.966	0.973	0.983	0.979	0.978

	75295B F3 Cpx10	75295B F3 Cpx11	75295B F3 Cpx12	75295B F3 Cpx13	75295B F3 Cpx14	75295B F3 Cpx15	75295B F3 Cpx16	75295B F3 Cpx18	75295B F3 Cpx19	75295B F3 Cpx20	75295B F3 Cpx21	75295B F3 Cpx22	75295B F3 Cpx23	811081A F3 Omp1
Analysis														
SiO_2	55.40	55.33	54.66	55.31	55.27	55.49	55.46	54.40	55.22	55.04	55.30	55.02	55.40	53.87
TiO_2	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.00	0.02	0.02	0.18
Al_2O_3	0.17	0.39	1.81	0.31	0.39	0.21	0.34	3.14	0.67	0.58	0.30	0.35	0.28	6.75
Cr_2O_3	0.25	0.28	0.77	0.31	0.45	0.11	0.33	0.72	0.49	0.44	0.29	0.58	0.41	0.00
Fe_2O_3	1.00	0.31	0.28	0.99	0.32	0.61	0.29	0.00	0.17	0.89	0.55	0.99	0.77	3.84
MgO	17.94	17.92	19.52	17.53	17.82	18.23	18.02	20.97	18.00	17.91	17.96	18.07	18.05	9.12
CaO	25.28	24.90	19.94	25.44	25.31	25.72	25.33	16.40	24.39	25.03	25.58	25.39	25.74	16.74
MnO	0.06	0.06	0.09	0.09	0.12	0.04	0.07	0.04	0.10	0.08	0.02	0.10	0.04	0.04
FeO	0.77	1.50	2.05	1.09	1.19	0.70	1.17	2.15	1.75	0.97	0.88	0.45	0.63	5.72
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	0.23	0.17	0.63	0.24	0.13	0.04	0.11	0.92	0.18	0.17	0.09	0.11	0.09	4.56
Total	101.10	100.87	99.78	101.32	100.99	101.15	101.10	98.79	100.96	101.14	100.97	101.08	101.43	100.81
Cations														
Si	1.987	1.989	1.968	1.984	1.986	1.987	1.988	1.956	1.983	1.975	1.985	1.974	1.981	1.958
Ti	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.005
Al	0.007	0.016	0.077	0.013	0.016	0.009	0.014	0.133	0.028	0.025	0.013	0.015	0.012	0.289
Fe^{3+}	0.027	0.008	0.008	0.027	0.009	0.016	0.008	0.000	0.005	0.024	0.015	0.027	0.021	0.105
Fe^{3+}	0.007	0.008	0.022	0.009	0.013	0.003	0.009	0.021	0.014	0.013	0.008	0.017	0.012	0.000
Mg	0.959	0.961	1.047	0.937	0.954	0.973	0.963	1.124	0.964	0.958	0.961	0.966	0.962	0.494
Ca	0.972	0.959	0.769	0.978	0.974	0.987	0.973	0.632	0.938	0.962	0.984	0.976	0.986	0.652
Mn	0.002	0.002	0.003	0.003	0.004	0.001	0.002	0.001	0.003	0.002	0.001	0.003	0.001	0.001
Fe^{2+}	0.023	0.045	0.062	0.033	0.036	0.021	0.035	0.065	0.052	0.029	0.026	0.014	0.019	0.174
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.016	0.012	0.044	0.017	0.009	0.003	0.008	0.064	0.013	0.012	0.006	0.008	0.006	0.321
Total	4.000	4.000	4.000	4.000	4.000	4.000	4.000	3.997	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.977	0.955	0.944	0.966	0.964	0.979	0.965	0.946	0.948	0.971	0.973	0.986	0.981	0.740

	811081A F3 Omp2	811081A F3 Omp3	811081A F3 Omp4	811081A F3 Omp5	811081A F3 Omp6	811081A F3 Omp7	811081A F3 Omp8	811081A F3 Omp9	811081A F3 Omp10	811081A F3 Omp11	811081A F3 Omp12	811081A F5 Omp1	811081A F5 Omp2	811081A F5 Omp3
Analysis														
SiO_2	54.47	54.35	54.14	53.73	53.66	54.31	52.97	53.87	53.86	53.88	53.88	54.06	54.75	55.03
TiO_2	0.30	0.18	0.20	0.23	0.19	0.25	0.20	0.24	0.18	0.56	0.17	0.15	0.19	0.13
Al_2O_3	7.04	6.73	6.90	6.39	6.40	6.21	6.77	6.68	6.67	5.99	5.94	5.98	6.74	5.22
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe_2O_3	3.73	3.06	4.80	3.28	4.42	3.14	3.36	3.04	4.16	2.21	2.98	4.01	3.66	3.46
MgO	8.83	9.15	9.01	9.54	9.44	9.48	9.53	9.37	9.22	9.29	9.40	9.58	9.34	10.43
CaO	16.17	16.61	16.20	17.28	17.18	17.31	16.05	17.05	17.05	16.39	17.37	17.18	16.47	16.72
MnO	0.04	0.06	0.04	0.04	0.07	0.05	0.07	0.10	0.08	0.05	0.07	0.02	0.09	0.04
FeO	5.62	6.12	5.01	6.16	5.16	6.49	6.84	6.46	5.28	7.68	6.73	5.58	5.37	5.19
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	5.02	4.62	4.98	4.12	4.37	4.22	4.11	4.21	4.52	4.24	4.05	4.33	4.84	4.46
Total	101.22	100.86	101.28	100.76	100.87	101.45	99.89	101.01	101.01	100.28	100.60	100.89	101.45	100.67
Cations														
Si	1.967	1.972	1.956	1.957	1.951	1.966	1.948	1.957	1.955	1.975	1.970	1.966	1.971	1.995
Ti	0.008	0.005	0.006	0.006	0.005	0.007	0.005	0.006	0.005	0.016	0.005	0.004	0.005	0.003
Al	0.300	0.288	0.294	0.274	0.274	0.265	0.293	0.286	0.285	0.259	0.256	0.256	0.286	0.223
Fe^{3+}	0.101	0.083	0.130	0.090	0.121	0.085	0.093	0.083	0.114	0.061	0.082	0.110	0.099	0.094
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.475	0.495	0.485	0.518	0.512	0.512	0.522	0.507	0.499	0.508	0.512	0.519	0.501	0.564
Ca	0.626	0.646	0.627	0.674	0.669	0.671	0.633	0.664	0.663	0.644	0.681	0.669	0.635	0.649
Mn	0.001	0.002	0.001	0.001	0.002	0.001	0.002	0.003	0.002	0.001	0.002	0.001	0.003	0.001
Fe^{2+}	0.170	0.186	0.151	0.188	0.157	0.196	0.210	0.196	0.160	0.236	0.206	0.170	0.162	0.157
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.352	0.325	0.349	0.291	0.308	0.296	0.293	0.297	0.318	0.301	0.287	0.305	0.338	0.313
Total	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.737	0.727	0.762	0.734	0.765	0.723	0.713	0.721	0.757	0.683	0.713	0.754	0.756	0.782

	811081A F5 Omp4	811081A F5 Omp6	811081A F5 Omp7	811081A F5 Omp8	811081A F5 Omp9	811081A F5 Omp10	811081A F5 Omp11	811081A F5 Omp12	811081A F5 Omp13	811084A F7 Omp11	811084A F7 Omp12	811084A F7 Omp13	811084A F7 Omp21	811084A F7 Omp22
Analysis														
SiO_2	54.21	54.53	54.19	53.94	54.29	54.29	54.81	54.14	55.29	54,75	54,61	54,68	55,27	55,01
TiO_2	0.26	0.08	0.21	0.21	0.24	0.33	0.20	1.49	0.17	0,19	0,17	0,18	0,16	0,15
Al_2O_3	5.66	5.20	5.09	5.26	5.78	4.80	4.85	5.96	6.00	8,07	8,00	8,04	8,08	8,13
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0,00	0,00	0,00	0,00	0,00
Fe_2O_3	3.23	4.35	4.04	3.95	4.09	3.64	4.59	2.35	3.26	3,43	3,49	3,38	3,14	2,66
MgO	9.86	10.16	10.24	10.04	9.77	10.13	10.82	9.74	9.93	8,35	8,36	8,17	8,43	8,44
CaO	17.38	17.30	17.74	17.83	17.36	18.04	17.55	16.25	16.44	14,80	15,02	14,68	14,43	14,59
MnO	0.07	0.04	0.10	0.05	0.05	0.10	0.07	0.02	0.07	0,06	0,06	0,06	0,05	0,04
FeO	6.15	5.14	5.43	5.44	5.20	5.86	4.12	5.71	5.15	5,52	5,30	5,29	5,28	5,96
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	4.10	4.28	3.99	3.99	4.36	3.90	4.27	4.78	4.81	5,66	5,59	5,78	5,91	5,65
Total	100.91	101.08	101.02	100.69	101.16	101.10	101.27	100.43	101.12	100,81	100,61	100,27	100,75	100,62
Cations														
Si	1.972	1.978	1.970	1.968	1.967	1.976	1.978	1.968	1.992	1.975	1.973	1.980	1.988	1.984
Ti	0.007	0.002	0.006	0.006	0.007	0.009	0.005	0.041	0.005	0.005	0.005	0.005	0.004	0.004
Al	0.243	0.222	0.218	0.226	0.247	0.206	0.206	0.255	0.255	0.343	0.341	0.343	0.343	0.346
Fe^{3+}	0.088	0.119	0.111	0.108	0.111	0.100	0.125	0.064	0.088	0.093	0.095	0.092	0.085	0.072
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.535	0.549	0.555	0.546	0.528	0.550	0.582	0.528	0.533	0.449	0.451	0.441	0.452	0.454
Ca	0.677	0.672	0.691	0.697	0.674	0.703	0.679	0.633	0.635	0.572	0.582	0.570	0.556	0.564
Mn	0.002	0.001	0.003	0.001	0.002	0.003	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.001
Fe^{2+}	0.187	0.156	0.165	0.166	0.158	0.178	0.125	0.174	0.155	0.166	0.160	0.160	0.159	0.180
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.289	0.301	0.281	0.282	0.306	0.275	0.298	0.337	0.336	0.395	0.392	0.406	0.412	0.395
Total	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.741	0.779	0.771	0.767	0.770	0.755	0.824	0.752	0.775	0.730	0.738	0.733	0.740	0.716

	811084A F7 Omp23	811084A F6 Omp1	811084A F6 Omp2	811084A F6 Omp3	811084A F6 Omp4	811084A F6 Omp5	811084A F6 Omp21	811084A F6 Omp22	811084A F6 Omp23	811084A F1 Omp1	811084A F1 Omp2	811084A F1 Omp3	811084A F1 Omp4	811084A F1 Omp5
Analysis														
SiO_2	55,15	54,20	54,71	54,95	54,87	55,00	54,82	55,00	54,89	54,92	55,03	55,02	55,38	54,91
TiO_2	0,17	0,13	0,13	0,24	0,43	0,18	0,09	0,16	0,15	0,13	0,11	0,10	0,12	0,13
Al_2O_3	8,14	7,30	8,33	8,49	8,01	8,31	8,03	7,76	7,80	7,86	7,63	7,33	8,21	7,89
Cr_2O_3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fe_2O_3	2,28	4,12	4,57	5,00	3,24	3,99	4,47	3,32	4,57	4,09	4,63	3,53	4,16	4,95
MgO	8,36	8,83	8,15	7,91	8,68	8,53	8,83	8,73	8,73	8,48	8,88	8,87	8,55	8,66
CaO	14,57	15,96	14,55	14,30	14,83	14,54	15,06	14,68	15,08	14,76	15,24	15,30	14,64	14,80
MnO	0,02	0,09	0,06	0,05	0,00	0,05	0,02	0,04	0,06	0,00	0,03	0,04	0,04	0,04
FeO	5,68	5,09	4,47	3,73	4,81	4,17	3,88	5,15	3,87	4,47	4,00	5,00	3,95	3,93
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	5,79	5,08	6,01	6,41	5,77	6,01	5,76	5,69	5,82	5,89	5,72	5,49	6,11	5,91
Total	100,16	100,80	100,96	101,09	100,63	100,78	100,96	100,53	100,97	100,61	101,27	100,67	101,16	101,22
Cations														
Si	1.994	1.963	1.968	1.969	1.976	1.975	1.968	1.984	1.972	1.980	1.972	1.985	1.980	1.968
Ti	0.005	0.003	0.003	0.006	0.012	0.005	0.002	0.004	0.004	0.004	0.003	0.003	0.003	0.003
Al	0.347	0.312	0.353	0.359	0.340	0.351	0.340	0.330	0.330	0.334	0.322	0.312	0.346	0.333
Fe^{3+}	0.062	0.112	0.124	0.135	0.088	0.108	0.121	0.090	0.124	0.111	0.125	0.096	0.112	0.134
Fe^{3+}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.451	0.477	0.437	0.423	0.466	0.456	0.472	0.469	0.467	0.456	0.474	0.477	0.455	0.463
Ca	0.564	0.619	0.561	0.549	0.572	0.559	0.579	0.568	0.580	0.570	0.585	0.591	0.561	0.569
Mn	0.001	0.003	0.002	0.001	0.000	0.002	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.001
Fe^{2+}	0.172	0.154	0.134	0.112	0.145	0.125	0.117	0.155	0.116	0.135	0.120	0.151	0.118	0.118
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.405	0.357	0.419	0.446	0.402	0.419	0.401	0.398	0.405	0.411	0.398	0.384	0.424	0.411
Total	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.724	0.756	0.765	0.791	0.763	0.785	0.802	0.751	0.801	0.772	0.798	0.760	0.794	0.797

	811084A F1 Omp6	811084A F1 Omp7	811084A F1 Omp8	811084A F1 Omp9	Q09B F1 CPx 1 4	Q09B F1 CPx 1 5	Q09B F1 CPx 1 6	Q09B F1 CPx 1 7	Q09B F1 CPx 1 8	Q09B F1 CPx 1 9	Q09B F1 CPx 1 10	Q09B F1 CPx 1 11	Q09B F1 CPx 1 12	Q09B F1 CPx 1 13
Analysis														
SiO_2	55,31	55,38	55,21	55,01	53.12	53.62	53.70	53.76	53.91	52.86	52.97	53.15	53.26	53.64
TiO_2	0,12	0,12	0,15	0,15	0.21	0.17	0.16	0.17	0.14	0.15	0.12	0.19	0.18	0.18
Al_2O_3	7,81	7,62	7,97	7,90	7.80	8.74	7.46	8.06	8.28	8.05	8.05	7.67	7.41	7.54
Cr_2O_3	0,00	0,00	0,00	0,00	0.11	0.06	0.11	0.06	0.09	0.12	0.04	0.06	0.08	0.06
Fe_2O_3	4,39	4,21	4,50	4,86	0.11	0.06	0.12	0.06	0.10	0.13	0.04	0.06	0.08	0.06
MgO	8,87	8,84	8,46	8,33	10.64	10.39	11.00	10.53	10.51	10.55	10.55	10.88	10.92	10.89
CaO	15,14	14,97	14,84	14,77	18.41	17.62	19.01	18.60	18.67	18.09	18.51	18.64	18.77	19.00
MnO	0,00	0,02	0,05	0,02	0.05	0.04	0.05	0.08	0.09	0.05	0.09	0.07	0.11	0.04
FeO	4,10	4,27	4,40	4,12	6.60	6.47	6.62	6.56	6.61	6.53	6.53	6.64	6.68	6.81
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	5,81	5,85	5,96	6,04	2.74	2.99	2.50	2.73	2.61	2.58	2.59	2.52	2.50	2.45
Total	101,54	101,28	101,53	101,20	99.79	100.16	100.76	100.61	101.01	99.11	99.50	99.89	99.99	100.68
Cations														
Si	1.975	1.982	1.974	1.973	1.939	1.940	1.942	1.943	1.941	1.939	1.937	1.938	1.942	1.942
Ti	0.003	0.003	0.004	0.004	0.006	0.005	0.004	0.005	0.004	0.004	0.003	0.005	0.005	0.005
Al	0.328	0.321	0.336	0.334	0.335	0.373	0.318	0.343	0.351	0.348	0.347	0.330	0.318	0.322
Fe^{3+}	0.118	0.113	0.121	0.131	0.003	0.002	0.003	0.002	0.003	0.004	0.001	0.002	0.002	0.002
Fe^{3+}	0.000	0.000	0.000	0.000	0.003	0.002	0.003	0.002	0.003	0.004	0.001	0.002	0.002	0.002
Mg	0.472	0.472	0.451	0.446	0.579	0.561	0.593	0.568	0.564	0.577	0.575	0.591	0.593	0.588
Ca	0.579	0.574	0.569	0.568	0.720	0.683	0.737	0.721	0.720	0.711	0.725	0.728	0.733	0.737
Mn	0.000	0.001	0.001	0.000	0.002	0.001	0.002	0.002	0.003	0.001	0.003	0.002	0.003	0.001
Fe^{2+}	0.122	0.128	0.132	0.124	0.201	0.196	0.200	0.198	0.199	0.200	0.200	0.203	0.204	0.206
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.402	0.406	0.413	0.420	0.194	0.210	0.176	0.191	0.182	0.183	0.184	0.178	0.177	0.172
Total	4.000	4.000	4.000	4.000	3.982	3.972	3.979	3.974	3.969	3.971	3.977	3.979	3.980	3.977
X_{Mg}	0.794	0.787	0.774	0.783	0.742	0.741	0.748	0.741	0.739	0.742	0.742	0.745	0.744	0.740

	Q09B F7 CPx 1 1	Q09B F7 CPx 1 2	Q09B F7 CPx 1 3	Q09B F7 CPx 1 4	Q09B F7 CPx 1 5	Q09B F7 CPx 1 6	Q09B F7 CPx 1 7	Q09B F8 CPx 1 1	Q09B F8 CPx 1 2	Q09B F8 CPx 1 3	Q09B F8 CPx 2 1	Q09B F8 CPx 2 2	Q09B F8 CPx 4 1	Q09B F8 CPx 4 2
Analysis														
SiO_2	53.66	53.68	53.40	53.60	54.05	53.03	53.35	53.62	53.17	53.24	53.39	53.46	53.69	53.38
TiO_2	0.10	0.19	0.14	0.11	0.10	0.16	0.24	0.13	0.19	0.17	0.16	0.16	0.12	0.14
Al_2O_3	7.13	9.23	7.34	8.48	8.44	7.50	7.68	7.77	8.18	7.47	8.30	7.01	8.44	8.23
Cr_2O_3	0.11	0.18	0.15	0.19	0.21	0.21	0.30	0.09	0.18	0.10	0.37	0.54	0.32	0.34
Fe_2O_3	0.12	0.19	0.16	0.20	0.22	0.22	0.31	0.09	0.19	0.11	0.38	0.56	0.33	0.36
MgO	10.95	9.95	10.91	10.24	10.70	10.90	10.92	10.67	10.56	10.73	10.28	10.65	10.36	10.58
CaO	19.27	17.33	19.16	18.28	17.88	19.02	19.09	18.89	18.49	18.90	18.29	19.15	18.41	18.40
MnO	0.02	0.05	0.03	0.03	0.06	0.10	0.07	0.07	0.05	0.07	0.05	0.07	0.07	0.07
FeO	6.79	5.97	6.82	6.58	5.70	6.66	6.51	6.74	6.57	6.89	5.95	6.49	6.51	6.41
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	2.41	2.95	2.45	2.86	3.02	2.56	2.63	2.68	2.71	2.39	2.81	2.41	2.92	2.87
Total	100.55	99.73	100.56	100.58	100.39	100.36	101.10	100.75	100.31	100.06	99.99	100.50	101.18	100.78
Cations														
Si	1.947	1.944	1.939	1.938	1.947	1.930	1.927	1.940	1.931	1.941	1.939	1.944	1.932	1.929
Ti	0.003	0.005	0.004	0.003	0.003	0.004	0.006	0.004	0.005	0.005	0.004	0.004	0.003	0.004
Al	0.305	0.394	0.314	0.361	0.358	0.322	0.327	0.331	0.350	0.321	0.355	0.300	0.358	0.351
Fe^{3+}	0.003	0.005	0.004	0.005	0.006	0.006	0.009	0.003	0.005	0.003	0.011	0.015	0.009	0.010
Fe^{3+}	0.003	0.005	0.004	0.005	0.006	0.006	0.009	0.003	0.005	0.003	0.011	0.015	0.009	0.010
Mg	0.592	0.537	0.590	0.552	0.575	0.592	0.588	0.575	0.572	0.583	0.557	0.577	0.556	0.570
Ca	0.749	0.672	0.745	0.708	0.690	0.742	0.739	0.732	0.719	0.738	0.712	0.746	0.710	0.712
Mn	0.000	0.002	0.001	0.001	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Fe^{2+}	0.206	0.181	0.207	0.199	0.172	0.203	0.197	0.204	0.200	0.210	0.181	0.197	0.196	0.194
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.170	0.207	0.173	0.200	0.211	0.181	0.184	0.188	0.191	0.169	0.198	0.170	0.204	0.201
Total	3.979	3.952	3.982	3.973	3.970	3.989	3.987	3.982	3.979	3.975	3.968	3.971	3.979	3.982
X_{Mg}	0.742	0.748	0.740	0.735	0.770	0.745	0.749	0.738	0.741	0.735	0.755	0.745	0.739	0.746

	Q09B F8 CPx 4 3	Q09B F8 CPx 4 4	Q09B F8 CPx 4 5	Q09B F8 CPx 4 6	Q09B F8 CPx 4 7	Q09B F8 CPx 4 8	Q09B F8 CPx 4 9	Q09B F8 CPx 4 10	Q09B F1omp_ te	Q09B F1omp_ te	Q09B F3Sym- pl11	Q09B F3Sym- pl12	Q09B F3Sym- pl13	Q09B F3Omp1
Analysis														
SiO_2	53.24	53.73	53.72	53.19	53.18	53.47	53.32	53.41	53.97	54.10	52.95	53.23	52.94	54.16
TiO_2	0.12	0.19	0.10	0.13	0.20	0.16	0.12	0.13	1.91	0.16	0.20	0.20	0.16	0.13
Al_2O_3	8.22	8.31	8.69	7.33	7.32	7.23	7.51	6.94	6.85	6.93	4.31	2.33	2.13	7.08
Cr_2O_3	0.31	0.41	0.48	0.58	0.53	0.58	0.65	0.46	0.13	0.03	0.05	0.05	0.03	0.16
Fe_2O_3	0.32	0.43	0.50	0.61	0.55	0.61	0.68	0.49	0.13	0.03	0.06	0.05	0.04	0.17
MgO	10.53	10.27	10.07	10.55	10.67	10.83	10.45	10.88	10.38	10.53	15.92	12.56	13.12	10.19
CaO	18.50	18.18	17.89	19.37	19.39	19.33	18.99	19.66	18.80	18.68	12.72	23.71	22.71	18.59
MnO	0.04	0.04	0.11	0.04	0.09	0.07	0.05	0.07	0.07	0.04	0.14	0.16	0.03	0.02
FeO	6.33	6.05	5.98	6.30	6.85	6.13	6.36	6.79	6.68	7.01	11.04	7.62	7.91	6.30
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	2.96	3.04	3.21	2.58	2.58	2.50	2.68	2.42	3.41	3.55	0.71	0.72	0.70	3.71
Total	100.56	100.66	100.76	100.70	101.35	100.91	100.83	101.24	102.33	101.07	98.15	100.64	99.79	100.51
Cations														
Si	1.929	1.939	1.936	1.932	1.924	1.935	1.933	1.934	1.930	1.958	1.969	1.967	1.971	1.965
Ti	0.003	0.005	0.003	0.003	0.005	0.004	0.003	0.003	0.051	0.004	0.006	0.006	0.004	0.003
Al	0.351	0.354	0.369	0.314	0.312	0.308	0.321	0.296	0.289	0.296	0.189	0.101	0.093	0.303
Fe^{3+}	0.009	0.012	0.014	0.017	0.015	0.017	0.019	0.013	0.004	0.001	0.002	0.002	0.001	0.005
Fe^{3+}	0.009	0.012	0.014	0.017	0.015	0.017	0.019	0.013	0.004	0.001	0.002	0.002	0.001	0.005
Mg	0.568	0.553	0.541	0.571	0.575	0.584	0.564	0.587	0.553	0.568	0.882	0.692	0.728	0.551
Ca	0.718	0.703	0.691	0.754	0.752	0.749	0.737	0.762	0.720	0.724	0.507	0.939	0.906	0.723
Mn	0.001	0.001	0.003	0.001	0.003	0.002	0.002	0.002	0.002	0.001	0.004	0.005	0.001	0.000
Fe^{2+}	0.192	0.183	0.180	0.191	0.207	0.185	0.193	0.205	0.200	0.212	0.343	0.236	0.246	0.191
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.208	0.213	0.224	0.182	0.181	0.176	0.189	0.170	0.236	0.249	0.051	0.051	0.051	0.261
Total	3.988	3.974	3.975	3.982	3.990	3.978	3.979	3.986	3.989	4.014	3.957	4.001	4.003	4.006
X_{Mg}	0.748	0.752	0.750	0.749	0.735	0.759	0.745	0.741	0.735	0.728	0.720	0.746	0.747	0.742

	Q09B F3Omp2	Q09B F3Omp3	Q09B F3Omp4	Q09B F3Omp11	Q09B F3Omp12	Q09B F3Omp13	Q09B F3Omp14	Q09B F3Omp15	Q09B F3Omp16	Q09B F3Omp17	Q09B F3Omp18	Q09B F3Omp19	Q09B F3Omp20	Q09B F3Omp21
Analysis														
SiO_2	54.10	54.23	53.94	54.10	53.99	54.10	54.02	53.77	54.04	54.12	54.05	54.25	54.27	54.51
TiO_2	0.15	0.12	0.21	0.09	0.14	0.19	0.10	0.17	0.15	0.13	0.14	0.16	0.17	0.17
Al_2O_3	7.18	7.08	7.04	6.33	6.95	7.19	7.19	7.40	7.37	7.51	7.59	7.69	7.76	7.82
Cr_2O_3	0.04	0.01	0.01	0.10	0.15	0.16	0.15	0.22	0.26	0.26	0.18	0.17	0.15	0.10
Fe_2O_3	0.04	0.01	0.01	0.11	0.15	0.17	0.16	0.23	0.27	0.27	0.19	0.18	0.15	0.10
MgO	10.46	10.35	10.47	10.84	10.57	10.37	10.36	10.03	9.99	10.16	10.17	10.12	9.96	10.04
CaO	18.65	18.66	18.77	19.29	18.74	18.54	18.41	18.12	18.00	18.08	18.10	18.00	17.93	17.98
MnO	0.04	0.06	0.07	0.11	0.11	0.06	0.00	0.02	0.15	0.00	0.12	0.06	0.00	0.06
FeO	6.86	6.99	6.96	7.00	6.36	6.61	6.46	5.97	6.29	6.28	6.31	6.08	6.25	6.52
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na_2O	3.72	3.63	3.56	3.34	3.59	3.76	3.78	4.01	3.93	4.01	4.02	3.98	4.05	4.04
Total	101.25	101.16	101.04	101.32	100.75	101.16	100.64	99.93	100.45	100.81	100.86	100.68	100.70	101.34
Cations														
Si	1.953	1.960	1.953	1.958	1.957	1.954	1.958	1.959	1.961	1.956	1.954	1.960	1.961	1.959
Ti	0.004	0.003	0.006	0.002	0.004	0.005	0.003	0.005	0.004	0.003	0.004	0.004	0.005	0.005
Al	0.306	0.302	0.300	0.270	0.297	0.306	0.307	0.318	0.315	0.320	0.323	0.327	0.330	0.331
Fe^{3+}	0.001	0.000	0.000	0.003	0.004	0.005	0.004	0.006	0.007	0.007	0.005	0.005	0.004	0.003
Fe^{3+}	0.001	0.000	0.000	0.003	0.004	0.005	0.004	0.006	0.007	0.007	0.005	0.005	0.004	0.003
Mg	0.563	0.558	0.565	0.585	0.571	0.558	0.560	0.545	0.541	0.548	0.548	0.545	0.536	0.538
Ca	0.722	0.722	0.728	0.748	0.728	0.717	0.715	0.707	0.700	0.700	0.701	0.697	0.694	0.692
Mn	0.001	0.002	0.002	0.003	0.003	0.002	0.000	0.001	0.005	0.000	0.004	0.002	0.000	0.002
Fe^{2+}	0.207	0.211	0.211	0.212	0.193	0.200	0.196	0.182	0.191	0.190	0.191	0.184	0.189	0.196
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.260	0.254	0.250	0.234	0.252	0.263	0.266	0.283	0.277	0.281	0.282	0.279	0.284	0.281
Total	4.019	4.013	4.016	4.019	4.013	4.015	4.014	4.013	4.008	4.013	4.017	4.007	4.007	4.009
X_{Mg}	0.731	0.725	0.729	0.734	0.748	0.737	0.741	0.750	0.739	0.742	0.742	0.748	0.740	0.733

	Q09B F3Omp22	Q09B F3Omp23	Q09B F3Omp24	Q09B F1Omp Line1	Q09B F1Omp Line2	Q09B F1Omp Line3	Q09B F1Omp Line4	Q09B F1Omp Line5	Q09B F1Omp Line6	Q09B F1Omp Line7	Q09B F1Omp Line8	Q09B F1Omp Line9	Q09B F1Omp Line10	Q63B F11 Cpx1
Analysis														
SiO_2	54.21	54.23	54.22	52.02	54.39	54.17	54.38	54.28	54.22	54.06	54.15	54.27	54.23	49.78
TiO_2	0.14	0.15	0.18	0.06	0.13	0.14	0.17	0.11	0.15	0.15	0.15	0.15	0.15	0.07
Al_2O_3	7.63	7.70	7.65	6.16	6.23	6.36	6.70	6.56	6.63	6.95	7.04	7.03	6.59	1.09
Cr_2O_3	0.09	0.11	0.11	0.04	0.02	0.03	0.03	0.07	0.04	0.07	0.01	0.03	0.02	0.00
Fe_2O_3	0.09	0.12	0.11	0.04	0.02	0.04	0.03	0.06	0.04	0.06	0.02	0.03	0.02	4.84
MgO	10.05	10.13	10.04	10.31	10.68	10.67	10.53	10.46	10.59	10.47	10.38	10.24	10.60	9.26
CaO	18.12	17.95	17.66	18.92	19.21	19.17	18.95	18.90	18.99	18.73	18.66	18.57	18.92	23.13
MnO	0.06	0.00	0.06	0.01	0.10	0.00	0.03	0.04	0.05	0.15	0.05	0.04	0.09	0.34
FeO	6.22	6.24	6.60	7.19	7.11	6.90	6.88	7.11	6.39	6.92	6.50	6.33	6.49	12.06
NiO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.21
Na_2O	3.96	4.08	4.13	2.28	3.27	3.42	3.66	3.47	3.59	3.77	3.69	3.52	3.53	0.03
Total	100.58	100.71	100.77	97.05	101.17	100.90	101.36	101.07	100.70	101.33	100.67	100.22	100.64	100.81
Cations														
Si	1.961	1.959	1.960	1.963	1.969	1.965	1.962	1.966	1.966	1.954	1.963	1.971	1.967	1.912
Ti	0.004	0.004	0.005	0.002	0.004	0.004	0.005	0.003	0.004	0.004	0.004	0.004	0.004	0.002
Al	0.325	0.328	0.326	0.274	0.266	0.272	0.285	0.280	0.283	0.296	0.301	0.301	0.282	0.049
Fe^{3+}	0.003	0.003	0.003	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.000	0.001	0.001	0.140
Fe^{3+}	0.003	0.003	0.003	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.000	0.001	0.001	0.000
Mg	0.542	0.546	0.541	0.580	0.576	0.577	0.567	0.565	0.572	0.564	0.561	0.555	0.573	0.530
Ca	0.702	0.695	0.684	0.765	0.745	0.745	0.733	0.733	0.738	0.725	0.725	0.723	0.735	0.952
Mn	0.002	0.000	0.002	0.000	0.003	0.000	0.001	0.001	0.001	0.005	0.002	0.001	0.003	0.011
Fe^{2+}	0.188	0.188	0.200	0.227	0.215	0.209	0.208	0.215	0.194	0.209	0.197	0.192	0.197	0.387
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.278	0.286	0.290	0.167	0.229	0.241	0.256	0.244	0.252	0.264	0.259	0.248	0.248	0.016
Total	4.009	4.012	4.014	3.981	4.009	4.015	4.018	4.011	4.014	4.024	4.012	3.997	4.011	4.000
X_{Mg}	0.742	0.743	0.730	0.719	0.728	0.734	0.732	0.724	0.747	0.730	0.740	0.742	0.744	0.578

	Q63B F11 Cpx2	Q63B F11 Cpx3	Q63B F11 Cpx4	Q63B F11 Cpx5	Q63B F11 Cpx6	Q63B F11 Cpx7	Q63B F11 Cpx8	Q63B F11 Cpx9	Q63B F11 Cpx11	Q63B F12 Cpx1	Q63B F12 Cpx2	Q63B F12 Cpx3	Q63B F12 Cpx4	Q63B F12 Cpx5
Analysis														
SiO_2	49.94	49.72	49.60	47.98	49.75	49.69	49.50	49.84	49.89	49.62	50.06	49.31	49.44	49.33
TiO_2	0.16	0.12	0.12	0.15	0.12	0.17	0.02	0.13	0.17	0.15	0.19	0.22	0.16	0.18
Al_2O_3	1.09	1.03	0.99	1.07	1.08	0.99	1.03	0.88	1.01	1.08	1.09	1.05	1.07	1.02
Cr_2O_3	0.04	0.02	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.00
Fe_2O_3	3.85	3.93	3.66	3.93	4.12	3.67	4.78	4.57	4.19	3.48	3.70	4.63	4.27	4.52
MgO	9.36	9.25	9.25	8.96	9.35	9.15	9.26	9.27	9.34	8.93	8.97	8.97	9.01	8.88
CaO	22.28	22.49	22.03	21.26	22.61	22.66	22.64	22.89	22.82	22.56	22.83	22.63	22.62	22.33
MnO	0.37	0.37	0.39	0.39	0.40	0.40	0.40	0.39	0.42	0.39	0.38	0.36	0.41	0.43
FeO	13.15	12.86	13.17	13.04	12.63	13.00	12.30	12.38	12.60	13.15	13.34	12.88	12.96	13.14
NiO	0.24	0.22	0.25	0.18	0.20	0.18	0.22	0.24	0.19	0.23	0.23	0.21	0.19	0.25
Na_2O	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.02	0.01	0.00	0.00	0.00
Total	100.49	100.02	99.46	96.98	100.27	99.89	100.18	100.58	100.65	99.61	100.82	100.27	100.12	100.08
Cations														
Si	1.923	1.924	1.929	1.918	1.920	1.926	1.914	1.919	1.919	1.929	1.924	1.909	1.915	1.914
Ti	0.005	0.004	0.004	0.004	0.003	0.005	0.001	0.004	0.005	0.004	0.006	0.006	0.005	0.005
Al	0.049	0.047	0.046	0.050	0.049	0.045	0.047	0.040	0.046	0.050	0.050	0.048	0.049	0.047
Fe^{3+}	0.112	0.114	0.107	0.118	0.120	0.107	0.139	0.132	0.121	0.102	0.107	0.135	0.124	0.132
Fe^{3+}	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Mg	0.537	0.533	0.536	0.534	0.538	0.529	0.534	0.532	0.535	0.517	0.514	0.518	0.520	0.514
Ca	0.919	0.932	0.918	0.911	0.935	0.941	0.938	0.944	0.940	0.940	0.940	0.939	0.939	0.929
Mn	0.012	0.012	0.013	0.013	0.013	0.013	0.013	0.013	0.014	0.013	0.012	0.012	0.013	0.014
Fe^{2+}	0.423	0.416	0.428	0.436	0.408	0.421	0.398	0.398	0.405	0.427	0.429	0.417	0.420	0.426
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.018	0.017	0.019	0.014	0.015	0.014	0.016	0.018	0.014	0.017	0.017	0.015	0.014	0.019
Total	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.559	0.562	0.556	0.550	0.569	0.557	0.573	0.572	0.569	0.548	0.545	0.554	0.553	0.546

	Q63B F12 Cpx6	Q63B F12 Cpx8	Q63B F12 Cpx9	Q63B F12 Cpx11	Q63B F12 Cpx12	Q63B F12 Cpx15
Analysis						
SiO_2	50.15	49.44	49.09	49.66	49.34	49.40
TiO_2	0.09	0.08	0.08	0.06	0.16	0.05
Al_2O_3	0.45	0.78	0.90	0.98	1.06	1.08
Cr_2O_3	0.02	0.01	0.00	0.03	0.00	0.00
Fe_2O_3	4.02	4.21	4.83	3.76	4.57	4.61
MgO	9.13	8.98	8.99	8.96	8.95	8.90
CaO	23.48	22.87	23.19	22.53	22.53	22.84
MnO	0.43	0.39	0.35	0.41	0.40	0.38
FeO	12.60	12.90	11.99	13.07	12.62	12.83
NiO	0.14	0.13	0.15	0.24	0.28	0.17
Na_2O	0.01	0.00	0.00	0.00	0.01	0.01
Total	100.51	99.80	99.59	99.71	99.92	100.25
Cations						
Si	1.934	1.923	1.912	1.929	1.915	1.913
Ti	0.003	0.002	0.002	0.002	0.005	0.001
Al	0.020	0.036	0.041	0.045	0.048	0.049
Fe^{3+}	0.117	0.123	0.142	0.110	0.133	0.134
Fe^{3+}	0.001	0.000	0.000	0.001	0.000	0.000
Mg	0.525	0.521	0.522	0.519	0.518	0.514
Ca	0.970	0.953	0.968	0.938	0.937	0.948
Mn	0.014	0.013	0.011	0.014	0.013	0.012
Fe^{2+}	0.406	0.419	0.391	0.425	0.410	0.416
Ni	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Na	0.010	0.010	0.012	0.018	0.021	0.013
Total	4.000	4.000	4.000	4.000	4.000	4.000
X_{Mg}	0.564	0.554	0.572	0.550	0.558	0.553

Spinel

Electron microprobe analyses of spinel. Cations based on a 4 oxygen basis. Ferric iron was calculated using the method of Droop (1987).

	75257A F1 Spn4	75257A F1 Spn5	**75257A F1 Spn6**	**75257A F1 Spn7**	**75257A F1 Spn10**	**75257A F1 Spn12**	**75257A F1 Spn13**	**75257A F1 Spn14**	**75257A F1 Spn16**	**75257A F1 Spn17**	**75257A F2 Spn1**	**75257A F2 Spn3**	**75257A F2 Spn4**	**75257A F2 Spn6**
Analysis														
SiO_2	0.02	0.00	0.01	0.01	0.00	0.02	0.00	0.16	0.76	0.03	0.03	0.03	0.16	0.00
TiO_2	0.16	0.24	0.23	0.21	0.23	0.19	0.17	0.16	0.17	0.18	0.18	0.11	0.10	0.16
Al_2O_3	8.42	11.30	12.21	12.99	12.75	10.53	10.11	8.35	7.55	7.30	4.74	6.36	6.32	8.39
Cr_2O_3	58.41	54.43	53.28	52.74	52.83	55.35	55.89	57.46	57.50	59.13	60.26	60.91	60.38	57.90
Fe_2O_3	2.56	3.43	3.36	3.63	3.85	3.11	3.10	2.93	2.73	3.05	3.67	2.49	2.40	3.20
MgO	5.58	6.41	6.59	6.87	6.77	6.23	6.09	5.68	6.16	5.40	4.31	5.01	5.01	5.61
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.33	0.33	0.28	0.31	0.26	0.36	0.32	0.39	0.32	0.29	0.37	0.40	0.38	0.35
FeO	24.74	23.89	23.69	23.56	23.69	23.89	24.02	24.43	24.45	24.90	25.74	25.25	25.26	24.62
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NiO	0.00	0.04	0.03	0.00	0.09	0.01	0.05	0.10	0.11	0.06	0.09	0.08	0.08	0.04
Total	100.22	100.06	99.68	100.31	100.48	99.69	99.75	99.66	99.73	100.32	99.38	100.62	100.07	100.27
Cations														
Si	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.006	0.026	0.001	0.001	0.001	0.006	0.000
Ti	0.004	0.006	0.006	0.005	0.006	0.005	0.004	0.004	0.004	0.005	0.005	0.003	0.002	0.004
Al	0.341	0.449	0.485	0.510	0.501	0.422	0.406	0.339	0.306	0.297	0.198	0.259	0.259	0.339
Cr	1.584	1.451	1.418	1.388	1.391	1.488	1.506	1.565	1.563	1.613	1.692	1.668	1.662	1.570
Fe^{3+}	0.066	0.087	0.085	0.091	0.097	0.080	0.080	0.076	0.071	0.079	0.098	0.065	0.063	0.083
Mg	0.285	0.322	0.331	0.341	0.336	0.316	0.309	0.292	0.316	0.277	0.228	0.258	0.260	0.287
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.009	0.009	0.008	0.009	0.007	0.010	0.009	0.011	0.009	0.008	0.011	0.012	0.011	0.010
Fe^{2+}	0.710	0.674	0.667	0.656	0.660	0.679	0.685	0.704	0.703	0.718	0.764	0.731	0.735	0.706
Zn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.000	0.001	0.001	0.000	0.002	0.000	0.001	0.003	0.003	0.002	0.003	0.002	0.002	0.001
Total	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

	75257A F2 Spn7	**75257A F2 Spn8**	**75257A F2 Spn9**	**75295A F2 Spn1**	**75295A F2 Spn2**	**75295A F2 Spn3**	**75295A F2 Spn4**	**75295A F2 Spn5**	**75295A F2 Spn6**	**75295A F2 Spn7**	**75295A F2 Spn8**	**75295A F2 Spn9**	**75295A F2 Spn10**	**75295A F2 Spn11**
Analysis														
SiO_2	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	0.00	0.01	0.02	0.02	0.00	0.01
TiO_2	0.23	0.24	0.20	0.43	0.24	0.08	0.06	0.06	0.04	0.00	0.03	0.06	0.04	0.07
Al_2O_3	10.74	11.51	11.54	7.40	9.55	11.05	12.10	12.38	13.04	13.48	14.52	15.00	13.63	13.05
Cr_2O_3	55.16	54.41	54.70	46.93	47.76	49.03	49.43	49.47	49.93	49.74	48.71	48.20	49.42	50.17
Fe_2O_3	3.30	3.19	3.17	14.39	11.67	9.54	8.51	8.19	7.31	6.90	6.80	6.76	6.79	7.35
MgO	6.14	6.29	6.29	4.76	5.50	6.12	6.48	6.80	7.02	7.12	7.49	7.55	7.21	7.12
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.29	0.30	0.29	0.42	0.35	0.31	0.38	0.32	0.29	0.38	0.22	0.35	0.27	0.31
FeO	24.30	24.07	24.24	25.66	24.83	24.13	23.86	23.43	23.28	23.01	22.82	22.68	22.85	23.35
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NiO	0.02	0.12	0.05	0.10	0.08	0.06	0.09	0.06	0.07	0.06	0.03	0.05	0.13	0.01
Total	100.18	100.12	100.48	100.10	100.01	100.33	100.93	100.73	100.99	100.69	100.63	100.65	100.33	101.43
Cations														
Si	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Ti	0.006	0.006	0.005	0.011	0.006	0.002	0.001	0.002	0.001	0.000	0.001	0.001	0.001	0.002
Al	0.428	0.457	0.457	0.304	0.387	0.441	0.476	0.487	0.509	0.526	0.563	0.580	0.533	0.507
Cr	1.475	1.450	1.453	1.295	1.297	1.312	1.305	1.304	1.307	1.302	1.266	1.250	1.296	1.307
Fe^{3+}	0.084	0.081	0.080	0.378	0.302	0.243	0.214	0.206	0.182	0.172	0.168	0.167	0.169	0.182
Mg	0.310	0.316	0.315	0.248	0.282	0.309	0.323	0.338	0.346	0.351	0.367	0.369	0.356	0.350
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.008	0.009	0.008	0.013	0.010	0.009	0.011	0.009	0.008	0.011	0.006	0.010	0.008	0.009
Fe^{2+}	0.688	0.678	0.681	0.749	0.713	0.683	0.666	0.653	0.645	0.637	0.627	0.622	0.634	0.643
Zn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.000	0.003	0.001	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.003	0.000
Total	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

	75295A F2 Spn12	75295A F2 Spn13	75295A F2 Spn14	75295A F2 Spn15	75295A F2 Spn16	75295A F4 Spn1	75295A F4 Spn2	75295A F4 Spn3	75295A F4 Spn4	75295A F4 Spn5	75295A F4 Spn6	75295A F4 Spn7	75295A F4 Spn8	75295A F4 Spn9
Analysis														
SiO_2	0.00	0.38	0.00	0.04	0.06	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01
TiO_2	0.01	0.08	0.11	0.24	0.60	0.52	0.59	0.46	0.33	0.11	0.06	0.05	0.04	0.06
Al_2O_3	12.53	12.09	11.50	10.11	7.96	6.50	7.23	8.27	9.11	10.33	11.26	11.53	11.51	11.14
Cr_2O_3	49.90	49.12	49.44	48.43	44.77	48.60	47.14	47.36	48.08	48.90	49.41	49.14	49.15	49.09
Fe_2O_3	7.76	8.02	9.28	11.43	15.40	13.28	14.70	13.76	12.05	10.73	9.29	9.36	9.32	10.04
MgO	6.92	6.96	6.40	5.94	4.97	4.64	4.92	5.14	5.38	5.86	6.22	6.50	6.28	6.23
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.37	0.33	0.26	0.37	0.29	0.44	0.43	0.42	0.33	0.41	0.29	0.33	0.35	0.39
FeO	23.14	23.56	24.17	24.63	25.65	25.63	25.63	25.53	25.20	24.60	24.17	23.74	23.96	24.16
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NiO	0.07	0.08	0.01	0.09	0.12	0.12	0.21	0.11	0.06	0.00	0.05	0.02	0.11	0.06
Total	100.70	100.61	101.17	101.27	99.82	99.74	100.86	101.05	100.53	100.97	100.75	100.67	100.72	101.18
Cations														
Si	0.000	0.013	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Ti	0.000	0.002	0.003	0.006	0.016	0.014	0.015	0.012	0.008	0.003	0.002	0.001	0.001	0.002
Al	0.492	0.475	0.453	0.402	0.327	0.270	0.295	0.335	0.368	0.412	0.446	0.456	0.456	0.440
Cr	1.313	1.295	1.308	1.293	1.234	1.351	1.291	1.286	1.304	1.308	1.315	1.304	1.306	1.302
Fe^{3+}	0.194	0.201	0.234	0.290	0.404	0.351	0.383	0.356	0.311	0.273	0.235	0.236	0.236	0.254
Mg	0.343	0.346	0.319	0.299	0.258	0.243	0.254	0.263	0.275	0.296	0.312	0.325	0.315	0.312
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.011	0.009	0.007	0.011	0.009	0.013	0.013	0.012	0.010	0.012	0.008	0.009	0.010	0.011
Fe^{2+}	0.644	0.657	0.676	0.695	0.748	0.754	0.743	0.733	0.723	0.696	0.680	0.666	0.673	0.678
Zn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.002	0.002	0.000	0.002	0.003	0.004	0.006	0.003	0.002	0.000	0.001	0.000	0.003	0.002
Total	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

	75295A F4 Spn10	75295A F4 Spn11	75295A F4 Spn12	75296D F4 Spn1	75296D F4 Spn2	75296D F4 Spn3	75296D F4 Spn4	75296D F4 Spn5	75296D F4 Spn6	75296D F4 Spn7	75296D F4 Spn8	75296D F4 Spn9	75296D F4 Spn10	75296D F4 Spn11
Analysis														
SiO_2	0.00	0.03	0.02	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.03
TiO_2	0.14	0.28	0.47	0.17	0.10	0.06	0.01	0.04	0.08	0.13	0.17	0.13	0.12	0.11
Al_2O_3	10.25	9.25	7.76	11.33	13.88	15.00	15.61	15.60	14.25	12.88	11.79	10.37	7.40	6.86
Cr_2O_3	48.49	47.59	47.37	45.61	45.01	45.79	46.97	46.77	46.15	44.97	45.24	46.07	51.33	52.44
Fe_2O_3	11.26	12.37	14.34	13.01	10.68	8.71	8.08	7.75	9.80	12.19	12.72	12.15	11.18	10.04
MgO	5.90	5.47	5.11	6.67	7.36	7.87	8.22	8.15	7.58	7.06	6.80	6.26	5.72	5.39
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.33	0.36	0.37	0.29	0.26	0.26	0.25	0.23	0.30	0.23	0.29	0.33	0.28	0.40
FeO	24.49	24.94	25.61	23.42	22.54	22.01	21.91	21.81	22.52	23.11	23.27	23.33	24.24	24.35
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NiO	0.12	0.12	0.13	0.10	0.15	0.02	0.06	0.09	0.09	0.13	0.07	0.10	0.06	0.06
Total	100.98	100.40	101.17	100.60	100.00	99.74	101.10	100.43	100.78	100.72	100.36	98.80	100.36	99.68
Cations														
Si	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001
Ti	0.003	0.007	0.012	0.004	0.002	0.001	0.000	0.001	0.002	0.003	0.004	0.003	0.003	0.003
Al	0.409	0.374	0.315	0.449	0.544	0.583	0.597	0.600	0.553	0.505	0.467	0.421	0.301	0.282
Cr	1.297	1.290	1.288	1.213	1.183	1.195	1.205	1.207	1.201	1.183	1.202	1.254	1.401	1.446
Fe^{3+}	0.287	0.319	0.371	0.329	0.267	0.216	0.197	0.190	0.243	0.305	0.322	0.315	0.290	0.264
Mg	0.298	0.279	0.262	0.334	0.365	0.387	0.397	0.397	0.372	0.350	0.341	0.321	0.294	0.280
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.009	0.010	0.011	0.008	0.007	0.007	0.007	0.006	0.008	0.007	0.008	0.010	0.008	0.012
Fe^{2+}	0.693	0.715	0.737	0.659	0.627	0.608	0.595	0.595	0.620	0.643	0.654	0.672	0.700	0.710
Zn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.003	0.003	0.003	0.003	0.004	0.000	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.002
Total	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

Staurolite

Electron microprobe analyses of staurolite (24 oxygen basis).

	75261C F2 St2	75261C F2 St3	75261C F2 St4	75261C F2 St5	75261C F2 St6	75261C F2 St7	75261C F2 St8	75261C F2 St9	75261C F6 St1	75261C F6 St2	75261C F6 St5	75261C F6 St7	75261C F6 St9	75261C F6 St10
Analysis														
SiO_2	28.12	27.71	27.84	27.63	27.98	27.99	27.93	27.76	28.20	28.27	28.04	28.20	28.33	28.10
TiO_2	0.75	0.75	0.75	0.71	0.70	0.76	0.69	0.64	0.58	0.64	0.59	0.52	0.55	0.54
Al_2O_3	54.10	53.58	53.79	53.56	53.69	53.55	53.82	54.04	54.06	53.51	54.63	54.22	53.92	53.94
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.64	1.94	1.94	1.91	1.89	1.92	1.92	1.81	2.11	2.13	1.83	2.18	2.13	2.16
CaO	0.01	0.01	0.02	0.00	0.02	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.01	0.03
MnO	0.05	0.07	0.08	0.03	0.04	0.02	0.07	0.08	0.07	0.04	0.06	0.10	0.03	0.08
FeO	13.26	13.44	12.91	13.12	12.92	12.82	12.89	12.85	13.87	13.57	13.42	13.46	13.87	13.83
Na_2O	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00
K_2O	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00
Total	97.95	97.49	97.33	96.97	97.23	97.08	97.34	97.21	98.92	98.17	98.59	98.68	98.84	98.67
Cations														
Si	4.051	4.020	4.033	4.022	4.055	4.061	4.044	4.024	4.036	4.070	4.016	4.037	4.056	4.033
Ti	0.081	0.082	0.082	0.078	0.076	0.083	0.075	0.070	0.062	0.070	0.064	0.056	0.060	0.058
Al	9.184	9.159	9.183	9.189	9.171	9.157	9.184	9.234	9.120	9.081	9.222	9.150	9.099	9.123
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.352	0.419	0.418	0.413	0.408	0.415	0.415	0.391	0.450	0.456	0.391	0.465	0.455	0.462
Ca	0.002	0.001	0.003	0.000	0.002	0.001	0.002	0.001	0.003	0.000	0.000	0.000	0.001	0.004
Mn	0.006	0.008	0.009	0.003	0.005	0.003	0.008	0.010	0.009	0.005	0.007	0.012	0.004	0.009
Fe^{2+}	1.598	1.630	1.564	1.597	1.565	1.556	1.561	1.558	1.661	1.634	1.607	1.612	1.660	1.659
Na	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.005	0.004	0.000	0.000	0.000
K	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.002	0.001	0.000	0.000	0.000	0.003	0.000
Total	15.278	15.319	15.293	15.308	15.283	15.277	15.291	15.290	15.342	15.322	15.311	15.332	15.336	15.348
X_{Mg}	0.180	0.203	0.210	0.205	0.206	0.210	0.209	0.199	0.212	0.218	0.195	0.223	0.215	0.217

	75261C F6 St11	75261C F6 St12	75261C F6 St13	75261C F6 St15	75261C F6 St16	75261C F6 St17	75261C F6 St18	75261C F6 St19	75261C F6 St21	75261C F6 St22	Q61E F8 St 1 1	Q61E F8 St 1 2	Q61E F8 St 1 4	Q61E F8 St 1 5
Analysis														
SiO_2	27.70	27.40	27.84	27.87	28.30	27.78	27.89	28.28	28.04	28.01	27.00	26.93	26.31	26.95
TiO_2	0.53	0.55	0.59	0.66	0.80	0.82	0.83	0.72	0.74	0.66	0.62	0.65	0.62	0.66
Al_2O_3	54.21	55.13	54.47	53.98	54.56	53.70	53.69	53.42	53.80	53.89	51.97	52.28	52.19	52.97
Cr_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.03	0.03
MgO	2.18	1.78	2.15	2.11	2.01	2.12	2.13	2.27	2.17	2.10	1.48	1.53	1.48	1.44
CaO	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00
MnO	0.08	0.06	0.04	0.06	0.05	0.05	0.05	0.03	0.05	0.08	0.10	0.09	0.07	0.13
FeO	13.75	13.68	14.28	14.21	13.23	14.25	14.39	14.55	14.03	14.39	13.16	13.22	13.67	13.38
Na_2O	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.04	0.01	0.00	0.03
K_2O	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	98.46	98.61	99.38	98.89	98.95	98.73	98.98	99.28	98.84	99.16	94.38	94.72	94.36	95.57
Cations														
Si	3.985	3.932	3.976	4.000	4.034	3.996	4.003	4.048	4.022	4.012	4.046	4.022	3.958	3.991
Ti	0.057	0.060	0.063	0.071	0.086	0.089	0.090	0.077	0.080	0.072	0.069	0.073	0.070	0.074
Al	9.190	9.324	9.168	9.129	9.167	9.102	9.084	9.011	9.095	9.098	9.178	9.203	9.252	9.247
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.003	0.003
Mg	0.466	0.382	0.457	0.452	0.427	0.455	0.455	0.484	0.463	0.448	0.331	0.341	0.332	0.319
Ca	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.003	0.000	0.000	0.000	0.000
Mn	0.010	0.007	0.005	0.008	0.006	0.006	0.006	0.004	0.006	0.009	0.013	0.011	0.009	0.016
Fe^{2+}	1.654	1.641	1.706	1.705	1.577	1.714	1.727	1.742	1.682	1.723	1.649	1.652	1.719	1.657
Na	0.001	0.000	0.000	0.002	0.000	0.000	0.003	0.002	0.006	0.004	0.010	0.004	0.000	0.008
K	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Total	15.364	15.347	15.378	15.366	15.297	15.364	15.367	15.370	15.354	15.370	15.299	15.305	15.344	15.314
X_{Mg}	0.219	0.188	0.211	0.209	0.213	0.209	0.208	0.217	0.215	0.206	0.167	0.171	0.162	0.161

	Q61E F8 St 1 6	Q61E F8 St 1 8	Q61E F8 St 1 9	Q61E F8 St 1 11	Q61E F8 St 1 12	Q61E F8 St 1 13	Q61E F8 St 1 14	Q61E F8 St 1 15	Q61E F8 St 1 16	Q61E F8 St 1 17	Q61E F8 St 1 19	Q61E F8 St 1 23	Q61E F8 St 1 24	Q61E $14St*
Analysis														
SiO_2	26.30	26.58	26.53	26.09	26.10	26.57	26.10	26.42	26.46	26.33	26.36	26.21	26.62	27.05
TiO_2	0.63	0.61	0.68	0.63	0.61	0.68	0.68	0.74	0.88	0.89	0.81	0.76	0.80	0.65
Al_2O_3	52.62	51.73	52.19	51.76	52.16	51.00	52.73	51.73	52.28	51.68	51.84	51.58	51.86	54.06
Cr_2O_3	0.04	0.04	0.02	0.04	0.01	0.04	0.05	0.03	0.03	0.02	0.04	0.05	0.04	0.02
MgO	1.44	1.49	1.45	1.41	1.50	1.51	1.37	1.54	1.59	1.56	1.34	1.42	1.34	1.52
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.07	0.10	0.10	0.12	0.09	0.07	0.08	0.08	0.08	0.09	0.09	0.06	0.08	0.08
FeO	13.35	13.62	13.58	13.18	13.38	13.16	13.38	13.29	13.17	13.51	13.23	13.08	13.09	13.67
Na_2O	0.00	0.02	0.03	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.01	0.19
K_2O	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	94.45	94.19	94.60	93.23	93.88	93.03	94.42	93.85	94.49	94.07	93.71	93.16	93.84	97.24
Cations														
Si	3.945	4.005	3.979	3.965	3.943	4.044	3.919	3.989	3.966	3.972	3.985	3.983	4.013	3.943
Ti	0.072	0.069	0.077	0.072	0.069	0.078	0.077	0.084	0.099	0.101	0.092	0.086	0.090	0.071
Al	9.303	9.186	9.226	9.272	9.287	9.149	9.332	9.207	9.234	9.189	9.235	9.240	9.214	9.289
Cr	0.004	0.005	0.003	0.005	0.002	0.005	0.006	0.004	0.003	0.002	0.005	0.006	0.005	0.003
Mg	0.322	0.334	0.324	0.320	0.337	0.342	0.307	0.347	0.355	0.350	0.301	0.322	0.302	0.331
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.009	0.013	0.013	0.015	0.012	0.009	0.010	0.010	0.010	0.012	0.011	0.008	0.010	0.010
Fe^{2+}	1.674	1.716	1.704	1.675	1.690	1.675	1.680	1.679	1.651	1.705	1.673	1.663	1.650	1.666
Na	0.000	0.005	0.010	0.001	0.007	0.000	0.006	0.004	0.000	0.000	0.002	0.000	0.004	0.053
K	0.002	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Total	15.330	15.333	15.335	15.325	15.348	15.301	15.338	15.324	15.317	15.332	15.305	15.308	15.289	15.367
X_{Mg}	0.161	0.163	0.160	0.160	0.166	0.170	0.155	0.171	0.177	0.171	0.153	0.162	0.155	0.166

	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q61E $14St*	Q67F F6 Stau 2 1	Q67F F6 Stau 2 2	Q67F F6 Stau 2 3	Q67F F6 Stau 2 4	Q67F F6 Stau 2 5
Analysis														
SiO_2	27.09	26.35	26.78	26.56	26.79	26.32	26.76	26.04	26.29	27.46	27.33	27.40	27.69	27.15
TiO_2	0.85	1.06	0.99	0.95	0.97	0.94	0.83	0.76	0.76	0.58	0.58	0.62	0.61	0.54
Al_2O_3	54.49	53.96	54.19	53.75	54.37	54.00	54.60	54.48	54.40	53.09	52.63	52.65	52.59	52.53
Cr_2O_3	0.02	0.00	0.06	0.02	0.03	0.02	0.02	0.05	0.04	0.04	0.03	0.03	0.03	0.04
MgO	1.61	1.64	1.62	1.56	1.54	1.51	1.64	1.59	1.56	1.76	1.81	1.86	1.84	1.90
CaO	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MnO	0.09	0.05	0.05	0.07	0.07	0.06	0.04	0.06	0.04	0.11	0.10	0.11	0.08	0.10
FeO	13.42	13.64	13.76	13.93	13.52	13.84	13.87	13.90	13.75	13.26	13.12	13.19	13.13	12.93
Na_2O	0.13	0.16	0.14	0.16	0.17	0.13	0.17	0.17	0.18	0.00	0.00	0.03	0.00	0.01
K_2O	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Total	97.73	96.85	97.60	97.02	97.52	96.83	97.94	97.07	97.04	96.28	95.59	95.89	95.98	95.21
Cations														
Si	3.924	3.863	3.895	3.892	3.895	3.862	3.879	3.815	3.848	4.031	4.039	4.040	4.074	4.027
Ti	0.093	0.116	0.108	0.105	0.106	0.104	0.091	0.084	0.083	0.064	0.064	0.069	0.068	0.061
Al	9.304	9.321	9.289	9.282	9.316	9.339	9.328	9.406	9.383	9.186	9.170	9.150	9.120	9.184
Cr	0.002	0.000	0.006	0.002	0.003	0.003	0.002	0.006	0.005	0.004	0.003	0.003	0.004	0.005
Mg	0.349	0.358	0.350	0.341	0.334	0.330	0.354	0.347	0.341	0.385	0.399	0.408	0.404	0.421
Ca	0.001	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Mn	0.011	0.006	0.006	0.008	0.008	0.008	0.005	0.008	0.005	0.014	0.012	0.014	0.010	0.013
Fe^{2+}	1.626	1.671	1.673	1.706	1.644	1.698	1.682	1.703	1.683	1.628	1.621	1.626	1.616	1.604
Na	0.038	0.046	0.041	0.044	0.049	0.038	0.049	0.049	0.050	0.000	0.000	0.008	0.000	0.003
K	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.001	0.002	0.000	0.001	0.000	0.000	0.001
Total	15.349	15.383	15.371	15.386	15.365	15.382	15.390	15.420	15.401	15.311	15.311	15.318	15.296	15.320
X_{Mg}	0.177	0.177	0.173	0.167	0.169	0.163	0.174	0.169	0.169	0.191	0.198	0.201	0.200	0.208

* kindly provided by Bradley R. Hacker

	Q67F F6 Stau 2 6	Q67F F6 Stau 2 7	Q67F F6 Stau 2 8	Q67F F6 Stau 2 9	Q67F F6 Stau 2 10	Q67F F6 Stau 2 12	Q67F F6 Stau 2 13	Q67F F6 Stau 2 14	Q67F F6 Stau 2 15	Q67F F6 Stau 2 16
Analysis										
SiO_2	28.64	27.17	27.44	27.54	27.48	27.42	27.01	27.50	27.49	27.85
TiO_2	0.46	0.43	0.40	0.45	0.42	0.50	0.52	0.52	0.55	0.65
Al_2O_3	54.47	53.17	52.41	52.48	52.47	52.91	50.46	52.78	52.99	52.82
Cr_2O_3	0.02	0.02	0.02	0.04	0.02	0.01	0.04	0.04	0.02	0.02
MgO	2.02	1.87	1.84	1.87	1.85	1.82	1.77	1.65	1.62	1.59
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
MnO	0.09	0.11	0.09	0.09	0.08	0.08	0.10	0.08	0.11	0.10
FeO	13.09	13.35	13.07	13.09	13.09	13.13	14.97	12.87	13.40	13.15
Na_2O	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.02
K_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01
Total	98.82	96.11	95.27	95.59	95.41	95.87	94.94	95.46	96.18	96.20
Cations										
Si	4.083	4.000	4.068	4.069	4.068	4.040	4.068	4.063	4.042	4.087
Ti	0.050	0.047	0.045	0.051	0.046	0.056	0.059	0.058	0.061	0.071
Al	9.152	9.224	9.157	9.139	9.153	9.187	8.956	9.191	9.183	9.135
Cr	0.002	0.003	0.002	0.005	0.002	0.001	0.005	0.004	0.002	0.003
Mg	0.429	0.410	0.406	0.412	0.408	0.400	0.398	0.364	0.355	0.348
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000
Mn	0.011	0.014	0.011	0.011	0.010	0.010	0.012	0.010	0.013	0.012
Fe^{2+}	1.561	1.643	1.620	1.618	1.620	1.617	1.885	1.590	1.648	1.614
Na	0.008	0.000	0.000	0.007	0.001	0.000	0.000	0.004	0.000	0.005
K	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.001	0.000	0.002
Total	15.294	15.340	15.309	15.312	15.309	15.310	15.395	15.285	15.305	15.276
X_{Mg}	0.216	0.200	0.200	0.203	0.201	0.198	0.174	0.186	0.177	0.177

Titanite

Electron microprobe analyses of titanite. Cations based on a 5 oxygen basis.

	75271A F5 Tit1	75271A F5 Tit2	75271A F5 Tit3	75271A F5 Tit4	75271A F5 Tit5
Analysis					
SiO_2	30.79	30.91	30.86	30.93	30.93
TiO_2	38.27	38.11	37.76	38.55	38.83
Al_2O_3	1.88	2.21	2.08	1.82	1.71
Cr_2O_3	0.01	0.00	0.00	0.00	0.00
Fe_2O_3	0.29	0.38	0.36	0.28	0.40
MgO	0.00	0.00	0.00	0.00	0.00
CaO	28.66	28.81	28.74	29.14	28.80
MnO	0.09	0.10	0.08	0.04	0.06
FeO	0.00	0.00	0.00	0.00	0.00
Na_2O	0.04	0.01	0.00	0.02	0.00
K_2O	0.00	0.00	0.00	0.00	0.00
Total	100.03	100.51	99.88	100.78	100.72
Cations					
Si	1.002	1.001	1.005	1.000	1.000
Ti	0.937	0.928	0.925	0.937	0.944
Al	0.072	0.084	0.080	0.069	0.065
Cr	0.000	0.000	0.000	0.000	0.000
Fe^{3+}	0.007	0.009	0.009	0.007	0.010
Mg	0.000	0.000	0.000	0.000	0.000
Ca	0.999	0.999	1.003	1.010	0.998
Mn	0.002	0.003	0.002	0.001	0.002
Fe^{2+}	0.000	0.000	0.000	0.000	0.000
Na	0.003	0.000	0.000	0.001	0.000
K	0.000	0.000	0.000	0.000	0.000
Total	3.023	3.025	3.025	3.025	3.018

Curriculum vitae

14.05.1978	Born in Löbau
09/1984 – 08/1991	Primary school
09/1991 – 06/1996	Secondary high school
10/1996 – 07/1997	Study of geology
08/1997 – 10/1998	Community service in lieu of military service
10/1998 – 06/2005	Continuation of the study of geology at the TU Bergakademie Freiberg; focus on petrology and the geology of mineral deposits Subject of the diploma mapping: "Documentation of the Mühlwand – Lambzig – Netzschkau – Mylau area" Subject of the diploma thesis: "Contact metamorphism in the Aue-Schwarzenberg area: Petrological investigations and Finite-Elements modelling" Supervisor: Prof. Dr. Leander Franz
06/2005 – 12/2006	Practical work in the field of hydrogeology
01/2007-06/2011	Doctorate study at Basel University; subject: Multiple high- and ultra-high-pressure orogenies in the Qinling Mountains: boundary conditions permitting their formation and exhumation. Advisers: Prof. Dr. Leander Franz, Prof. Dr. Christian de Capitani, Prof. Dr. Lothar Ratschbacher