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Editorial

Introduction to the special issue of *Geographica Helvetica*: "Mapping, measuring and modeling in geomorphology"

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By necessity, the term "physical geography" is somewhat generic, since the overall discipline consists of a hugely diverse pool of potential subject matter that has duly led to the development of an equally diverse array of sub-disciplines and research specialisms (Matthews and Herbert, 2008). Despite the fact that many of those sub-disciplines may adopt slightly different terminology or nomenclature, the porosity of their respective research boundaries, and the level of overlap that exists between adjacent subjects means that many practitioners in "physical geography" commonly draw on ideas, theories or techniques from neighbouring specialisms in order to more robustly test a specific hypothesis or answer a particular research question (Sparks, 1969). One subdiscipline that regularly draws on techniques from closely allied disciplines is geomorphology (e.g. Zapata et al., 2002; Lang, 2008; Greenwood et al., 2013; Kuhn et al., 2014), or the study of landform features and the process-based mechanisms that have led to their development (Thornbury, 1969; Derbyshire et al., 1979). Such processes inherently involve a mixture of weathering, transport and subsequent deposition of eroded material by one or a combination of media that include water, wind and ice, or in some instances, by gravity alone (Wooldridge and Morgan, 1959). Those processes not only take place over a wide range of spatial scales (Pitty, 1982), but invariably the rate at which they occur can be episodic, very rapid and hence unpredictable, or so imperceptibly slow that documenting them in real time is simply not possible (Embleton and Thornes, 1979). As observations of such weathering mechanisms are considered fundamental to interpreting the very landscapes in which they occur (Burr and Howard, 2015), the need for process-based evidence ensures that mapping and monitoring-based experiments, whether undertaken in situ or ex situ, conducted under laboratory conditions, or performed using physical or numerical models have, and will undoubtedly continue to underpin future research into geomorphology and other closely related sub-disciplines (Allen, 2014).

The suite of papers presented in this special issue of *Geographica Helvetica* entitled "Mapping, measuring and modeling in geomorphology" encapsulate the very essence of this theme by illustrating the diverse spectrum of successfully employed and highly relevant experimental approaches developed by and available to geomorphologists and indeed to many other neighbouring sub-disciplines within "physical geography". For instance, Stähli et al. (2015) demonstrate a variety of ways in which episodic and hence difficult-to-observe mountain and hillslope processes, such as debris flows, landslides and rock falls, can be recreated under laboratory conditions. The resultant process-based knowledge is then used to bridge the gap between pure observations (i.e. monitoring-based data acquisition) and the development of numerical models to predict the occurrence and rate of such processes. Staub et al. (2015) monitor ground surface and near-surface temperatures within talus slopes in mountain environments and thereafter compare observed with modelled data. The outcome of this work has allowed them to predict spatial and temporal variations of permafrost in sensitive mountain environments under a range of ongoing and future climate change scenarios. Greenwood et al. (2015) combine GIS-based and experiment-based approaches to assess the influence of hillslope terracettes on surface hydrology on steep-sloping and subalpine terrain. Their work highlights the fact that the spatial heterogeneity of these relatively common features means that they can influence the surface hydrology in ways that can be both positive and negative. Ambrosi and Scapozza (2015) adopt a pioneering approach using the latest digital software to generate 3-D maps from scanned 2-D stereoscopic images. The outcome of their work has allowed them to quantitatively assess historical ground surface deformation on challenging mountainous terrain with unprecedented accuracy, and with a minimum of ground truthing. Xiao et al. (2015) present results from a series of small-scale experiments combining laboratory-based erosion plots with artificial rainfall simulations to discriminate eroded soil fractions according to their likely transport distance during erosion events. This approach represents an important key to determining the possible fate of sediment and organic carbon across landscapes over event-based timescales. Willi et al. (2015) describe a range of methods used to monitor debris flows. Against a backdrop of increased debris flow movements attributed to climate and environmental change, they then compare results from selected approaches in order to determine which is most accurate, cost-effective and user-friendly. Finally, and in contrast to the studies described above, the last two papers deviate from geomorphology per se and instead report on work undertaken within adjacent research specialisms; namely sustainability and geochemistry. In the former of those two communications, Kuonen (2015) combines the use of an open source data platform with a GIS to present an easy-to-use interface capable of calculating carbon emissions during journeys made by commonly used modes of travel. This not only allows individuals to choose less polluting modes of transport, but it could also provide organisers of, for instance, conferences, meetings and corporate group events, with the tools to identify an optimum centralized setting relative to attendees' original start points. Finally, Müller and Schaub (2015) focus on the reoccurring problem of nitrogen (N) and phosphorous (P) enrichment, leading to the repeated eutrophication of Lake Hallwil in central Switzerland. Their work seeks to elucidate the mechanisms of soil and soil-associated nutrient transfers from nearby agricultural land and attempts to predict N and P inputs into the lake over the coming years.

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