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Combining geomorphometry, feature extraction techniques and earth-surface processes research: the way forward

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In today's world, humans, climate and nature are inextricably linked, and despite uncertainties in the precise nature and likelihood of human and climate-induced processes, geomorphology and geomorphometry can explore the changes in process regimes and landscape responses. From a geomorphological point of view, we can look at a landscape, and work out how each earth surface process, such as air, water, and ice, can mould it. We can piece together the history and life of such a landscape place by studying landforms and sediments, and how they interact(ed). On the other hand, we can also provide quantitative land-surface analysis, for such a landscape, drawing upon mathematics, computer vision, machine learning, image-processing techniques and statistics to quantify the shape of earth's topography at various spatial and temporal scales. Geomorphology and geomorphometry have been significantly advanced in recent years at all spatial and temporal scales. Many of these advances are based on new methodologies and techniques that, compared to some years ago, offer largely improved capabilities. This talk will present some recent advances in the use of high-resolution data for Earth-surface processes research, and in particular for feature extraction. The rapid growth of survey technologies and computing advances and the increase of data acquisition from various sources (platforms and sensors) has led to a vast data pool with unprecedented spatiotemporal range, density, and resolution (from submeter to global scale data), which requires efficient data processing to extract sought-after information. This unprecedented set of tools and techniques allow to measure and provide field evidence of specific landscape features. This poses a basis to enhance our understanding of changes in landscapes at a variety of scales, from micro to local, to global.