



Identifying scales for assessing erosion and deposition on dryland and humid region hillslopes

Nikolaus J. Kuhn, Harald Hikel, and Philipp Greenwood

University of Basel, Physical Geography and Environmental Change, Department of Environmental Science, Basel, Switzerland (nikolaus.kuhn@unibas.ch)

Drylands and humid regions show distinct differences in runoff generation connectivity, soil erosion and sediment deposition across hillslopes. While the driving agent of erosion, rainfall, is greater in humid regions, the lack of vegetation and soil cover often leads to greater runoff ratios and erosion in drylands. However, these effects are not linear because the controlling factors of the hillslope processes vary on different spatial scales. Rainfall can be considered to be fairly uniform on a given slope. However, patterns of infiltration capacity differ: on humid region slopes a more or less continuously evolving catena of soil development leads to gradual changes along a slope.

In drylands, on the other hand, patterns of infiltration are often determined by the structure of the underlying rocks and the positive feedbacks for soil development and vegetation induced by these patterns. As a consequence, indices used to assess hillslope hydrology and geomorphology have to be adapted to the different set of controlling factors. Failing to do so can lead to erroneous observations of runoff coefficients or erosion rates, in particular when plots are installed disregarding the spatial scale of the surface properties controlling runoff and erosion. Similarly, modelling approaches that do not reflect these properties deliver, at best, the right results for the wrong reasons.

This study explores approaches to identify the relevant surface properties and development of indices for integration into runoff and erosion models.