

## **Channelized and hillslope sediment transport and the geomorphology of mountain belts**

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This study uses morphometric data from the Andes of northern Peru and the eastern Swiss Alps to illustrate how the ratio between sediment transport on hillslopes and in channels influences landscape and channel network morphologies and dynamics. The headwaters of fluvial- and debris flow-dominated systems (channelized processes) are characterized by rough, high-relief, highly incised surfaces which contain a dense and hence a closely-spaced channel network. Also, these systems tend to respond rapidly to modifications in external forcing (e.g., rock uplift and/or precipitation). This is the case because the high channel density results in high bulk diffusivity. In contrast, headwaters where landsliding is an important sediment source are characterized by a low channel density and by rather straight and unstable channels. In addition, the topographies are generally smooth. The low channel density then results in relatively low bulk diffusivity. As a consequence, response times are greater in headwaters of landslide dominated systems than in highly dissected drainages.

The Peruvian and Swiss case studies show how regional differences in climate and the lithotectonic architecture potentially exert contrasting controls on the relative importance of channelized versus hillslope processes and thus on the overall geomorphometry. Specifically, the Peruvian example illustrates to what extent the storminess of climate has influenced production and transport of sediment on hillslopes and in channels, and how these differences are seen in the morphometry of the landscape. The Swiss example shows how the bedding orientation of the bedrock drives channelized and hillslope processes to contrasting extents, and how these differences are mirrored in the landscape.