Geophysical Research Abstracts
Vol. 12, EGU2010-14030, 2010
EGU General Assembly 2010

Scaling relations in mountain streams: colluvial and Quaternary controls

Francesco Brardinoni (1,2), Marwan Hassan (3), and Michael Church (3)

(1) Department of Geological Sciences and Geotechnologies, University of Milano-Bicocca, Milano, Italy (francesco.brardinoni@unimib.it), (2) Department of Geography and Environmental Studies, Ottawa, Canada, (3) Department of Geography, University of British Columbia, Vancouver BC, Canada

In coastal British Columbia, Canada, the glacial palimpsest profoundly affects the geomorphic structure of mountain drainage basins. In this context, by combining remotely sensed, field- and GIS-based data, we examine the scaling behavior of bankfull width and depth with contributing area in a process-based framework. We propose a novel approach that, by detailing interactions between colluvial and fluvial processes, provides new insights on the geomorphic functioning of mountain channels. This approach evaluates the controls exerted by a parsimonious set of governing factors on channel size. Results indicate that systematic deviations from simple power-law trends in bankfull width and depth are common. Deviations are modulated by interactions between the inherited glacial and paraglacial topography (imposed slope), coarse grain-size fraction, and chiefly the rate of colluvial sediment delivery to streams. Cumulatively, departures produce distal cross-sections that are typically narrower and shallower than expected. These outcomes, while reinforcing the notion that mountain drainage basins in formerly glaciated systems are out of balance with current environmental conditions, show that cross-sectional scaling relations are useful metrics for understanding colluvial-alluvial interactions.