Annonce de conférence

Jeudi 09.06.2011 à 12:15, Salle GC C30 (Génie Civil)

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The influence of extreme events on sediment transport, channel bed conditions, and the accuracy of bedload transport calculations

Abstract

The sediment supply to steep streams is highly episodic and is partially a function of the magnitude and timing of landslides and debris flows. In these channels, clusters and steps of large boulders move only during infrequent, extreme flow events, and significantly alter the flow hydraulics and the transport of the more mobile gravel. Bedload flux predictions are often inaccurate in these streams because they do not account for the influence of the immobile boulders and the highly variable sediment supply.

We measured bedload transport rates, grain-size, and the boulder-step characteristics (e.g. protrusion) in the Erlenbach torrent (gradient of 10%), Switzerland, over a period of 6 years. This period encompassed two extreme events (recurrence interval ~50 years) that reorganized boulder steps. Bedload fluxes increased and bed grain sizes fined after each extreme event because of greater hillslope sediment supply, and reduced bed armoring and particle interlocking. The boulder step protrusion was a power function of the bedload flux; protrusion increased with lower sediment availability and with time elapsed since the last extreme event.

We previously developed a bedload transport equation that accounts for the influence of boulder steps on the flow hydraulics. We now incorporate a function for protrusion, to estimate the sediment availability during any flow event, in our bedload transport equation. Sediment transport predictions were within an order of magnitude of the measured values if they used a time-dependent protrusion. Use of a constant protrusion caused the predicted bedload fluxes to systematically over- or under-estimate the measured values. This suggests that protrusion may be used as a proxy for the relative sediment availability and that bedload flux predictions may be improved using stochastic functions for bed roughness and sediment supply.

Durée de la conférence: env. 45 minutes, suivie d'une discussion

Prof. Dr Anton SCHLEISS