



Constant sediment flux despite enhanced landslide activities in the Waldemme drainage basin, Entlebuch area, central Switzerland.

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The sediment routing system comprises hillslope processes (e.g., landslides) that mobilizes sediment, and channelized processes (e.g., debris flows and fluvial processes) that results in export of sediment. We explore feedback mechanisms and limits of interactions between production and transport of sediment.

Flysch areas display abundant landslides and are therefore important sediment sources. Such an area is provided by the Waldemme drainage basin that is to large extent made up of Penninic and Subalpine flysch. These units experienced a substantial reactivation of landslide activities in 1994. We used the Waldemme drainage basin to detect possible feedback mechanisms between landslide activities and fluvial sediment loads. The data are photogrammetry based process rates of the Schimbrig landslide (Entlebuch) and suspended sediment loads from the trunk stream (Waldemme).

The quantification of process rates of the Schimbrig landslide was established using digital photogrammetry. Four stereopairs taken in 1962, 1986, 1993 and 1998 were used for extraction of high-resolution digital elevation models. The differences between these models yield information about temporal evolution of the topography and hence about surface process rates. The suspended sediment loads of the trunk stream were taken from the Swiss Federal Office for Water and Geology.

Volumetric data of the 23 ha-wide landslide area were calculated for non-active and active periods. Displacement rates of the landslide increased from 10'000 m³/yr between 1962-1993 to > 50'000 m³/y between 1993 and 1998. This increase is mainly due to the 1994 landslide event. In contrast, fluvial transport rates of the same area

remained at constant magnitudes of $<6000 \text{ m}^3/\text{yr}$ despite increasing slip rates during and immediately after the 1994 event. Similarly, sediment loads of the trunk stream (Waldemme) do not increase in 1994 and 1995. The data suggest a limited coupling between landslide activities and fluvial sediment loads. We attribute this limit in the coupling between hillslope and fluvial processes to the transport-limited nature of sediment flux in this drainage basin, preventing any additional sediment loads to be transported despite enhanced landslide activities.