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# Spatio-temporal variability and quantification of sediment transfer and storage in an Alpine basin

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The spatial and temporal variability of sediment transfer and storage in an Alpine catchment (Reintal, Bavarian Alps) is presented. Spatial information of storage types including the quantification of sediment volumes is based on geomorphologic mapping, airphoto interpretation, seismic refraction surveys, and GIS-analysis. Temporal information was derived from concepts on paraglacial slope adjustments, multitemporal airphoto interpretation and geomorphologic mapping of erosion and sedimentation as well as dating results obtained from two sediment cores.

Widespread storage types in the valley are talus sheets/cones and rockfall deposits covering 67 and 11%, respectively, of the surface area. Alluvial fans (9%), alluvial plains (6%), debris cones (5%), moraines (1%) and avalanche deposits (1%) are less frequent, but all of them show a much higher sediment transfer activity. At present, however, only 21% of the valley surface is characterised by any sediment transport at all (input, output or both). Most of the sediment storage types (especially talus sheets) are decoupled from the present-day geomorphic system.

Airphoto interpretation and field reconnaissance between 1999 and 2003 show that there is no significant difference of sediment transfer in the entire valley considering the overall surface area. However, in contrast to the average value, specific sediment storage types (alluvial fans, talus cones, river banks) differ significantly ($> 60\%$) with respect to their sediment transfer activity. The total sediment mobilised in 1999 and 2003 corresponds only to 0.3% compared with the overall volume of sediment stored in the valley.

It is unlikely that at the outlet of the catchment any significant clastic sediment output has occurred since (at least) historical times when the valley was partially closed by

to two large rockfall events creating large natural sediment sinks (alluvial plains) in the centre of the valley. Behind a larger rockfall deposit, which occurred between appr. 1500 AD, 0.9 million $m^3$ of sediments covering an area of 84000 $m^2$ have been trapped. This suggests extraordinarily high mean sedimentation rates (18 - 27 mm $a^{-1}$). Based on drillings and sediment cores from the trapped sediment we calculate sedimentation rates of similar magnitude. This demonstrates the possibility of rapid refills of almost closed sediment sinks in upper alpine catchments.