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Quantifying Late and Postglacial sediment fluxes and storage in nested alpine catchments – a geomorphological perspective of the upper Möll catchment

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The analysis of alpine sediment cascades requires the identification, differentiation and quantification of sediment sources, storages, and transport processes. On a continental scale the Alps can be considered as source area with high rates of sediment production and huge amounts of sediments available for transport. However, large areas shift to (intermediate) sediment storages when analysing smaller spatial and temporal scales. These sediment storages frequently interrupt sediment fluxes and therefore decouple alpine cascading systems. Valley blockings due to large rockfall deposits or glacial oversteepening effects are possible causes for decoupled systems. As a consequence characteristic knick points in longitudinal profiles with increased sediment storage above and reduced sediment storage below develop. Subject to the considered spatial scale, altering driving forces controlling sedimentation patterns and processes can be observed. Whereas the variability of major driving forces (e.g. geology, lithology, and climate) controls sedimentation patterns on larger scales, the relation of landscape adjustment to specific topoclimatic, morphometric and subsurface characteristics is of major concern on smaller scale investigations.
Both categories of parameters controlling sedimentation in high mountain systems show a high variability in the area under investigation (upper Möll basin with several subcatchments, approx. 430 km^2). Due to the location within the transition zone between Tauern Window formations and the Palaeozoic, geological, lithological, and tectonical conditions are varying significantly between the different subcatchments. In addition, small scale driving forces are also highly variable, not only between different subcatchments, but also within them. In this context, the spatial variability of permafrost conditions and a heterogeneous glacial imprint in the study area plays a key role for the explanation of local patterns of sediment storage and flux. In contrast to frequent studies dealing with alpine sediment budgets on smaller scales, this contribution highlights the transferability of locally acquired field data to a mesoscale catchment. For this purpose, the whole set of the above mentioned parameters have to be analysed complementary in order to identify key parameters finally serving as input for modelling postglacial relief evolution. Overall objectives of this study are to improve the knowledge of source area characteristics in general and to provide a better understanding of source to sink linkages in alpine sedimentary systems.

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