



Predictive Mapping of Sediment Cascades in Alpine Geosystems

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Geomorphological maps are important tools for landscape and process analysis and also for hazard assessment. To create these maps requires intensive field work if working on larger scales, and manual mapping may be considerably influenced by operator bias. Furthermore, in alpine environments large portions of the study area may be inaccessible for field work. To overcome these shortcomings, predictive mapping is a helpful solution.

In this study, numerical GIS-based models are applied to digital elevation models (DEM) to obtain geomorphic process units by delineating the trajectories and process domains of important geomorphic processes in high-mountain environments (rock fall, slope-type debris flows, slope aquatic and fluvial processes). The models are calibrated and validated by field data and aerial photography interpretation and then applied to three meso-scale catchments (15-17 sqkm) in the Bavarian and Austrian Alps.

The resulting maps reveal the spatial distribution of specific geomorphic processes and their zones of erosion, transport, and deposition. Overlapping areas can be identified, where the erosion zone of one process reaches into the accumulation zone of another. These overlaps represent coupling within sediment cascades and thus crucial elements for sediment transport and sensitivity of alpine geosystems. The process models also yield spatial distributions of process intensities which are used for further quantification of coupling relationships.