Permafrost and Periglacial Dynamics Poster Session

SEDIMENT BUDGET ASSESSMENTS AS A PREREQUISITE FOR LANDSLIDE HAZARD ANALYSIS - EXAMPLES FROM ARCTIC ENVIRONMENTS IN ICELAND

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Analysis on landslide hazards differ significantly. Approaches range from expert judgement to highly sophisticated modelling techniques. The application of a particular approach is highly dependent on restrained budgets and time limitations. Therefore, investigations and analysis have to be focussed on the specific problem, often without considering the overall environmental setting appropriately. The inherent danger of the interpretation of results is to draw conclusions which are indeed appropriate to the current situation, but possibly not in conjunction with long-term trends.

Approaches of landslide hazard investigations include either statistical analysis of former events, mostly on small scales, or mathematically and physically based modelling of specific events in given locations considering detailed information on geotechnical, hydrologic and hydraulic parameters. Comprehensive investigations include herein current sediment storage and potential mobility of the sediment. Unfortunately, often the reproduction of sediment is not taken into account although the rate of refilling storages, removed by previous events, is most crucial in estimating future events.

Numerous communities in Iceland are heavily affected by many natural hazards, including landslides, and specifically rock falls and debris flows. As soon as either of these processes have occurred, sediment is partially or totally removed from the catchment. Therefore, comparable triggering conditions do not have similar process responses. In Iceland, sediment storage is refilled by continuous bedrock weathering. In addition it is suggested, that sediment is also delivered from high altitude plateaus to the slopes and channels by solifluction and frost creep processes. Although not quantified yet through measurements, it is concluded, that the delivering of sediment due to weathering and solifluction is most important for sediment availability for debris flows in the Westfjords in Iceland. The condition of sediment storage, removal, and deposition can be determined by a geomorphic assessment on sediment budgets

for the whole region before investigating the factors for debris flows hazard analysis in detail. Consequently it is suggested to include geomorphic assessments, and in particular sediment budget approaches, into detailed hazard analysis as a general procedure.