Geophysical Research Abstracts
Vol. 15, EGU2013-2035, 2013
EGU General Assembly 2013

Contemporary hillslope processes sediment budgets in two parabolic-shaped and glacier-fed valley systems in western Norway

Katja Laute and Achim A. Beylich
Geological Survey of Norway (NGU), Geo-Environment Division, Trondheim, Norway (katja.laute@ngu.no)

Hillslopes within defined drainage basin systems function as key elements for sediment production, storage and transfers from sources to sinks, both for short-term and longer-term periods. Rates of hillslope processes are exceptionally varied and affected by numerous influences of varying intensity, especially in sensitive cold climate environments.

This research has been conducted over four years (since 2009) as part of a doctoral thesis, which is integrated in the Norwegian Research Council (NFR) funded SedyMONT-Norway project within the ESF TOPO-EUROPE SedyMONT (Timescales of sediment dynamics, climate and topographic change in mountain landscapes) Programme. Focus of this study is on (i) contemporary geomorphic process rates and sedimentary mass transfers within the drainage basins Erdalen (79.5 km2) and Bødalen (60.1 km2) in western Norway, (ii) the absolute and relative importance of the identified relevant denudational processes and (iii) the importance of sediment delivery from slope systems for the drainage basin sedimentary budgets.

Identified relevant contemporary denudational processes in both valley systems include rock and boulder falls, snow avalanches, slush flows, debris flows, creep processes, wash- and chemical denudation and fluvial transport of solutes, suspended sediments and bedload. These processes are analysed by combining geomorphologic mapping, geophysical subsurface investigations, terrestrial laser scanning and spatial data analysis with process monitoring. For monitoring contemporary surface processes a designed program has been applied at selected hillslope test sites including e.g. installed nets for collecting freshly accumulated rockfall debris, remote cameras for monitoring rapid mass movement events (avalanches, slush- and debris flows), stone tracer lines for measuring surface movements as well as temperature loggers both in rock walls and talus slopes for analysing rock temperatures and mechanical weathering. Slope wash traps for analyzing slope wash denudation have been installed and measurements of solute concentrations at small hillslope drainage creeks for investigating the role of chemical denudation have been conducted.

Results show that snow avalanches and rock falls are comparably important processes regarding geomorphic mass transfers. The level of slope-channel coupling is altogether limited. It is higher in Bødalen as compared to Erdalen causing comparably higher rates of sediment delivery from slopes into channels in Bødalen. Both drainage basins represent supply-limited systems.