Geophysical Research Abstracts, Vol. 9, 09028, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09028

Paraglacial landform quantification in the Turtmann Valley, Swiss Alps

Jan-Christoph Otto

Department of Geography, University of Bonn, Meckenheimer Allee 166, 53115 Bonn, Germany. (j.otto@giub.uni-bonn.de)

Sediment flux plays a central role within the evolution of land surfaces and Earth's biogeochemical system. In mountain environments sediment flux is often still influenced by quaternary glaciation in form of glacier derived depositional landforms. The paraglacial concept discusses the transformation of these depositions in the postglacial period in sediment flux systems. However, the role of sediment storage is often the least understood part in paraglacial system analysis. A quantification of deposition volumes is often based on rough assumptions only. Today, geophysical methods, high resolution digital terrain data and GIS techniques open up new possibilities for the more accurate quantification of sediment storage volumes.

This study analyses the spatial distribution of paraglacial and postglacial landforms and quantifies sediment volumes in the high alpine, meso-scale Turtmann Valley, Swiss Alps (110 km^2). Landform volumes are calculated in different sediment flux subsystems: The hanging valleys, the glacier forefield, the main trough floor and the main trough slopes. A detailed geomorphological mapping provided information on the distribution structure of storage landforms. Geophysical methods and GIS modelling were used to derive sediment volumes of seven different alpine landform types.

The spatial distribution of landforms reveals a typical high alpine land surface pattern. Though slope deposits cover more than 50% of the hanging valley surface, the largest sediment volumes are stored in moraine deposits that include up to 77 % of the material. A total sediment volume of 780 to 1,030 x 10^6 $m^3$is stored in the Turtmann Valley. More than 70 % of this material is located in the hanging valleys that are considered as closed systems with respect to the coarse debris flux and consequently decoupled from the main valley system. The average denudation rate for the Turtmann

Valley varies between 0.94 and 1.25 mm/a.

A sequence of paraglacial landform evolution is derived from the spatial landform distribution. Based on the position of relict glacier-derived rock glaciers three relative stages of paraglacial landform succession can be identified in the study area. The study bridges a gap in landform quantification studies by quantifying sediment volumes of all alpine landform types in a meso-scale catchment. Thus, sediment volumes deposited by different processes are compared and related to the paraglacial and postglacial evolution of this high mountain geosystem.