Geophysical Research Abstracts, Vol. 7, 04926, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04926

Earth-, mud- and debris streams in the ultrahelvetic nappe of the Gschliefgraben near Gmunden, Upper Austria – a retrospective view on 100 years of research and mitigation measures

J.T. Weidinger (1,2), Die. Wildbach

(1) Department of Geography, Geology and Mineralogy, Salzburg University, Austria, (2) Erkudok Institute, Museum of Gmunden, Gmunden, Austria, (3) die.wildbach, Division of Upper Austria, Linz

A tectonic window of ultrahelvetic rocks overthrusted by the Flysch Nappe is exposed in front of the border of the Calcareous Alps (Mt. Traunstein) in the so called Gschliefgraben, east of Lake Traunsee, district Gmunden (Upper Austria).

The widely distributed Northern Ultrahelvetic series mainly consist of dark grey, partly variegated marls ("Buntmergelserie"), which are highly susceptible to water saturation forming huge streams of earth-, mud- and debris down the valley. Those glacier-like mass movements (velocity: 20m/yr) have destroyed forests, cultivated land and farm houses for centuries, f. i. in the years 1660, 1734, 1825 and 1910. Debris flows along the main Gschlief- and Liedring rivers respectively torrents within the Gschliefgraben have made serious problems during thunderstorms until present times, f. i. in the years 1897, 1899, 1947, 1977, 1987.

Additionally rock avalanches are also well known from the W- and N-flanks of Mt. Traunstein within the overthrusted Triassic Nappes of the Calcareous Alps, close to the Gschliefgraben. They have occurred f. i. in the years 1730, 1884, 1891, 1967 and 1990. The deposited rock material has periodically formed debris flows with high velocity during summer season with extraordinary precipitation.

The whole landslide and debris flow affected area covers a size of more than 5 km^2.

Engineering geologic investigations and hazard mapping in the past and at present

times in this area confirm a direct relation of these geomorphologic activities with the geo-tectonic history (overthrusting of the Calcareous Alps) and neo-tectonic movements along transversal faults parallel to the big Traunsee Fault. Acting as preparatory causal factors and triggers of the mass movements climatic conditions and the infiltration of water have played an important role too. The precipitation close to the northern border of the Alps (stagnation at the N-flank of Mt. Traunstein) is as high as 2500 mm/year and can be as high as 200 mm/day. Also the vegetation (flat root plates) has an effect on the degradation of the terrain.

In areas where local people could not have coped with these natural hazard problems by simple solutions (f. i. damming of torrents to avoid debris flows or let them pass by), active measures in torrent and avalanche control organized by the technical engineers of die.wildbach have been done. Technical constructions, drainage systems as well as stabilizing input in forest techniques have partly solved different problems during the past 100 years. Unfortunately there is still a lack solving problems on the knowledge of the internal mechanism of the sliding area for preventing new catastrophes. Also a modern monitoring and warning system is still missing.

So far we can only say that the disasterous chronology is as follows: tectonics $\Rightarrow$ seismicity $\Rightarrow$ rock loosening and weakening of rock strength $\Rightarrow$ rock avalanches and high precipitation $\Rightarrow$ mobilization of earth-, mud- and debris streams $\Rightarrow$ torrent activity $\Rightarrow$ debris flows. This complex system of mass movements at the NW-foot of Mt. Traunstein is somewhat similar to the system “hard on soft rocks” from the region around Lake Hallstatt in the Inner Salzkammergut, district of Gmunden.

Nevertheless all these circumstances make the foot of Mt. Traunstein and the adjacent Gschliefgraben an ideal testing and investigation area concerning mass movements and their impact on cultural history.