Geophysical Research Abstracts,
Vol. 11, EGU2009-13064, 2009
EGU General Assembly 2009

Artificial full scale shallow landslides

L Bugnion (1), A Volkwein (2), and M Denk (3)

(1) WSL Institute for Snow and Avalanche Research SLF, Davos-Dorf, Switzerland (bugnion@slf.ch), (2) WSL Swiss Federal Institute for Forest, Snow & Landscape Research, Birmensdorf, Switzerland (volkwein@wsl.ch), (3) Geobrugg AG Protection Systems, Romanshorn, Switzerland (matthias.denk@geobrugg.com)

Shallow landslides are mixtures of water, soil and debris that initiate on steep slopes during periods of intense rainfall. Infrastructure, buildings, roads and railways are thereby threatened by destruction or closure. Once triggered, the geomorphologic process lays in-between a slide and a flow of the mixed material. A full understanding of the process is necessary to (i) enable a proper simulation and modelling on the computer and to (ii) plan and design new and suitable protection measures. Both needs can be satisfied if full scale field data are available. However, it is difficult to trigger or even to predict natural shallow landslides. Therefore, an experimental setup is explained in this contribution that enables clearly defined, full scale and repeatable shallow landslides.

A new test site has been set up in a quarry close to Veltheim in Switzerland along a 30 degree steep slope. The soil material on top of the slope was removed down to the rock face in a way that a 10 m wide channel was retrieved with a length of up to 100 m. A specially developed start device enables the release of up to 60 m3 all at once. The test material consists of granular soil, gravel and water. The mixture is prepared by excavators and optimized to produce a flow process typical for shallow landslides with front velocities of 8 – 10 m/s.

Along the first 40 m the channel has been equipped with laser and video systems to measure flow height and front velocity. Furthermore, additional devices will measure parameters influencing the shallow landslide process: flow velocity, pore water pressure, normal and shear forces and the material composition (also through later analysis in the laboratory). At the end of the test track a flexible protection system is installed in order to stop the material flow and to measure the forces acting within the barrier during the artificial landslide events.

After having finished the first test series measurment results and according interpretations will be presented. In addition, the interaction between the released material and the barrier will be compared to similar protection barriers against debris flows.