Computer modeling of rainfall triggered landslides (Quinto, Switzerland, November 2002)

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In November 2002 heavy rainfalls have triggered about 100 superficial slope instabilities - landslides, debris flows and other related instability phenomena - in the community of Quinto, located in the upper Leventina valley (Ticino, Switzerland). Subsequent mapping of the instabilities [1], field and laboratory tests of the soil parameters and analysis of the meteorological conditions allowed describing and classifying the event. Consecutively, an attempt was made to reproduce the land instabilities using a mixed geotechnical-hydrological model. Used in a GIS environment, the model combines geotechnical and hydrogeological aspects to simulate slope stability. Mainly based on the work [2], these models, e. g. SHALSTAB [3], SINMAP [4] and TRIGRS [5], have a series of input parameters describing the geometrical, mechanical and hydrogeological properties of the slope and differ mainly in the number of parameters they can simulate, the ability to vary these parameters and, most important, in the capacity to treat the precipitational input as steady-state or transient.

The poster presents the typological characterization of the landslide event, as well as a critical review of the application of the geotechnical-hydrological models on the Quinto event. This research was conducted as part of the Interreg III-B project CatchRisk [6].

References

[1] Comune di Quinto. Dissesti geologici - novembre 2002. Dissesto documentazione. Beffa F., 2003.

[2] Montgomery D.R. and Dietrich W.E. (1993): A physically based model for the topographic control on shallow landsliding. Water Resources Research, Vol. 36, No.

7, pp. 1897-1910.

[3] Dietrich W.E. and Montgomery D.R. (1998): SHALSTAB: A digital terrain model for mapping shallow landslide potential. Internet: ist-socrates.berkeley.edu/˜geomorph/shalstab

[4] Pack, R. T., D. G. Tarboton and Goodwin C. N. (1998): The SINMAP Approach to Terrain Stability Mapping. Internet: www.crwr.utexas.edu/gis/gishydro99/uwrl/sinmap.htm

[5] Baum R.L., Savage W.Z. and Godt J.W. (2002): TRIGRS - A Fortran Program for Transient Rainfall Infiltration and Grid-Based Regional Slope-Stability Analysis. U.S. Geological Survey Open-File Report 02-424. Internet: pubs.usgs.gov/of/2002/ofr-02-424

[6] Project CatchRisk. Interreg III-B, Alpine Space. Internet: www.catchrisk.org