



## Landslides distribution during intense climatic events, the case of August 2005 in Switzerland

Pierrick Nicolet, Marc Choffet, and Michel Jaboyedoff

University of Lausanne, Institute of Geomatics and Risk Analysis, Lausanne, Switzerland (pierrick.nicolet@unil.ch)

Rainfalls are known to be the major triggering effect on shallow landslides. Thus, a correlation is expected between the precipitations and the number of events per sq. kilometer or between the precipitations and the total displaced volumes per sq. kilometer. To illustrate these correlations, the example of the August 2005 events in Switzerland is developed. Indeed, precipitations up to 300 mm in 5 days were observed in the northern part of the Swiss Alps (and up to 190 mm in 24 hours), triggering major flooding and landslides that caused death to 5 persons and damages of 2.1 billion USD. As shown by [1], the correlation between the spatial distribution of landslides and precipitations is strong. Only few landslides occurred in places where the precipitations were lower than 70 mm in 72 hours, and an upper limitation of the number of events by sq. kilometer is given by :

$$D = 8.335 \cdot \ln(p_{72}) - 35.4 \quad (1)$$

With  $D$  = density [*events/km<sup>2</sup>*] and  $p_{72}$  = precipitations over 72 hours.

Data shows that the number of landslides increases with cumulated precipitations up to a threshold. When it comes to risk assessment, since the return period of the 48 hours precipitations is 77 years [2], such events cannot be considered as exceptional. Furthermore, shallow landslides occur usually suddenly, which complicates the attribution of a temporal occurrence probability. This study proposes to estimate the temporal probability of landslide occurrence at a regional scale and to correlate it with the damage cost. This permit the calculation of portfolio values with existing data. As a consequence, this is a tool for predicting future economical impacts.

## References

- [1] Jaboyedoff, M. & Bonnard, Ch.: Report on landslide impacts and practices in Switzerland: need for new risk assessment strategies, in Ho & Li (Eds.), The 2007 International Forum on Landslide Disaster Management, 2007
- [2] Rotach, M., Appenzeller, C., Bader, S., Frei, C., Germann, U., Liniger, M., Zbinden, P.: Meteorologie, in Bezzola & Hegg (Eds.), Ereignisanalyse Hochwasser 2005, Bundesamt für Umwelt BAFU und WSL, 2007 (in German)