



Shallow landslide preliminary risk analysis based on a rainfall event in Switzerland

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Central Switzerland was affected in 2005 by extreme rainfall, causing floods, debris-flows and a large number of landslides. Indeed, more than 5'700 landslides and earth flows were reported and produced damage reaching CHF 16 million to private infrastructure. 6 persons were killed, among which 2 were killed by a landslide-generated debris-flow.

Comparing landslide distribution and precipitation maps, we can observe that landslide density is highly correlated with precipitation amounts over the entire precipitation event and with lithological units. Thus, a probabilistic model can be deduced from the precipitation map to obtain the probability of overpassing a certain number of landslides in each model cell (1km x 1km) for a specific precipitation event.

To find if a landslide will produce some damage, a concept of intersection probability is used. We assume that the landslide can occur anywhere within a polygon given by an indicative hazard map with the same probability. Given this first assumption, if a landslide occurs, the probability that it hits a building is given by the ratio between the surface covered by buildings – extended by a buffer depending on the landslide dimensions – and the total surface.

Thus, a mean annual risk estimation can be modeled from the precipitation return periods inferred from station data.