Regional-scale landslide risk analysis in the Swiss canton of Vaud

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Shallow and deep-seated landslides are common natural hazards in the Swiss Canton of Vaud, inducing damage to the infrastructures. Many studies have been done in the Canton about these phenomena, including a landslide inventory, preliminary hazard maps and hazard maps.

The biggest challenge to estimate the risk is the uncertainty on the events frequencies and the different approaches used to map the existing and potential landslides.

In disaster risk analysis, the events frequency is a very sensitive parameter that has a major influence on the expected mean annual damage costs. However, deep-seated landslides (generally slow-moving) and shallow landslides (which can't be considered as repetitive on a given location, but only over a large area), can't be easily related to a frequency.

For this study, we combine different data sources in order to perform a regional risk analysis for the two types of landslides. These maps come from different types of analysis such as manual mapping based on aerial photos and ALS, modelling, and field visits. On some of these maps, the landslides have been given a return period deduced from their morphology or other characteristics, often judged by the expert.

The analyses are based on incertitude weighting with simulations of possible scenarios using information on the buildings locations and characteristics obtained from the building database of the Canton. The main observation is that among around 200,000 buildings, 6% are located on permanent landslide. Among these, 69% are located on slow moving landslides.

To improve these results, two additional data sources will be used in a further step, namely an insurance database, in order to improve the frequency and the vulnerability, and a velocity map for permanent landslides based on radar interferometry.