Changes and future trends in landslide risk mapping for mountain communities: application to the Vars catchment and Barcelonnette basin (French Alps)

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Landslide risk assessment has become a major research subject within the last decades. In the context of the French-funded ANR Project SAMCO which aims at enhancing the overall resilience of societies on the impacts of mountain risks, we developed a procedure to quantify changes in landslide risk at catchment scales. First, we investigate landslide susceptibility, the spatial component of the hazard, through a weight of evidence probabilistic model. This latter is based on the knowledge of past and current landslides in order to simulate their spatial locations in relation to environmental controlling factors. Second, we studied potential consequences using a semi-quantitative region-scale indicator-based method, called method of the Potential Damage Index (PDI). It allows estimating the possible damages related to landslides by combining weighted indicators reflecting the exposure of the element at risk for structural, functional and socio-economic stakes. Finally, we provide landslide risk maps by combining both susceptibility and potential consequence maps resulting from the two previous steps. The risk maps are produced for the present time and for the future (e.g. period 2050 and 2100) taking into account four scenarios of future landcover and landuse development (based on the Prelude European Project) that are consistent with the likely evolution of mountain communities. Results allow identifying the geographical areas that are likely to be exposed to landslide risk in the future. The results are integrated on a web-based demonstrator, enabling the comparison between various scenarios, and could thus be used as decision-support tools for local stakeholders.
The method and the demonstrator will be presented through the analysis of landslide risk in two catchments of the French Alps: the Vars catchment and the Barcelonnette basin, both characterized by a different exposure to landslide hazards.