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Improvement of vulnerability curves using data from extreme events: a debris-flow event in South Tyrol

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Alpine hazards such as debris flow, floods, snow avalanches, rock falls and landslides pose a significant threat to local communities. The assessment of the vulnerability of the built environment to these hazards is a topic that is growing in importance in hazard and risk management. Nevertheless, only few approaches for the assessment of vulnerability based mainly on estimations are available for detailed risk analysis, so far.
In this contribution, a methodology for the creation of a vulnerability curve as a function of the intensity of the process and the degree of loss is presented. The approach is based on detailed investigations of damaging events regarding the deduction of intensity, the identification of damage pattern according to different process types and the calculation of losses as well as value at risk. The methodology is applied in Martell, South Tyrol, Italy. The case study area suffered significant damages following a debris flow event in 1987. The event was very well documented and the respective data were used to create as first results a curve that shows the degree of loss that corresponds to different intensities of the process. This first curve will be verified by applying data from more damaging events in the region of South Tyrol. The methodological approach is designed to integrate easily future damaging events and consequently, improving automatically the vulnerability curve. The newly developed methodology can be a valuable tool in the hands of local authorities, emergency and disaster planners and other stakeholders.