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Testing robustness in estimating risk in landslide risk assessment

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In risk assessment for future landslides, the risk, R at a given sub-area, S is defined by:

R= E V H, where E is the element at risk in S, such as infrastructure, V is the vulnerability illustrating the probability of loss to the element at risk resulting from the occurrence of a landslide, and H is the probability of the occurrence of a landslide within a specific time period in S.

To estimate the risk, therefore, two probabilities V and H are derived from the data, including the histories, geomorphological descriptions and the locations of the past landslides and topographical environments of the surrounding area as well as damages.

The uncertainties of the estimators of the probabilities are usually considerably large, and in turn, they effect significantly to the estimation of the risk. In this sense, we have examined the robustness of the estimators of the risk with respect to the uncertainties of the estimators of above mentioned probabilities.

The approach has been applied in western Guipúzcoa (northern Spain) where a detailed study of landslide occurrences and damages in the recent past (last five decades) has been carried out.

To estimate the hazard, different scenarios corresponding to different probability levels of future behaviour have been defined, by extrapolation, on the basis of trends derived from occurrences during the last 50 years. Likewise, different vulnerability values have been estimated for each type of element by comparing past losses with actual

values and adding expert's knowledge.

The analysis reveals similar risk map patterns but showing different values. Risk range in the area and the sensibility of H and V probabilities in risk assessment is also illustrated.