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A regional scale landslide vulnerability assessment using a First Order Second Moment approach

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As risk is being created alongside economic growth, reducing vulnerability to local infrastructure, housing and livelihoods of communities affected by natural hazards constitutes a central issue worldwide. In recent years, quantitative risk assessment approaches have gained traction as issues related with the limited availability and resolution of data, model constrains and reliability of the analysis outcomes are recognized.

This paper explores the applicability of a methodology for landslide vulnerability assessment based on a First Order Second Moment (FOSM) approach in a case study area where information about the intensity of landslides and resistance of the elements at risk to withstand the landslide action of a given degree of severity is limited. The FOSM approach provides analytical approximations for the mean and standard deviation of a parameter of interest as a function of the mean and standard deviations of the various input factors, and their correlations. A quantitative model is proposed to estimate the vulnerability of the exposed transportation infrastructure and built-up areas to shallow and medium-seated landslides as a function of their intensity and the characteristics of the elements at risk. The methodology is tested in Buzău County, Romania, a region where communities and the environment are severely affected by recurrent mass movement processes. The main advantages and limitations of the proposed methodology are outlined and recommendations for future improvements are given.

The results of the proposed procedure can be directly used in a quantitative risk analysis and contribute to a better informed decision-making in the prescribed area of investigation.