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Comparing performances of heuristic and logistic regression models for a spatial landslide susceptibility assessment in Maramureș County, Northwestern Romania

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Various methods exist in analyzing spatial landslide susceptibility and classing the results in susceptibility classes. The prediction of spatial landslide distribution can be performed by using a variety of methods based on GIS techniques. The two very common methods of a heuristic assessment and a logistic regression model are employed in this study in order to compare their performance in predicting the spatial distribution of previously mapped landslides for a study area located in Maramureș County, in Northwestern Romania.
The first model determines a susceptibility index by combining the heuristic approach with GIS techniques of spatial data analysis. The criteria used for quantifying each susceptibility factor and the expression used to determine the susceptibility index are taken from the Romanian legislation (Governmental Decision 447/2003). This procedure is followed in any Romanian state-ordered study which relies on financial support.
The logistic regression model predicts the spatial distribution of landslides by statistically calculating regressive coefficients which describe the dependency of previously mapped landslides on different factors. The identified shallow landslides correspond generally to Pannonian marl and Quaternary contractile clay deposits.
The study region is located in the Northwestern part of Romania, including the Baia Mare municipality, the capital of Maramureș County. The study focuses on the former piedmontal region situated to the south of the volcanic mountains Gutâi, in the Baia Mare Depression, where most of the landslide activity has been recorded. In addition, a narrow sector of the volcanic mountains which borders the city of Baia Mare to the north has also been included to test the accuracy of the models in different lithologic units.
The results of both models indicate a general medium landslide susceptibility of the study area. The more detailed differences will be discussed with respect to the advantages and disadvantages of applying each method, as well as the problems involved in the analysis process.

Keywords: heuristic, logistic regression, landslide susceptibility, Romania, Baia Mare.