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Assessment and validation of landslide susceptibility in different geomorphological environments in Portugal

Aldina Piedade, José Luís Zêzere, Cristina Henriques, Pedro Sevinate Pinto, Susana Pereira, and Raquel Melo
RISKam - Environmental Hazard and Risk Assessment and Management. CEG - IGOT. University of Lisbon. Portugal (aldinapiedade@campus.ul.pt)

Portugal is formed by 3 morphostructural units with different geological and geomorphological characteristics: The 'Maciço Antigo' (Platform unit mainly formed by granite and schist of Paleozoic and Precambrian age, which is dominant in the North and the interior of Portugal), two Inactive Sedimentary Basins (formed by sedimentary rocks mainly of Mesozoic age that are present in the west and south parts of the country), and an Active Sedimentary Basin of Cenozoic age (Tagus and Sado Basins mainly formed by clastic sedimentary rocks). These morphostructural units are often affected by slope movements, mainly triggered by rainfall.

The aim of this study is to construct and compare three landslide susceptibility models at the regional scale developed in different geological and geomorphological contexts, which are representative of the Portuguese morphostructural diversity Therefore, three test sites representing such diversity were selected, each one corresponding to a Portuguese municipality: Torre de Moncorvo (within the 'Maciço Antigo'), Caldas da Rainha (in the Inactive Sedimentary Basin) and Santarém (within the Active Sedimentary Basin).

The landslide susceptibility models were developed at the same scale (1:10 000) and for the same types of slope movement (rotational and translational slides). A historical landslide inventory based on the interpretation of detailed orthophotomaps and validated by field work was available for each test site. The same set of predisposing factors, assumed as independent variables, was considered (slope angle, slope aspect, slope curvature, wetness index, lithology, soil type and land use), and the single bivariate statistical method of Likelihood Ratio was selected to weight predisposing variables, to allow comparison. A pixel size of 10m was used systematically for data calculation and integration in the three test sites.

This approach aims to evaluate the predictive capacity of the same set of predisposing factors and determine their ranking through a sensitivity analysis. This process allows understanding which predisposing factors better suits the susceptibility models according to the particular geological and geomorphological conditions of each test site.