



Landslide susceptibility assessment based on different rainfall-triggered landslide events

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The availability of several complete landslide event inventory maps associated to different rainfall conditions is uncommon for a single region. Nevertheless, it could contribute to a better recognition of the total extent and magnitude of landslides under specific triggering conditions. The motivation of the present work is related with three problems that should be solved: (i) How representative of the landslide activity and distribution in a study area can be a landslide event? (ii) How reliable can be a landslide event-based susceptibility map? (iii) How adequate can be a landslide event-based map to independent validate a landslide susceptibility map?

To answer the previous questions two independent rainfall-triggered landslide event inventories, available for the Grande da Pipa river basin, north of Lisbon, Portugal, are used to assess landslide susceptibility at the regional scale. The 1983 landslide event was triggered by a single day of intense precipitation and originates 220 landslides that affected 0.15% (161413 m²) of the study area. The 2010 landslide event was associated with a long lasting rainfall period up to 90 days and generated 254 landslides that affected 0.46 % (511820 m²) of the study area.

The two landslide-event inventories are compared according the following topics: (i) the landslide typology; (ii) the landslide morphometric characteristics; (iii) the analysis of the landslide predisposing factors; (iv) the assessment of magnitude-frequency relationships; (v) the predictive capability of landslide event-based susceptibility models. For the last topic, the Information Value method is used to establish the statistical relationships between the dependent landslide inventory map and the data-set of independent predisposing factors. Two landslide event-based susceptibility maps are produced using independently the landslide inventories of 1983 and 2010. The independent validation is obtained by crossing each landslide susceptibility map with the landslide-event inventory not used to assess landslide susceptibility. Results and discussion are further supported by Receiver Operator Characteristic curves and the corresponding Area Under the Curve.

This work was supported by the FCT - Portuguese Foundation for Science and Technology and is within the framework of the Project Pan-European and nation-wide landslide susceptibility assessment, European and Mediterranean Major Hazards Agreement (EUR-OPA). The first author was funded by a postdoctoral grant (SFRH/BPD/85827/2012) from the Portuguese Foundation for Science and Technology (FCT).