



A preliminary attempt to determine the landslide hazard in Italy

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Determining landslide hazard at the national scale remains a difficult task. However, such a complex task needs to be accomplished to mitigate the landslide consequences, including loss of lives and economic and environmental damages. For administrative purposes, the Italian territory (303,000 km sq.) is subdivided in 20 regions that cover a large variety of natural environments, most of which are subject to landslide hazards. To determine landslide hazard in such a complex and diversified territory, the many natural and anthropogenic variables, and their variations, must be considered. In Italy, the Italian national Civil Protection Department (DPC), an office of the Prime Minister, is in charge of managing natural and human-made hazards, and the associated risk. For landslide (and flood) hazards, the DPC has subdivided the Italian territory into 134 “alert zones” (AZ), decided based on administrative and hydrological criteria. Here, we describe the results of a preliminary effort made by our research group – in the framework of a larger effort to forecast landslide hazard and risk in Italy – to describe landslide hazard in each AZ. For the purpose, we summarized in a specifically designed form the geographical, morphological, geological and landslide information available for each AZ. The form also contains general information on past landslide events and on the vulnerability to landslides of the AZ. We obtained the morphological information from the SRTM DEM with a grid resolution of 90 m × 90 m, and the geological and lithological information from the Geological Map of Italy, at the 1:500,000 scale, published by the Italian Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA). We used the morphological (terrain elevation and terrain gradient) and the lithological information to subdivide the Italian territory in three main morphological domains (plains, hills and mountains), and we computed the proportion of the three domains in each AZ. We determined the type, abundance and distribution of landslides in each AZ heuristically, based on our experience aided by the critical evaluation of existing official documents and maps, including: (i) the maps produced by the national Inventory of Landslide Phenomena in Italy (IFFI), (ii) the maps associated to the geo-hydrological (landslide and flood) hazard plans (PAI), and (iii) other landslide maps prepared by our Institute (CNR IRPI) for parts of Italy. We obtained information on the damage to the population caused by landslides in Italy from a catalogue of historical landslides (and floods) with human consequences compiled by Salvati et al. (2010), and information on sinkholes failures from a catalogue of natural and human-induced sinkhole failures in Italy recently compiled by Parise & Vennari (2013). For each AZ, the dates of the most damaging events were identified, and the number of landslide fatalities, casualties and evacuated people were calculated. These figures provide a quantitative measure of the intensity of the landslide consequences in each AZ. The ensemble of the information collected provides a comprehensive – albeit preliminary – evaluation of the hazard posed by landslides in the Italian territory, and the basic data for proceeding to determine the related vulnerability.

References

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