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Early warning system to forecast rainfall-induced landslides in Italy (SANF)

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Harmful landslide events are frequent in Italy. In this Country, in 2009 rainfall-induced landslides have caused at least 208 casualties, in multiple landslide events. In the period 1950-2009, the average yearly number of harmful landslide events has exceeded 35, most of which rainfall-induced landslide events. These figures indicate the impact that rainfall-induced landslides have on the population of Italy. The Italian national Department for Civil Protection (DPC), an Office of the Prime Minister, and the Research Institute for Geo-Hydrological Protection (IRPI), of the Italian National Research Council (CNR), are designing and implementing a prototype system to forecast the possible occurrence of rainfall-induced landslides in Italy. The system is based on two components. The first component consists of: (i) a set of national, regional, and local rainfall thresholds (of the intensity-duration (ID) type) for possible landslide imitation, (ii) a database of sub-hourly rainfall measurements obtained by a network of 1950 rain gauges in Italy, and (iii) quantitative rainfall forecasts acquired through numerical modelling. Every day, and for each individual rain gauge, the system compares the measured and the forecasted rainfall amounts against pre-defined thresholds, and assigns to each rain gauge a probability for possible landslide occurrence. This information is used to prepare synoptic-scale maps showing where rainfall-induced landslides are expected, in a period of time. The second component of the system consists of synoptic assessments of landslide hazard and risk in Italy, including small-scale zoning maps. The assessments are obtained through statistical modelling of thematic and environmental information, including national catalogues of historical landslides and of historical landslides with human consequences in Italy, in the period 1900-2005. Combination of the hazard and risk zonations with the daily forecasts for possible landslide occurrence, allows the Italian national Department for Civil Protection for an improved management of potential landslide risk conditions in Italy. To further facilitate this challenging task, the different maps are displayed using Web-GIS technology.