



An attempt to determine the frequency of landslide events in Italy

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Landslides are widespread and recurrent phenomena in Italy, where they cause extensive damage and pose a severe threat to the population. The Italian national Department of Civil Protection, an Office of the Prime Minister, is seeking synoptic information on landslide risk in Italy. To determine landslide risk, information on the frequency of landslide events is required. To obtain an estimate of the temporal probability of landslide occurrence, we exploited (i) a catalogue of historical damaging landslide events, and (ii) a catalogue of historical landslide events with direct human consequences, in Italy. The two catalogues were obtained searching SICI (<http://sici.irpi.cnr.it>), the Italian information system on historical landslides and floods in Italy.

The Italian national Department of Civil Protection has subdivided the Italian territory into 126 civil protection alert zones, used to issue meteorological and geo-hydrological warnings. For each alert zone, corresponding on average to the size of a Province, the total number of damaging landslide events, and the total number of landslides with human consequences, in the 51-year period 1950-2000 was obtained. Next, the sections of the two catalogues covering the 41-year period from 1950 to 1990 were single out, and the average (long term) recurrence between damaging landslide events and landslide events with human consequences, were calculated for each alert zone. Next, we assumed that landslides in the two catalogues were random point events in time, and we adopted a Poisson distribution to describe the temporal occurrence of the events. For the two catalogues, we computed the exceedence probability of experiencing damaging landslides, and landslides with human consequences, for different periods, from 1 to 10 years. Lastly, we tested the obtained temporal forecasts against the sections of the catalogues covering the 10-year period from 1991 to 2000, and not used to make the temporal forecasts. Results are encouraging, and indicate that the obtained temporal forecasts can be used to predict landslide risk in Italy, at the synoptic (national) scale.