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An updated catalogue of landslides and floods with human consequences in Italy

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We have updated the catalogue of landslides and floods with direct consequences to the population in Italy. The catalogue covers the 1941-year period between 68 and 2008, and lists landslides and floods that have resulted in deaths, missing persons, injuries and homeless. The catalogue was complied searching a variety of bibliographical and archive sources, including the national catalogue of landslide and flood events in Italy (http://sici.irpi.cnr.it), and five regional catalogues of historical landslide and flood events. We have mapped, at 1:25,000 or 1:100,000 scales, the exact or the approximate location of all the sites were harmful landslides and floods have occurred in the considered period.

Analysis of the catalogues indicates that at least 57,450 people have died, went missing or were injured in 3020 landslide and flood events. This corresponds to a long term average of about 30 casualties per year, and 1.5 harmful event per year. In the new catalogue, the number of landslide events with casualties (1770) is largest than the number of flood events with casualties (1233). However, the number of fatalities caused by foods (38,750, 75%) is largest than the number of landslide fatalities (13,542, 25%). Further analysis of the catalogue reveals that the total number of homeless exceeded 873,400, corresponding to a long term, yearly average of 450 people. Harmful landslide and flood events were inventoried in 2496 of the 8102 Italian municipalities (31%). Fatal events (i.e., events resulting in deaths and missing persons) occurred in 1378 municipalities (17%), and were most numerous in northern Italy. The region where the landslide death toll was highest is the Campania region, in southern Italy, where 3319 people died or went missing. The figure corresponds to 25% of total number of reported landslide fatalities. The large number of fatalities in this region is due mostly to soil slips and debris flows in areas where a thin cover of volcanic ash overlies limestone on steep slopes, a highly hazardous geological setting. In the considered period, the majority of flood fatalities occurred in southern Italy. The largest number of flood fatalities occurred in Sicily, where 7,762 people died or went missing, corresponding to 20% of the total number of flood fatalities. The difference between the frequency of harmful events (which is highest in northern Italy) and the number of fatalities (which is largest in southern Italy) points to the fact that the risk to the population depends on (i) the local geological and morphological setting, (ii) the frequency and intensity of the triggers, and (iii) the location, distribution, and abundance of the exposures.

In general, historical documents and reports are more accurate in providing figures for the fatalities caused by landslides, than those caused by floods. For inundations, the oldest reports quite often provide only a qualitative measure for the fatalities. When fatalities were caused by widespread flooding, a total number was given, including e.g., deaths caused by diseases and famine. We attribute the disparity to the different types of events. Floods affect larger areas than landslides; they can cause damage at several localities during the same event, and often transport the bodies of dead persons for several kilometres along a river, making it difficult to report the exact location of sites where human consequences have occurred. Mass-movements are easier to identify geographically, and the spatial extent of the damage that they can cause to the population is more limited.