



A New Historical Catalogue of Landslide and Flood Events in Umbria, Central Italy

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We present a new catalogue of historical landslide and flood events for the Umbria Region, in Central Italy. The catalogue spans the 1142-year period from 860 to 2001, and was compiled through a thorough and systematic search of existing catalogues of historical landslide and flood events, supplemented by an extensive search of local historical archives and chronicles. When searching the historical archives and chronicles, care was taken in reporting the date or the period and the location of the reported landslides and inundations, and that no duplicates were listed. Care was also taken in collecting information on the type and extent of damage caused by landslides and floods. The new catalogue lists information on 1983 landslide events in the period from 1139 to 2001, and on 1956 flood events in the period from 860 to 2001. This represents a marked improvement over pre-existing catalogues of historical landslides and floods in Umbria. We exploit the new catalogue to: (i) evaluate the completeness of the historical information on landslide and flood events in Umbria, for different periods, (ii) study the spatial distribution of sites affected by landslide and flood events in Umbria, (iii) investigate the temporal distribution (recurrence) of landslide and flood events, (iv) establish the seasonal distribution of landslide and flood events and its variation in time, and (v) determine the type and extent of damage caused by landslides and floods in Umbria, for different periods. To evaluate the completeness of the new historical catalogue we prepared cumulative curves of the number of the listed historical events. To study the spatial distribution of landslide and flood events, we prepared maps of the affected sites. In the considered period, in Umbria there are at least 1531 sites affected one or more times by landslides, and at least 1071 sites affected one or more times by inundations. This corresponds to a frequency of about 0.18 landslide sites per square kilometre, and 0.13 inundation sites per square kilometre. We determined that only a limited number of sites were affected repeatedly. In the period from 1139

to 2001 (863 years) there were only 9 sites affected by landslides 10 or more times, and in the period between 860 and 2001 (1142 years) there were only 17 sites affected by floods 10 or more times. Investigation of the seasonal distribution of landslide and flood events revealed that landslides are most frequent in the periods from October to December and from February to May, whereas floods are most frequent in the period from September to December and in February. Interestingly, the seasonal distributions of landslides and floods before and after 1900 are different. Analysis of the damage caused by landslides and floods to the population of Umbria revealed that floods have killed more people than landslides (38 vs. 24), and that landslides have resulted in a larger number of injured people (55 vs. 22). We further present a web site for the dissemination of the collected historical information on landslides and floods in Umbria (available at <http://sici.irpi.cnr.it/umbria.htm>).