



Individual landslide and flood risk in Italy: an update

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Combining yearly information on the number of fatalities caused by landslides and floods with an historical record of information on the population of Italy, we update existing national estimates of individual landslide and flood risk to the population of Italy, in the period 1861-2010, and we determine new regional estimates of individual landslide and flood risk for the twenty Italian regions, in the period 1951-2010. To measure individual landslide and flood risk we compute mortality, the ratio between the total number of landslide or flood fatalities (deaths and missing persons) to 100,000 people, in a period. For our analysis we use: (i) an updated version of the catalogue of historical landslide and flood events that have resulted in loss of life, missing persons, injuries, and homelessness in Italy, and (ii) historical information on the population of Italy provided by the Italian Census Bureau (Istituto Nazionale di Statistica, ISTAT). In the 150-year period from 1861 to 2010 the average national mortality was 0.08 for landslides and 0.05 for floods. Considering the recent part of the catalogue between 1951 and 2010, the average national mortality was 0.13 for landslides, and 0.04 for floods. In this period, the Veneto region, in northern Italy, experienced the largest yearly mortality to landslides (44.02). This extremely high mortality was experienced in 1963, and is due chiefly to a single catastrophic event: the 9 October 1963 Vajont landslide disaster that caused 1921 casualties. In the same period, the Calabria region, in southern Italy, experienced the largest yearly mortality to flood (5.04), a result of widespread inundations caused by prolonged rainfall in October 1953. Mortality depends on (i) the frequency and magnitude of the fatal events, and (ii) the size of the population involved. In Italy, population has changed significantly in the period from 1951 to 2010, going from 47.5 million (1951) to 60.3 million (2010), an increase of 27%. Mostly importantly, changes in the size of the population were not distributed equally in Italy. In some of the regions the population grew was above average (e.g., Lazio +65.6%, Lombardy +46.8%, Sardegna +38.8%, Trentino-Alto Adige +38.2%), whereas other regions suffered a decrease in the size of their population (e.g., Molise -21.1%, Basilicata -5.9%). We use this information to determine the yearly mortality to landslides and floods in the twenty Italian regions between 1951 and 2010, and we examine possible correlations – or lack of correlations – with climatic measures and indices.