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Temporal and Statistical Properties of 603 Triggered Landslide Events from 1950 to 2002 in the Emilia-Romagna Region of Italy

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AB: It is normally difficult to obtain quantitative information on triggered landslide events over time. Indeed, there are only a few records of series of triggered landslide events, of which none are extensive over time. As instrumental records of landslide events are virtually impossible to obtain for the last 50 years, we turn to a proxy for landslides that have occurred in a given region and are recorded in the historical records. Here, we describe a catalogue of 2279 landslides from 1950 to 2002 for three provinces in the Emilia Romagna Region of northern Italy. The catalogue was compiled through a thorough and systematic search of existing catalogues of historical landslide events, supplemented by an extensive search of local historical archives and chronicles. Care was taken in reporting the date or the period and the location of the reported landslides, and that no duplicates were listed. The 2279 individual landslides reported were grouped into 603 different landslide events, consisting of 1 to 129 landslides each. Grouping was performed by considering the successive landslides over time; during the winter (summer) a period of four (two) days without landslides was considered a separate event. The number of reported landslides in an event, we hypothesize to be directly related to the actual number of landslides that occurred during the event. Based on this assumption, we find that the non- cumulative frequency-size of these events (i.e. the number of reported landslides in each event), is a power-law distribution with a scaling exponent of approximately minus 2, in other words a heavy-tailed frequency-size distribution. We also find that the landslide events themselves are not random in time, and care should be taken by landslide modellers when estimating the recurrence times of landslide events using the assumption of a random Poissonian process.

DE: 1810 Debris flow and landslides

SC: Nonlinear Geophysics [NG]