COMPARING THE EFFECTS OF TWO LANDSLIDE TRIGGERING EVENTS USING FREQUENCY AREA STATISTICS

P. Reichenbach (1), F. Guzzetti (1), B.D. Malamud (2), D.L. Turcotte (3)
(1) CNR-IRPI, 06128 Perugia, Italy , P.Reichenbach@irpi.pg.cnr.it
(2) Dept. of Geography, Kings College London, London WC2R 2LS, UK
(3) Dept. of Earth and Atmospheric Sciences, Cornell University, Ithaca NY, USA

The last week of December 1997, was characterized by a severe snowstorm that covered the Umbria Region of Central Italy with up to 1 m of snow. On New Years Eve, a sudden temperature rise melted the snow, triggering more than 4200 landslides. Most of the failures were soil slips, but some were deep-seated, complex and compound mass-movements. In a separate event, on November 24, 2000, after a period of prolonged rainfall, a high intensity storm hit the Western Ligurian coast of Italy, dumping 150-200 mm of rain in about 12 hours. The high intensity storm triggered more than 1200 shallow and deep-seated landslides on the steep and very steep slopes that had already been saturated by severe antecedent rainfall conditions. Despite the difference in the triggering (intense rainfall vs. snow melting) of these two sets of landslides, and in the lithologic and physiographic setting, both of these landslide "events" have very similar frequency-area statistics. Over the range 10^{-3} km^2 < A_L <10^{-1} km^2, A_L the landslide area, the non-cumulative frequency-area distributions for both landside events have a good fit to a power-law relation with exponent 2.2±0.2. Additionally, both frequency-area distributions exhibit a characteristic "rollover" at a length scale ($A_L^{1/2}$) of about 30 m. Both landslide data sets are complete for landslides well below this rollover.