



Polarisation and spectral properties of the seismic site response of landslide-prone hillslopes: a case study from Italy

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Data acquired during three-year accelerometric monitoring in an area affected by landslide at Caramanico Terme (Central Italy) have provided evidence of peculiar properties of seismic slope response. These findings are relevant for assessing susceptibility of slopes to earthquake-induced failures. Recordings of shocks of low to moderate energy (local magnitude from 1.4 to 5.4) located at distances from 5 to 90 km were obtained on three accelerometric stations positioned within the same hillslope area, but in locations characterised by different lithological and morphological conditions: 1) a mudstone slope of moderate dip not involved in mass movements; 2) the head of a quiescent landslide on a slope of low-moderate dip, with mudstone substratum having the same lithology as the mudstone cropping out at the previous site; and 3) a site on fractured rock (limestone with poor mechanical properties), near the edge of a steep scarp. The collected data were compared with those recorded for the same events by two stations of the National Seismic Survey accelerometric network, sited on rock and distant 35 and 50 km from Caramanico. The comparative analysis provided evidence that slope sites characterised by a low impedance surface layer can be affected by systematic amplification effects polarised in the slope direction; furthermore a directivity of site-specific peaks of the spectral response was also observed. This suggests a combination of effects of lithology and morphology that, during an earthquake, can contribute to enhance destabilising forces along slope parallel sliding directions, thereby increasing seismic slope susceptibility to failure.