



Can low magnitude earthquakes influence landslide activity?

V. Del Gaudio (1), C. Lamanna (1), J. Wasowski (2)

(1) Dipartimento di Geologia e Geofisica, Università di Bari - Italy; (2) CNR - IRPI, Bari - Italy

Low magnitude earthquakes or modest intensity precipitation generally do not trigger mass movements, but little is known to what extent these events can influence landslide activity. In this work we report on a slump-earthflow occurred in Southern Apennines following a 3-day rainstorm in late 1993. Subsequently the landslide underwent different phases of activity, and in particular, the reactivation phase in 1995, which apparently coincided with a series of minor earthquakes and seasonal rainfall events. We focused on one year and half temporal-spatial variations in retrogressive evolution of the landslide and attempted to identify cause-effect relations between the headscarp failures and the occurrence of seismic and rainfall events. For this purpose correlation analysis was carried out first by treating separately each causative factor, and then by considering their combined influence. The results show that: 1) the general retrogressive trend is neither directly correlated to the temporal seismic activity pattern, nor to the monthly or short-term precipitation; instead the trend appears to be influenced by groundwater level variations that are related to a few month cumulative precipitation pattern; 2) the variations in retrogressive activity of the headscarp, with respect to the general trend, show a 60% correlation with a linear combination of seismic energy and monthly precipitation; 3) the relative influence of precipitation appears to be greater than that of seismic activity; the latter seems relevant only when the headscarp is already unstable. These results indicate that, in presence of other causative factors, low energy seismic activity can have a complementary role as destabilising agent; however a rigorous quantification of its relative weight would require detailed and longer term in situ monitoring data.