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A reconstruction of the propagation of the Montaguto earthflow

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Flow-like landslides represent a class of mass movement that, owing to long run-out, may generate significant damages to infrastructure lines as well as economic losses. Therefore, assessing the main kinematical features of landslide propagation for similar processes can provide useful information to mitigate landslide risk. The present abstract discusses the case history of a huge earthflow developed in 2005 – 2006 in the area of Montaguto town (Southern Apennines, Italy), that produced significant damages to both a national road and a national railway connecting Naples and Bari at the slope toe. The volume of the involved landslide mass has been evaluated to be about 4 million m3, whereas the total length of the earthflow, from the source area to the foot, is approximately 3 km, with the thickness of the landslide mass ranging between 4 and 30 m and the average displacement rate estimated for the propagation stage between 3 and 7 m/day. A reconstruction of the propagation stage of this landslide during the first high-mobility phase is here proposed as first, according to a detailed geomorphological analysis aimed at defining the main features of the in-situ landslide propagation. Later on, a back-analysis of the kinematical evolution of the same process, based on a 1-D sliding-visco-consolidation model as modified from the original sliding-consolidation model proposed by Hutchinson (1986), is presented to investigate the role of important factors controlling the process of landslide propagation. The analysis highlights that the development of high excess pore water pressures due to undrained loading processes active in the slope during the most critical stage along with the following consolidation process can represent a reasonable key to explain the earthflow mobility. In particular, the influence of mobilized friction angle and coefficient of consolidation of the soil, landslide mass thickness and initial value of the excess pore pressure at the base of the landslide mass is explored. Field evidence of the existence of residual excess pore water pressures in the landslide mass as measured in situ during different monitoring campaigns corroborates the proposed interpretation of the landslide process.