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Analysis of the current activity of the Montaguto flowslide by means of numerical analysis and topographical monitoring data

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In April 2010 a 3-km long flowslide reached the Cervaro River valley in the territory of Montaguto (AV, Southern Italy), destroying the SP90 provincial road and covering approximately 300 m of the national railway between Naples and Bari, after a run-out characterised by displacement rates of some m/day. The traffic along the railroad and the road was interrupted for about three months causing severe problems to the residents, the local economy and the national railway system; the consequences extended throughout southern and central Italy. This landslide activity could be considered only the last reactivation of a landslide prone areas that was characterised by the activation of two gravitational phenomena in the second half of 1950 and in 2005. In order to investigate the recent evolution of the landslide, a near real time monitoring network based on ground surface displacement measurements was installed in 2010, as well as automatic piezometric cells were installed in January 2012 in the landslide body to measure pore water pressures at-depth; both the systems are still active.
Although for most of the landslide channel the displacement rate between 2011 and 2012has been observed to reduce with time, specific sectors of the channel flow of the Montaguto landslide reveal to be still active. In particular, a central area, named Sector E, about 600 m long, has been characterised by an average displacement rate of approximately 0.20 m/month all over 2011 and 2012, with some acceleration recorded in the spring season. In order to explore the factors controlling the current activity of this landslide sector, a two-dimensional finite element model has been implemented, based on the pore water pressure monitoring data and the soil property data available. The numerical results indicate a significant role of the geometry of the sliding surface in the overall sector E, with a landslide body thickness increasing downslope, as a predisposing factor of the activity of this specific landslide area. Both high pore water pressures in the landslide body and low mechanical properties of the soil materials are also defined as controlling factors of the current landslide mobility.
The numerical results are in good agreement with the displacement field monitored all over the landslide channel and confirm that numerical modelling can represent a reliable support for the interpretation of the landslide failure mechanism and evolution.