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An integrated tool for real time prediction of hydrological response of steep-slopes in shallow pyroclastic deposits

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A large part of the mountains of Campania, in southern Italy, are interested by catastrophic flowslides triggered by heavy rainfalls. The slopes are covered by shallow deposits of loose pyroclastic soils in unsaturated conditions, which equilibrium is assured by the contribution of apparent cohesion due to soil suction. Hence, a key tool for the prediction of slope stability is the short-term forecasting of intense and persistent rainfall events and the subsequent analysis of the hydrological response of the shallow covers during such events.
To this aim a numerical tool, is presented, consisting of a module for stochastic short-term rainfall prediction and 3D finite volumes model of infiltration and seepage through porous medium, provided with a geotechnical module for slope stability analysis.
The presented predictor of rainfall evolution consists of an event based stochastic model, allowing formulating real time predictions of the future evolution of a storm, conditioned to the observed part of the storm.
The 3D code (I-MOD3D) was calibrated through back-analysis of infiltration tests on slope model (Olivares et al. 2009) and of in situ suction measurements (Olivares and Damiano, 2007) collected in a instrumented site on a slope where recently a catastrophic flowslide occurred. The calibrated model has been applied to real time predictions of the slope response during some observed storms, showing the reliability of the results of the proposed model, which may represent a useful tool for decision making to implement early warning systems.

Olivares L. and Damiano E. (2007). Post-failure mechanics of landslides: laboratory investigation of flowslides in pyroclastic soils. Journal of Geotechnical and Geoenvironmental Engineering ASCE, 133(1): 51-62

Olivares L., Damiano E, Greco R, Zeni L, Picarelli L, Minardo A, Guida A, Bernini R (2009). An Instrumented Flume to Investigate the Mechanics of Rainfall-Induced Landslides in Unsaturated Granular Soils. GEOTECHNICAL TESTING JOURNAL, vol. 32; p. 1-11, ISSN: 0149-6115.