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Physical modelling of the rainfall infiltration processes and related landslide behaviour.

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The prediction of natural processes, such as weather-induced landslide, an issue that is of great importance. Were held numerous research to understand the processes underlying the triggering of a landslide, and to improve the forecasting systems. A valid prediction model can allow the implementation of an equally valid announcement and warning system, thus reducing the risk caused by such phenomena.
The hydraulic and hydrologic modeling of the process that takes place in an unstable slope subjected to rainfall, can be performed using two approaches: through mathematical models or physical models.
Our research uses an integrated approach, making system data of experimental sites, with both the results and interpretations of physical models, both with simulations of mathematical models. The intent is to observe and interpret laboratory experiments to reproduce and simulate the phenomenon with mathematical models.
The research aims to obtain interpretations of hydrological and hydraulic processes, which occur in the slopes as a result of rain, more and more accurate.
For our research we use a scaled-down physical model and a mathematical model FEM.
The physical model is a channel with transparent walls composed of two floors at a variable angle (ignition and propagation) 1 meter wide and 3 meters long each. The model is instrumented with sensors that control the hydraulic and geotechnical parameters within the slopes and devices that simulate natural events.
The model is equipped with a monitoring system able to keep under observation the physical quantities of interest. In particular, the apparatus is equipped with tensiometers miniaturized, that can be installed in different positions and at different depths, for the measurement of suction within the slope, miniaturized pressure transducers on the bottom of the channel for the measurement of any pressure neutral positive , TDR system for the measurement of the volumetric water content, and displacement transducers to laser technology for the measurement of surface movements in the direction orthogonal to the plane of sliding. The monitoring system is completed with an apparatus of scanning type PIV consists of high-definition cameras, used for the reconstruction of the flow fields on the surface of the sample.
It has performed a first test, reconstructing within the channel a homogeneous deposit of volcanic ash, which committed the entire width of the channel for a length of 1,50 m and a thickness of 0.20 m. We proceeded to tilt the slope up to an angle of about 38 ° and has imposed an artificial rain of considerable intensity (about 220 mm / h), aimed at achieving the conditions trigger a landslide along the artificial slope.
The second test was made with the same characteristics as the first, but reconstructing a layered deposit, using the same stratigraphy found in a test site. Comparing the values recorded in the two tests can assess the different responses of the two deposits.