Geophysical Research Abstracts
Vol. 21, EGU2019-11070, 2019
EGU General Assembly 2019

Developing a landslide activation index based on hydrological stress index, for shallow landslides and debris flow forecasting

Valentina Colaiuda (1), Barbara Tomassetti (1), Annalina Lombardi (1), and Marco Verdecchia (2)

(1) University of L'Aquila, CETEMPS, L'Aquila, Italy (valentina.colaiuda@univaq.it), (2) Dept. of Physical and Chemical Sciences, University of L'Aquila, L'Aquila, Italy

According to the last Italian "Report on Hydrogeological Instability", almost 8% of the national territory is affected by landslide processes, being one third classified as rapid processes triggered by heavy or persistent precipitation, as well as earthquakes. Nowadays, landslide occurrences rate in Italy is estimated to be in the order of hundreds events per year (e.g. 172 events in 2017). As commonly recognized by the scientific community, heavy and sudden precipitation events are increasing in the last decades, due to global warning: therefore we can expect increasing rates and increasing population exposure to this kind of hydrogeological risk, consequently. For this reason, many landslide forecasting techniques have been developed at regional scale, especially for shallow landslides and debris flows that are generally activated by severe precipitation events. The forecast is based on rainfall quantification, which represents the most easily detectable physical quantity. Then, forecasting landslide models are usually based on rain empirical thresholds, that needs to be locally defined and usually revised for each element at risk, according to historical data that are not always available.
In this work, we propose a new approach, based on the Landslide Activation Index (LAI), inspired to the already tested CAI index, used for flood and flash flood forecasting through hydrological modeling. Following the same concept and starting from the rainfall spatialization techniques used in the CHyM hydrological model, the LAI index considers the drained rainfall in each point of the rebuilt drainage network during the runoff time and can be used to predict landslide risk over wide areas, by using a unique threshold over identified slopes, susceptible to collapse.