



Shallow landslides and debris flows triggering and rainfall thresholds using a quasi-dynamic wetness index: a case study in Sicily

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This work aims analyze the geomorphic impact of the flash flood event which affected the area of Giampilieri (Sicily, Italy) on October 1, 2009. The event was caused by a deep cyclone developed in the Southern part of the Mediterranean basin producing an intense rainstorm over the Ionic sea coast of Sicily. The analysis of the event suggested that more than 220 mm of rain fell in less than 4 hours with a peak of about 110 mm/hr in 5 minutes. Its probability was estimated as the equivalent of a 1 in 100 year return period. The shallow landslides triggered by the precipitation were analyzed by using a model for the prediction of both topographic and climatic control on shallow landslide initiation processes. The model uses a 'quasi-dynamic' wetness index to predict the spatial distribution of soil saturation in response to a rainfall of specified duration. The model is coupled with a simple scaling GEV model for the assessment of the relationship between rainfall amount and corresponding exceedance probability. This allows to characterize the rainfall predicted to cause instability in each topographic element by duration and frequency of occurrence. The application of the model to the study area provides a way to identify the relative potential for shallow landsliding as well as to evaluate rainfall thresholds for debris flow triggering.