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A geostatistical model for rainfall induced shallow landslide prediction over large territory

Diana Salciarini, Giulia Fanelli, and Claudio Tamagnini
Department of Civil and Environmental Engineering, University of Perugia

Probabilistic methods are considered necessary when: i) measured data are limited and sparse over a study area; ii) the natural uncertainty of real phenomena has to be accounted. In this work a newly developed probabilistic model for the prediction of rainfall induced shallow landslides over large areas is presented. Input data for the model (soil strength and permeability) are defined as appropriate probabilistic distributions over the territory. These were defined adopting the geostatistical Kriging approach and defining experimental variogram from the available measured and geo-referenced data.
The output of the model is the spatial distribution of the collapse probability for the slopes of a given study area. This result was obtained by using the direct stochastic model called Point Estimate Method (PEM).
The model was developed in Matlab and tested over a selected territory of the Umbria Region, in central Italy. The predictions provided by the model were compared with deterministic predictions provided by the TRIGRS deterministic approach and with available landslide inventories.