Geophysical Research Abstracts
Vol. 14, EGU2012-5683, 2012
EGU General Assembly 2012

Geotechnical vs. Geophysical models for slope stability

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Current approaches to landslide forecasting are based either on empirical models, which search for correlations between rainfall data and landslide occurrences, or on physically based models, which combine hydrological models with slope stability analyses for the computation of the Factor of Safety. Traditionally, the calculation of the Factor of Safety is based on accurate geotechnical measurements, which provide information on the internal structure and the mechanical properties of the investigated soils through the analysis of samples of very reduced size. Hence, both empirical and physically based traditional approaches are based on point information, which refer to very small rainwater collecting areas of rain gauges and very small soil volumes around porous probes.
To overcome the limit of point-sampled information, we propose a semi-empirical approach based on the use of a geophysical Factor of Safety introduced in terms of local resistivities and slope angles. Starting from two resistivity tomography surveys performed on a test area on Sarno Mountains (Southern Italy) during the autumnal and spring seasons, we present an application of the proposed geophysical approach and compared the results with those coming from the infinite slope analysis. Advantages and disadvantages of geotechnical and geophysical approaches are shown.