Geophysical Research Abstracts
Vol. 17, EGU2015-13662, 2015
EGU General Assembly 2015

Soil cover characterization at large scale: the example of Perugia Province in central Italy

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

In the last years, physically-based models aimed at predicting the occurrence of landslides have had a large diffusion because the opportunity of having landslide susceptibility maps can be essential to reduce damages and human losses. On one hand physically-based models rationally analyse problems, because mathematically describe the physical processes that actually happen, on the other hand their diffusion is limited by the difficulty of having and managing accurate data over large areas.
For this reason, and also because in the Perugia province geotechnical data are partial and not regularly distributed, a data collection campaign has been started in order to have a wide physical-mechanical data set that can be used to apply any physically-based model. The collected data have been derived from mechanical tests and investigations performed to characterize the soil.
The data set includes about 3000 points and each record is characterized by the following quantitative information: coordinates, geological description, cohesion, friction angle. Besides, the records contain the results of seismic tests that allow knowing the shear waves velocity in the first 30 meters of soil. The database covers the whole Perugia province territory and it can be used to evaluate the effects of both rainfall-induced and earthquake-induced landslides.
The database has been analysed in order to exclude possible outliers; starting from the all data set, 16 lithological units have been isolated, each one with homogeneous geological features and the same mechanical behaviour.
It is important to investigate the quality of the data and know how much they are reliable; therefore statistical analyses have been performed to quantify the dispersion of the data - i.e. relative and cumulative frequency - and also geostatistical analyses to know the spatial correlation - i.e. the variogram. The empirical variogram is a common and useful tool in geostatistics because it quantifies the spatial correlation between data.
Once the variogram has been calculated, it is possible to use it to forecast the best estimation of a parameter in a generic point where information are missing. One of the most used interpolation techniques is the Kriging, which makes a prediction of a function in a given point as weighted average of known values of such function in the nearest points, deriving the weights from the variogram.