Geophysical Research Abstracts
Vol. 16, EGU2014-10879, 2014
EGU General Assembly 2014

Quantifying temporal and spatial dynamics of root reinforcement in spruce protection forests

chiara vergani (1), massimiliano schwarz (2), filippo giadrossich (3), and enrico antonio chiaradia (1)

(1) Università degli studi di Milano, DISAA, Milano, Italy (chiara.vergani@unimi.it) (enrico.chiaradia@unimi.it), (2) Bern University of Applied Sciences, Zollikofen, Switzerland (massimiliano.schwarz@bfh.ch), (3) Università di Sassari, Department of Agriculture, Sassari, Italy (filippogiadrossich@hotmail.com)

Root reinforcement is a key factor when dealing with slope stability problems and is becoming an important quantitative criterion for the evaluation of the protective function of forests against shallow landslides and for the adoption of appropriate practices in protection forest management. Although many models have been developed to estimate the root reinforcement, a reliable quantification that considers both its spatial and temporal variability still remains a challenge. This work aims to extend the understanding of the spatial and temporal dynamics of root reinforcement after forest management in alpine spruce forests, supplying new experimental data and applying the state of the art in numerical model to compute root reinforcement (RBMw).
Root reinforcement decay was estimated 5, 10 and 15 years after timber harvesting in spruce stands in a small catchment in the Swiss Alps. Root distribution at different distances from the trees has been collected and a root distribution model implemented in SOSlope has been calibrated and validated. To estimate root mechanical properties roots bigger than 5 millimeters in diameter were tested in the field, to fill up the current lack of data regarding field pull out of roots of these dimensions. The contribution of shrub and tree renovation species on root reinforcement after felling has been evaluated. Finally, a model for the estimation of root reinforcement decay was proposed, based on the two key factors for root reinforcement dynamic: decay of root frequencies and root pullout force decay. The final result is a model for the spatial -temporal prediction of root reinforcement heterogeneity and dynamic in alpine spruce forest stands.
This is the basis for the implementation of the temporal variability of root reinforcement in slope stability models (i.e. SOSlope), in which vegetation is considered a key factor for shallow landslide stability.