Geophysical Research Abstracts
Vol. 16, EGU2014-13633-2, 2014
EGU General Assembly 2014

Characterisation of tree root penetration in bedrock and its impact on slope stability

Mao Zhun (1), Lavinia Selli (2), Enrico Guastini (3), and Federico Preti (3)

(1) Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture, EMGR, Saint-Martin-d'Hères Cedex, France, (2) Università di Bologna, Dip. di Scienze e Tecnologie Agro-Alimentari, Alma Mater Studiorum, Bologna, Italia, (3) Università degli Studi di Firenze, GESAAF, Firenze, Italia

The anchorage effect of tree root penetration in bedrock against shallow landslides has uniquely been discussed in conceptual models, but seldom been measured and characterised in fieldsite. Using both the ARBORADIX™ and the electrical resistivity tomography (ERT) techniques, we aims at (i) mapping the spatial distribution of tree roots penetrating in bedrock in situ, (ii) estimating their contributions to slope stabilization and (iii) comparing the two detection methods.
The experimental site is located on Pomezzana (Lu), Tuscany Apennine, Italy, where a great shallow landslide occurred in 1996 following periods of intense precipitation events. On aslope of45°, the studied forest has a density of 1800 trees/ha, mainly composed of black alder Alnus glutinosa L. (95%). Root mapping was conducted in two plots close to each other: one within an intact zone with no landslide damage; the other within a restored zone since the landslide. In each plot, two repetitions were conducted in dense tree clusters and in gaps, respectively.
Preliminary results showed that the density and spatial distribution of roots penetrating into bedrock were significantly associated to the site chronology (intact vs restored), stand density and tree positions. Thicker roots had much higher probability of penetrating into rocks. Each of detection methods showed it advantages and drawbacks. This study, highlighting the importance of the mechanical role of thick roots in slope stabilization, may significantly improve our understanding in the use of vegetation in ecological engineering.