Geophysical Research Abstracts
Vol. 13, EGU2011-9718, 2011
EGU General Assembly 2011

Automatic recognition of road and pathway induced slope instabilities by high resolution topography

Giancarlo Dalla Fontana (1), Simone Calligaro (1), Federico Cazorzi (2), and Paolo Tarolli (1)

(1) Department of Land and Agroforest Environments, University of Padova, Agripolis, viale dell'Università 16, 35020 Legnaro, PD, Italy, (2) Department of Agriculture and Environmental Science, University of Udine, via delle Scienze 208, 33100 Udine, UD, Italy

Road networks in mountainous forest landscapes have the potential to increase the susceptibility to shallow landsliding by altering surface and subsurface flow paths. The same issue is observed for the path networks with an evidence of surface erosion due to flow direction alteration. In this work LiDAR data with the combination of a interception grid-based methodology is developed in order automatically recognize the likely surface instabilities along the road and paths network.
The main goal is to investigate the forest road and pathway effects on altering hillslope flow directions and redirecting contributing area, and also how the high resolution topography is useful for such analysis.
This study was conducted in few small headwater basin, located in Eastern Italy, where a forest road and path networks have been accurately surveyed and detailed airborne LiDAR elevation data were available. The DTMs were derived using LiDAR bare ground elevation data with a spatial scale of 0.5 m.
Two major findings are addressed: i) the evidence of forest road effect on altering hillslope flow directions and redirecting contributing area within cross ditches, ii) the effectiveness of high resolution LiDAR derived DTM of 0.5 m in recognition of paths network and its derived implication on hillslope flow direction and derived contributing area calculation. These results underline the capability of high resolution topography for predicting the geomorphic effects of forest roads or trail paths located on steep slopes. The approach used in this study may be useful for defining criteria for road design that reduce the effects of roads on geomorphic processes, and also for planning engineering solutions for such areas where paths are relevant for tourism and trekking such Dolomites or in National Parks.