Geophysical Research Abstracts
Vol. 13, EGU2011-12557, 2011
EGU General Assembly 2011

Hazard hierarchization of debris flow sediment source areas

Vincenzo D'Agostino and Gabriele Bertoldi
TeSAF Dep., Padova University, Legnaro (Padova), Italy, vincenzo.dagostino@unipd.it

The increase of safety required by Alpine communities is forcing administrations and local authorities to improve prevention and mitigation of natural disasters triggered by flood events. Many projects concerning debris flows and their prevention have been financed by the European Union and several procedures have been proposed to better the related hazard mapping. Monitoring and prevention measures are costly and demand large efforts to be effective. So, economical and time resources become the limiting factor frequently and a hierarchization of the hazardous situation is mandatory when cost optimization and decisions about works priority are necessary. The hierarchization is also useful for monitoring projects connected with research or protective aims.
The Gadria catchment is located in the north west of the Bolzano Province, Italy (6 square kilometers, range of altitude 1200-3000 m a.s.l.) and is characterized by an unlimited supply of sediments from hillslopes. Its strongly weathered metamorphic bedrock and catastrophic geological events produced one of the largest debris-flow fan of the Alps (10 square kilometers). The catchment belongs to the network of the EU Project MONITOR II and the instrumental monitoring system will be in operation in May 2011. An intense field activity detected 208 active source areas affecting 13,8 % of the basin area. The above mentioned field surveys have been carried out at very steep slopes and they were partly limited by the respect of safe conditions for the surveyors. Thus, interrogation of digital landscape was necessary to identify the most interesting sub-basins in terms of sediment dynamics. The resulting number of unstable and potentially unstable slopes provided an inventory and a first mapping of the sediment source areas. The suitability of a 2 x 2 meters LiDAR DTM and DSM allowed a filtering of field-mapped source areas using a multi-factors analysis accounting for vegetation, ground roughness and image information. Field observations on the degree of connectivity and activity of the source areas were combined with digital landscape indexes in order to produce a quantitative hazard hierarchization. It was proposed a new methodology which considers the hazard magnitude of a sediment source areas as a function of volume involved, expected mobility of the debris material, and disposition to motion. This last variable is strictly related to the potential energy of the debris-flow volume of each source area and to the nearness of the main channel.