Geophysical Research Abstracts
Vol. 13, EGU2011-13066, 2011
EGU General Assembly 2011

Post-event debris flow volume measurement using GIS techniques and LIDAR data

Nathalie Morey (1), Giuseppe Tito Aronica (2), Gabriele Leoni (3), and Claudio Puglisi (4)

(1) Messina, Faculty of Science, Informatics, Italy (natmorey@tiscali.it), (2) Messina, University of Engineering, Department of Civil Engineering, Italy (aronica@ingegneria.unime.it), (3) Roma, University of Roma 3, Italy (lele.leoni@libero.it), (4) ENEA, Italy (puglisi@enea.it)

North-East part of Sicily (Italy) is frequently exposed to natural hazards such as landslides and debris flows. In this area, most of catchments are small, with a steep slope, and characterized by short concentration times. These characteristics make those basins prone to debris/mud flow formation, as demonstrated by events that frequently occur causing not only significant economic damages to property, buildings, roads and bridges but also, for this that concern the 1st October 2009 flash flood event, loss of human life.
Main focus of this work is to present the application of a GIS technique for a post event evaluation of debris flows materials. Particularly, the analysis has been carried out for the 2009 event occurred in the Giampilieri catchment, when devastating debris flows were caused by a large amount of rain fell over the Messina area.
Here, a series of GIS-based algorithms using spatial analysis have been implemented in order to perform calculation of debris moved during rainstorm. Volume of debris material has been estimated by comparing data collected before and after the event. Pre-event data has been provided by existing contour line maps while post-data where issued of a high resolution digital elevation model elaborated by a LIDAR technology produced immediately after the event. Calculation process faced coordinate transformation problems between data using different projection systems and moreover datum types. In the specific study, LIDAR data used global datum while existing geo-data information, which is the case of most national geo-information, used local one. Main troubles concerned geo-referencing geographical maps and comparison of elevation referred to ellipsoid in the global datum system while in geoid for local one. Debris flow volume results were matched with the alimentation area elaborated during a terrain analysis survey effectuated few days after the disaster. Volume determination, especially during extreme flood events, is fundamental in the analysis of landslide phenomena. Coupling with meteorological information, results help to predicate conditions in which a terrain is susceptible to slide and which quantity of debris could move.