Geophysical Research Abstracts
Vol. 18, EGU2016-11378, 2016
EGU General Assembly 2016

Implementation of the RAMMS DEBRIS FLOW to Italian case studies

Carmela Vennari (1,2), Brian Mc Ardell (3), Mario Parise (2), Nicoletta Santangelo (1), and Antonio Santo (1)

(1) Department of Earth Sciences, University of Naples Federico II, Largo San Marcellino 10, Napoli, Italy. E-mail: carmela.vennari@unina.it, (2) Institute of Research for Hydrogeological Protection, National Research Council, Bari, Italy , (3) WSL Swiss Federal Institute for Forest, Snow and Landscape Research, Mountain Hydrology and Mass Movements, Birmensdorf, Switzerland

RAMMS (RApid Mass MovementS) Debris Flow runout model solves 2D shallow-water equation using the Voellmy friction law. The model has been developed by the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), and the Swiss Federal Institute for Snow and Avalanche Research (SLF). It requires as input the following data: topography, release area or hydrograph, and the friction parameters μ and ξ. Deposition height, velocity, pressure and momentum are the most important outcomes, also in terms of Max values. The model was applied primarily in Alpine catchments to simulate debris flow runout.

Beside the Alps, alluvial events are very common even in torrential catchments of the Southern Apennines of Italy, and contribute to build alluvial fans mainly located at the foothill of carbonate and volcanic mountains. During the last decades several events occurred in these areas, often highly populated, and caused serious damage to society and to people.

Several case studies have been selected from a database on alluvial events in torrential catchments of Campania region, aimed at applying the RAMMS model to back-analyze the documented events, and to simulate future similar scenarios in different triggering conditions.

In order to better understand the obtained data and choose the best results, field data are mandatories. For this reason we focused our attention on torrential events for which field data concerning deposition area and deposition height were available. We simulated different scenarios, with variable peak discharge and friction parameters, reproducing also the influence of anthropogenic structures. To choose the best results, observed data and predicted data were compared in an objective way, by means of a quantitative analysis.

Predicted and observed deposition areas were compared in a GIS environment, and the best test was evaluated by computing several statistics accuracy derived from the confusion matrix, including the sensitivity, that provides a measure of the proportion of positives cases that have been correctly identified.

As regards deposition height, first of all we: i) classified the RAMMS results and the field data in the same class values, ii) associated to each observed value the predicted value in that point, and iii) calculated the frequency value for each class. Further, for every test we analyzed the wrong results by considering the proximity to the correct class.

Application of a quantitative analysis gives the advantage to evaluate impartially the best results, but it is applicable only in those cases for which there field data are available. The RAMMS simulations are useful to understand the anthropogenic influence on flow direction, the most vulnerable areas and the elements at higher risk. On the other hand, RAMMS applications on case studies where no field data is available will be useful to evaluate future scenarios, simulating different triggering events and different peak discharges, but they do not allow to choose the best result among the model outcomes.