Geophysical Research Abstracts
Vol. 14, EGU2012-13122, 2012
EGU General Assembly 2012

Flow characteristics of a channelized debris-flow and implications in numerical modelling: a study case

D. Termini

University of Palermo, Dipartimento di Ingegneria Civile, Ambientale e Aerospaziale, Palermo, Italy (dony@idra.unipa.it; donatella.termini@unipa.it)

As it is known, debris flows are characterized by extreme propagation rapidity and by the ability to move high quantity of fluid mass. Furthermore, debris flows are fluid enough to travel long distances and, thus, to cause damage in vast areas, even far from the trigger ones. Debris-flow runout estimations are important for the delineation of potentially hazardous areas. Especially in recent years, several researches have been conducted in order to define predicitive models. But, existing runout estimation methods need input parameters that can be difficult to estimate. Recent advances in theory and in experimental research have allowed the assessment of the physics of the debris flows. On one hand, analysis of flows of dry and solid- fluid mixtures (Azana et al, 1999; Spinewine et al., 2003) have provided a foundation for a comprehensive debris flow; on the other hand, experimental data have highlighted the limitations of the theoretical models. The major part of the experimental studies analyze the basic kinematic conditions which determine the phenomenon evolution. The aim of the present work is to give a contribution on understanding of the propagation phenomenon of the debris flow providing a method for choosing input parameters in runout estimation. This parameters are useful in numerical modelling. The analysis is conducted with the aid of experimental data collected in a laboratory flume appositely constructed at the Dipartimento di Ingegneria Civile, Ambientale e Aerospeziale – University of Palermo - Italy. Propagation conditions are analyzed for different granular concentrations.

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