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Propagation of a channelized debris-flow: experimental investigation and parameters identification for numerical modelling

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Recent catastrophic events due to intense rainfalls have mobilized large amount of sediments causing extensive damages in vast areas. These events have highlighted how debris-flows runout estimations are of crucial importance to delineate the potentially hazardous areas and to make reliable assessment of the level of risk of the territory. 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 experimental researches have also allowed the assessment of the physics of the debris flows. But, the major part of the experimental studies analyze the basic kinematic conditions which determine the phenomenon evolution. Experimental program has been recently conducted at the Hydraulic laboratory of the Department of Civil, Environmental, Aerospatial and of Materials (DICAM) – University of Palermo (Italy). The experiments, carried out in a laboratory flume appositely constructed, were planned in order to evaluate the influence of different geometrical parameters (such as the slope and the geometrical characteristics of the confluences to the main channel) on the propagation phenomenon of the debris flow and its deposition. Thus, the aim of the present work is to give a contribution to defining input parameters in runout estimation by numerical modeling. The propagation phenomenon is analyzed for different concentrations of solid materials. Particular attention is devoted to the identification of the stopping distance of the debris flow and of the involved parameters (volume, angle of depositions, type of material) in the empirical predictive equations available in literature (Rickenmanm, 1999; Bethurst et al. 1997).

Bethurst J.C., Burton A., Ward T.J. 1997. Debris flow run-out and landslide sediment delivery model tests. Journal of hydraulic Engineering, ASCE, 123(5), 419-429
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