The FlatModel: a 2D numerical code to evaluate debris flow dynamics. Eastern Pyrenees basins application.

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Abstract:

Debris flows are present in every country where a combination of high mountains and flash floods exists. In the northern part of the Iberian Peninsula, at the Pyrenees, sporadic debris events occur. We selected two different events. The first one was triggered at La Guingueta by the big exceptional flood event that produced many debris flows in 1982 which were spread all over the Catalonian Pyrenees. The second, more local event occurred in 2000 at the mountain Montserrat at the Pre-litoral mountain chain. We present here some results of the FLATModel, entirely developed at the Research Group in Sediment Transport of the Hydraulic, Marine and Environmental Engineering Department (GITS-UPC). The 2D FLATModel is a Finite Volume method that uses the Godunov scheme. Some numerical arranges have been made to analyze the entrainment process during the events, the Stop & Go phenomena and the final deposit of the material. The material rheology implemented is the Voellmy approach, because it acts very well evaluating the frictional and turbulent behavior. The FLATModel uses a GIS environment that facilitates the data analysis as the comparison between field and numerical data. The two events present two different characteristics, one is practically a one dimensional problem of 1400 m in length and the other has a more two dimensional behavior that forms a big fan.