Geophysical Research Abstracts,
Vol. 11, EGU2009-1978-2, 2009
EGU General Assembly 2009

Numerical simulation of debris flows with the 2D - SPH depth integrated model

T. Blanc (1) and M. Pastor (2)

(1) Universidad Politécnica de Madrid, Madrid, Spain, (2) Universidad Politécnica de Madrid, Madrid, Spain

Debris flow analysis is important to assess the risk and to delimitate vulnerable areas where mitigation measures are required. Numerical model is one of the most accurate and efficient tool for debris flow analysis. The SPH depth integrated model has been created by Pastor in 2005. The SPH depth integrated model is a 2D model able to predict runout distance, flow velocity, deposition pattern and final volume of debris flows. It is based on a mathematical model, on rheological models and on a numerical model. The basis of the mathematical model is a coupled depth integrated model coming from a velocity-pressure version of Biot-Zienkiewicz equations. The rheological models correspond to constitutive equations. In this work, the frictional and the Voellmy model has been used to simulate debris flows. The numerical model used is the SPH (Smooth Particles Hydrodynamics) methods. The SPH depth integrated model has been validated using analytical and back analysis. Actually not valuable database for input parameters are available. In this study, three case studies have demonstrated that the SPH depth integrated model is useful for debris flow risk analysis. A work on erosion law has been proposed in order to improve the model. After this thesis, the model gives to the user the opportunity to choose between the Hungr and the Egashira erosion law to model erosion processes. The study has shown that the Egashira erosion law is more efficient to predict some characteristics of debris flow processes, as flow velocity and deposition pattern.