Geophysical Research Abstracts, Vol. 7, 10515, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10515

Numerical modelling of saturated flow-like landslides

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Flow-like landslides are characterised by flow like features and behaviour. This abnormal behaviour is observed both for dry and saturated masses. Debris- and rock-avalanches fall in this class of phenomena but also smaller events like debris flows can be included. Large rock avalanches can be triggered by exceptional rainfall and subsequent groundwater conditions and they can include large quantities of water even if in small proportion with respect to rock. Debris- and rock-avalanches are extremely rapid phenomena and some debris flow can be considered quite fast too. In some cases water can be considered to move with the material and to drain or seep from the lateral or upper surface of the moving mass as well as from its base. We consider exactly these conditions in our analyses and we assume, initially, that water remain within the initially saturated part of the moving mass but at the same time can undergo pressure changes. The irregular geometry of the topographic surface on which the landslide move, the deformability of the mass and its general behaviour during shear, and the presence of obstacles can trigger large pressure changes of the fluids within the mass. We continued the development of a code developed to simulate landslides characterised by large deformations and displacements. We present the results of some modelling efforts of different type. One- and two-dimensional models have been implemented to test the approach and the adopted numerical scheme. The code implements the possibility to include: compressible fluids, flowing within the part of the mass already saturated at the beginning of the movement; different elasto-plastic rules; water expulsion from the surface of the mass. Differences between the movement of dry and saturated landslide masses are under examination.