Geophysical Research Abstracts, Vol. 7, 05948, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05948

Evaluation of a two-phase debris flow model

P.A. Bartelt (1), B.W. McArdell (2), M. Swartz (2) and M. Christen (1)

(1) WSL Swiss Federal Institute for Snow and Avalanche Research SLF, Gravity Currents Research Group, CH-7260 Davos Dorf, Switzerland, (2) WSL Swiss Federal Research Institute, Division of Natural Hazards, Gravity Currents Research Group, Birmensdorf, Switzerland (mcardell@wsl.ch)

Large sediment particles in debris flows may travel at speeds somewhat slower than the mean flow velocity. We have assembled a relatively simple two-phase, 1D debris flow model which can consider this behavior. The motion of the solid phase is based on a solution of the Savage-Hutter equations for granular flows, using a finite volume method. The fluid phase is similarly described as a Chezy-type fluid. The phases are coupled using a momentum exchange concept, and the equations are solved with a finite volume technique. Friction parameters consist of an internal Coulomb friction angle (relatively constant among the test cases) and a Chezy-type fluid friction parameter, which varies from case to case. Additional parameters include the momentum exchange coefficient, fluid and sediment densities, and the concentration of sediment. Using a new test facility, where we can measure the proportion of sediment in full-scale debris flows in the field, we were able to calibrate the model and apply it to other events to constrain the possible range of the model parameters.