Geophysical Research Abstracts
Vol. 14, EGU2012-11022-1, 2012
EGU General Assembly 2012

Numerical investigation of the influence of rock shape on rockfall trajectory

J. Glover (1), A. Schweizer (2), M. Christen (1), W. Gerber (1), R. Leine (2), and P. Bartelt (1)

(1) WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland (glover@slf.ch), (2) Center of Mechanics, Dept. of Mechanical & Process Engineering, ETH Zurich, Switzerland (schweizer@imes.mavt.ethz.ch)

It is the purpose of this contribution to investigate how rock shape, size, falling orientation, and slope angle determine the dynamics, dispersion, and run out distance of rockfalls. We perform a series of numerical tests using a numerical software program (RAMMS rockfall) which explicitly accounts for rock shape. Simulations are performed on both idealised slopes as well as full scale examples in natural terrain. We simulate polyhedral rigid bodies varying the ratio of their principle moments of inertia, in addition to natural rock blocks captured with a laser scanner and a perfect sphere. We do this in order to ascertain the influence of the rock shape on rockfall trajectories. Rock shape is an often cited, while little documented, parameter instrumental in the runout behaviour of rockfalls. It is not the intention of this work to investigate the underlying friction parameters. These simulations are important because we do not attempt to account for the influence of rock shape by probabilistically varying terrain topography or friction parameters. We document bounce heights, rotational kinetic energy, dispersion angle and runout distances as a function of initial conditions (position, orientation, translational and angular velocity) and geometry. The simulations permit a better inclusion of detailed rock mass information such as block release kinematics, and illustrate the importance of integrating true rock shape in rockfall trajectory modelling for both hazard mapping and the design of mitigation measures.