Geophysical Research Abstracts, Vol. 8, 04590, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04590

Flows of aerated particles down slopes

D. E. Jessop
University of Bristol (d.e.jessop@bris.ac.uk)

Geophysical flows, debris flows and snow avalanches are large scale natural hazards that pose a significant threat to human populations, infrastructures and the environment. However, the underlying physical processes and mechanisms that control their propagation remain unclear. This is partly because the interactions of particles with their neighbours and particles with interstitial fluid are not well understood; the range of particle sizes present in geophysical flows is large, often varying from a few hundred microns to a several metres or more. It is believed, particularly in the case of pyroclastic flows that motion of the interstitial fluid strongly affects motion and can change substantially along the course of motion.

By a combination of laboratory experiments, mathematical modelling and the application of analytical and numerical techniques, the fundamental dynamics of such problems are investigated. Preliminary experimental data suggests that fully fluidised flows of monodisperse particles along a horizontal surfaces propagate in an analogous manner to viscous gravity currents in that they are driven by a streamwise pressure gradient and resisted by drag. This conclusion can be verified by analysing the relevent forces acting on both the solid (particlulate) and fluid (gas) phases and deriving equations of motion for the flows from these, the predictions of which concur with our measurements.