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Granular flows on erodible layers: type and evolution of flow and deposit structures

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The interaction of a fast moving landslide mass with the basal layer over which movement takes place has been discussed in previous contributions. Nevertheless, the evolution of the structures within the moving mass and the erodible layer are still to be described in detail (Hungr and Evans, 2004; Crosta et al., 1992, 2006, 2009, 2011; Dufresne et al., 2010; Mangeney et al., 2010) and modeling results (Crosta et al., 2006, 2009, 2011; Mangeney et al., 2010).
We present some of the results from a campaign of laboratory experiments aimed at studying the evolution of a granular flow at the impact with and during the successive spreading over a cohesionless erodible layer. We performed these test to study the processes and to collect data and evidences to compare them with the results of numerical simulations and to verify capabilities of numerical codes.
The laboratory setup consists of an inclined slope and an horizontal sector where release and transport, and deposition take place, respectively. Materials used for the tests are: a uniform rounded siliceous sand (Hostun sand; 0.125-0.5 mm) commonly adopted in lab tests because free of scale effects, and a gravel made of angular elements (12 mm in ave. size). Both the materials have been tested in dry conditions.
Different slope angles have been tested (40, 45, 50, 55, 50, 66°) as well as different thicknesses of the erodible layer (0, 0.5, 1, 2 cm) and volumes of the released material (1.5, 3, 5, 9.6 liters). Tests have been monitored by means of a high speed camera and the pre- and post-failure geometries have been surveyed by means of a laser scanner. Deposit description allowed also the computation of volumes and the characterization of the different structures developed and frozen into the deposit.
Experiments allowed us to observe the extreme processes occurring during the movement and the mise en place of the deposits. In particular, we observe the formation of a clear wave-like feature developing during the movement and deposition along the flatter model sector.

Crosta G. (1992) An example of unusual complex landslide: from a rockfall to a dry granular flow. Geol. Romana, 30, 175-184
Crosta G.B., S. Imposimato, D.G. Roddeman (2006) Continuum numerical modelling of flow-like landslides. Landslides from massive rock slope failure, Evans, S.G., Scarascia Mugnozza, G., Strom, A., Hermanns, R., (eds) NATO Science Series, Earth and Environmental Sciences, 49, 211-232
Crosta, G.B., Imposimato, S., and D.G. Roddeman, (2008a) Approach to numerical modelling of long runout landslides. Hong Kong, GCO, Dec. 2007, Proc Inter. Forum on Landslide Disaster Management, 20 pp.
Crosta, G.B., Imposimato, S., and D.G. Roddeman, (2008b) Numerical modelling of entrainment/deposition in rock and debris-avalanches. Engineering Geology, 109, 1-2, 135-145.
Crosta, G. B., Imposimato, S., and D. Roddeman (2009) Numerical modeling of 2-D granular step collapse on erodible and nonerodible surface. J. Geophys. Res., 114,F03020.
Crosta, G. B., Imposimato, S., D. Roddeman, P. Frattini (2011) On controls of flow-like landslide evolution by an erodible layer. Proceedings of the Second World Landslide Forum – 3-7 October 2011, Rome
Dufresne, A., Davies, T., McSaveney, M. (2010) Influence of runout-path material on emplacement of the Round Top rock avalanche, New Zealand. Earth Surf. Proc. Land. 35, 190–201.
Hungr O, Evans SG. (2004) Entrainment of debris in rock avalanches; an analysis of a long run-out mechanism. Geological Society of America Bulletin 116(9–10): 1240–1252.
Mangeney, A., Roche, O., Hungr, O., Mangold, Faccanoni, G., and Lucas, A. , (2010). Erosion and mobility in granular collapse over sloping beds. J. Geophys. Res. - Earth Surface, 115, F03040