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Formation of levees, troughs and elevated channels by avalanches on erodible slopes[1] ANDREW EDWARDS, SYLVAIN VIROULET, University of Manchester, PETER KOKELAAR, University of Liverpool, NICO GRAY, University of Manchester — Snow avalanches are typically initiated on marginally stable slopes with a layer of fresh snow that may easily be incorporated into the avalanche. The net balance of erosion and deposition of snow determines whether an avalanche grows, starves away or propagates steadily. We present the results of small scale experiments in which particles are released on a rough inclined plane coated with a static erodible layer of the same grains. For thick static layers on steep slopes the initial avalanche grows rapidly in size by entraining grains. On shallower slopes an elevated channel forms and material is eventually brought to rest due to a greater rate of deposition than erosion. On steep slopes with thinner erodible layers it is possible to generate avalanches that have a perfect balance between erosion and deposition, leaving a constant width trough with levees. We then show, by combining Pouliquen & Forterre (2002)'s friction law with Gray & Edwards (2014)'s depth-averaged $\mu(I)$-rheology, that it is possible to develop a simple 2D shallow water-like avalanche model that qualitatively captures all of the experimental behaviours. Hence this model may have important practical implications for modeling the initiation, growth and decay of snow avalanches for hazard risk assessment.

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