Title: Tephra Flows on Cinder Cones: A Numerical Approach

Authors: Courtland, L. M. ; Thornton, A. ; Weinhart, T. ; Bokhove, I. O. ; Connor, C.

Affiliation: AA(Geology, University of South Florida, Tampa, FL, USA; leah.courtland@gmail.com), AB(Mathematics, University of Twente, Enschede, Netherlands;a.r.thornton@utwente.nl), AC(Mathematics, University of Twente, Enschede, Netherlands;t.weinhart@utwente.nl), AD(Mathematics, University of Twente, Enschede, Netherlands;o.bokhove@math.utwente.nl), AE(Geology, University of South Florida, Tampa, FL, USA; cbconnor@usf.edu)

Publication: American Geophysical Union, Fall Meeting 2011, abstract #V53E-2692

Publication Date: 12/2011

Origin: AGU

Keywords: 8428 VOLCANOLOGY / Explosive volcanism, 8488 VOLCANOLOGY / Volcanic hazards and risks

Bibliographic Code: 2011AGUFM.V53E2692C

Abstract

The classic model of cinder cone growth, espoused by McGetchin et al., 1974, among others, holds that at some point during cone construction growth transfers from the in-situ placement of ballistic bombs and blocks to growth dominated by the outward migration of a talus slope. From this point on enlargement of the talus slope is considered to be the primary control on cone geometry. In order to explore the ways in which the addition of material to such a slope will instigate grain avalanching, the formation and growth of the talus slope is probed numerically through the use of discrete particle simulations. The discrete particle model Mercury MD is used to simulate the motion of tephra particles due to both external body forces, such as gravity, and also contact forces, such as elastic and frictional forces. We investigate the depth and area of the resulting flows, and the subtleties of the geometrical evolution of the cone as a whole.