AOGS 2005

Numerical simulations of gravity flows: topographic confinements and flow properties

H. MIYAMOTO[1], G. MITRI[2], A.P. SHOWMAN[2], J.M. DOHM[3], and D. A. CROWN[4]

[1]*Department of Geosystem Engineering, University of Tokyo, Tokyo, Japan*
[2]*Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ*
[3]*Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ*
[4]*Planetary Science Institute, Tucson, Arizona, USA*

The emplacements of gravity flows are now widely modeled in multiple dimensions. One of the biggest advantages of a numerical simulation of a gravity flow is that it can include topography data as a boundary condition, and thus calculate a flow over topography. This becomes important since (1) interactions of a flow and the base topography, such as overall flow shapes, flow paths, bifurcations, and reconvergences of flows can be naturally reproduced, and (2) calculated extent of the emplacement can directly be compared with geological and geomorphological observations. These, on the other hand, mean that the effect of the topographic confinement on the flow morphology is quite useful in estimating both flow properties and flow emplacement style. Estimating these essential parameters becomes important for historic flows, whose emplacement was not observed, or those appeared on the area, whose accessibility is largely limited, such as in remote area from cities and on extraterrestrial planets. In this talk, we will discuss the applicability of the topographic confinement as a possible technique to estimate flow parameters by presenting some of our recent simulation results including cataclysmic floods of Missoula, pahoehoe flows in Hawaii, aa lava flows in Alaska, and putative ice flows on Europa.

Keywords: topographic confinements; lava flow; cataclysmic flood; ice flow