

SPH simulations of field explosion experiments

Toshiko Takata[1]; Akio Goto[2]; Mie Ichihara[3]; Hiromitsu Taniguchi[2]

[1] Geology, Miyagi U. Edu.; [2] CNEAS, Tohoku Univ; [3] ERI, U. Tokyo

It is predicted that volcanic explosions change shapes of mountains and surrounding areas are suffered from that disaster. However, it is difficult to predict collapse of mountain sides due to volcanic explosions in detail. Taniguchi et al.(2003) conducted field explosion experiments and they related the explosion conditions to the resultant surface phenomena. In particular, crater diameters and the explosive features (such as, aspect ratio of explosive clouds) are scaled by the energy amount and the depth of explosion (Goto et al. 2001, Ohba et al. ,2002). It may be able to scale to real volcanic eruptions. However, it is impossible to conduct the real scale of volcanic eruption and only predictions are available.

In order to confirm predictions, we performed numerical simulations in order to simulate volcanic eruptions and realize the propagation of shock waves in mountains, collapse of mountain sides, and crater formations.

SPH (Smoothed Particle Hydrodynamics) code of fully Lagrangian method is utilized. It was employed to simulate impact phenomena of meteoroids on planetary surfaces. In this time, energy source is allocated in some depth of semi-infinite target and development of high energy regions are traced as a function of time. Total amount of energies and depths of the energy source are varied and then, crater diameters and explosive feature are examined.

As a results, it is confirmed that deeper the depths of energy source become, smaller the crater diameters do. The size of the crater is also correlated to the total amount of energy. Tendencies of these correlations are similar to results of field explosions. Variations of aspect ratios of explosive clouds are also confirmed.

Hereafter, considerations of EOS and parallelization of the code are necessary to expand the usage of the code.