寄　書

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噴煙映像を用いた火山灰噴出量の推定
—浅間火山2003年2月6日噴火の噴煙解析—

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Evaluation of Total Ejected Ash in Volcanic Clouds Using Video Records: Application to the Eruption of Asama Volcano, Japan, on February 6, 2003

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From February to April 2003, four small eruptions occurred in Asama volcano, central Japan. During these eruptions, movements of volcanic clouds were automatically recorded by video cameras. Based on these camera records, we studied the features of ascent processes of volcanic clouds. The volcanic cloud on 6 February 2003 had mostly isolated symmetric shape and expanded linearly with height as it ascended. The squares of heights from virtual origin are proportional to time. These features are consistent with the characters of a thermal, which is well known from dimension analyses and experiments.

To evaluate the masses of ejected ash we developed a simple model for volcanic clouds based on thermal assumption, and described the ascent velocity as a function of mean temperature and mass of ash in a volcanic cloud. In this model, a volcanic cloud is composed of ash and ideal gas, driven only by buoyancy. Any fall-out of particles was neglected. We compared the model with the video records of the volcanic cloud on 6 February 2003, and deduced that the volcanic cloud had less than about 400 ton of ash.

We found new vents at the bottom of the main crater. Volume of the most prominent vent is comparable with the ash volume derived from our model. Chemical compositions of the products resemble those of Maekake stage, the youngest stage of Asama volcano, suggesting that the ash were derived from the shallow part of the volcanic edifice. It is interpreted that the small explosion occurred at the shallow part beneath the main crater. We propose that high temperature of ejecta was responsible for the formation of unusual volcanic cloud.

Key words: Asama volcano, thermal, volcanic cloud, camera recordings, mass of ash

1. はじめに

浅間火山では，2003年2月から4月にかけて計4回の噴火が発生した．これらの噴火は，同火山で頻繁にマグマ噴火が発生していた1980年代以前（例えば，下鶴・他，1975）よりも遥かに規模が小さかったが，一連の噴火に先立ち，地震の群発や噴気量の増大，火口底温度上昇など様々な異常が観測されていた（例えば，気象庁，2003a）．小噴火が頻発した後で大規模なプリニー式噴火が発生した北海道駒ヶ岳の例（例えば，中川・他，2001）からも明らかなように，今回の小噴火の特徴を定量的に把握し，発生機構を明らかにすることは，今後の浅間火山の活動を予測する上で重要である．

噴火を定量的に記述する重要なパラメータのひとつとして火山灰噴出量が挙げられ，一般に降灰地域における

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