

## Forming mechanism of Taiheizan pyroclastic flow: Block and ash flow generated from eruption column collapse

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Taiheizan pyroclastic flow erupted from Sambe volcano, southwestern Japan, 3600 years ago. The pyroclastic flow was regarded as a block and ash flow because of non-vesiculated essential fragments and its monolithologic facies. However Taiheizan pyroclastic-flow deposit is composed of fine ash and smaller blocks compare with 1991-1995 block-and-ash-flows of Unzen volcano originated. In this work, we examine that the Taiheizan pyroclastic flow was not formed by block and ash flow from lava dome collapse, but by the eruption column collapse based on (1) the distribution and emplacement temperature of the deposit, (2) component analysis of the essential fragments of the deposit, and (3) fractal analysis.

(1) Taiheizan pyroclastic flow distributes around the Sambe Volcano composed of four peaks, mainly filling the valley in south, east, north and west. More than three flow units are observed. The deposit consists of non-vesiculated essential fragment and matrix. The emplacement temperature of Taiheizan pyroclastic flow was estimated to be higher than 590 degree C by the thermal magnetization. The high temperature emplaced Taiheizan pyroclastic-flow deposit was also recognized on the ridge near the summit of the Sambe volcano, suggesting that the settlement near the summit should be by not lava dome collapse but eruption column collapse.

(2) Although Taiheizan pyroclastic-flow deposit mainly consists of essential non-vesiculated dacite fragments, breadcrust bomb and weakly vesiculated essential fragments are included slightly. Major element compositions of 60 essential fragments were determined by an XRF method from two exposures located at south and east from the vent area. Two sample shows low K<sub>2</sub>O content, which is correspond to southern peak of Mt. Sambe, but the rest shows the same chemical component as the other peaks of Mt. Sambe, suggesting that the essential fragment did not come from nearest peak but from all peaks.

(3) Fractal dimension of the relationship between the grain size and cumulative number for Taiheizan pyroclastic-flow deposit or cumulative weight for Unzen were obtained. Fractal dimension of Taiheizan pyroclastic-flow deposit is larger than that of the Unzen. This suggests that the degree of fracturation of Taiheizan pyroclastic flow is more advanced than Unzen. Since the essential fragments of the both area are porphyritic dacite, we assume that the degree of the homogeneity are equal each other. In this case, the difference in a fractal dimension dependent on the fracture energy. Therefore, it can be considered that fracture energy is larger on Taiheizan pyroclastic-flow eruption, so that a fractal dimension is high. Generally block and ash flow deposit is considered to be formed by lava dome collapse, but highly fragmentated Taiheizan block and ash flow should be generated by the eruption column collapse.