An examination of the impact of initial size distribution of volcanic ash particles on volcanic ash transport simulation in the case of Sinmoe-dake eruption 2011

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The volcanic ash cloud appeared during the eruption event at Mt. Shinmoe-dake from 26 to 27 January 2011 was simulated using Japan Meteorological Agency Non-Hydrostatic Model (JMA-NHM), which is coupled with a volcanic ash source model, to validate the model performance, based on satellite observation data. The source model was made up of a function of the height at which ash particles are released and the size of particle, based on Suzuki, (1983) and Shimbori et al., (2010). Applying the model to the volcanic ash transport simulation, reproducibility of the observed ash cloud was insufficient, because the model assumes a vertical eruption column that is not affected by cross wind and a simple air velocity profile in the eruption column, while the actual eruption event occurred in the environment with vertically sheared cross wind and the air flow in eruption column is not so simple as assumed in the model. To overcome the shortcomings of the model, new source model was developed based on the three-dimensional direct numerical simulation of a major sub-Plinian eruption during the period at Mt. Shinmoe-dake (Suzuki and Koyaguchi, 2013). The new model releases more ash particles in the middle troposphere than the usual model. This brought improvement of the reproducibility of the ash cloud.
For more improvement of the simulation result, the authors are examining the sensitivity of the resulted ash cloud distribution to another factor prescribed in the model; the initial size distribution of ash particles. As a preliminary result, it is found that doubling the variance of log-normal size distribution of ash particles improves the resulted ash cloud distribution. A systematic examination and its results on the impact of the initial size distribution on the ash transport simulation will be presented at the meeting.
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