# Reinterpretation of wind effects on volcanic ash transport process with Hoei eruption of Mt Fuji by using unsteady numerical simulation

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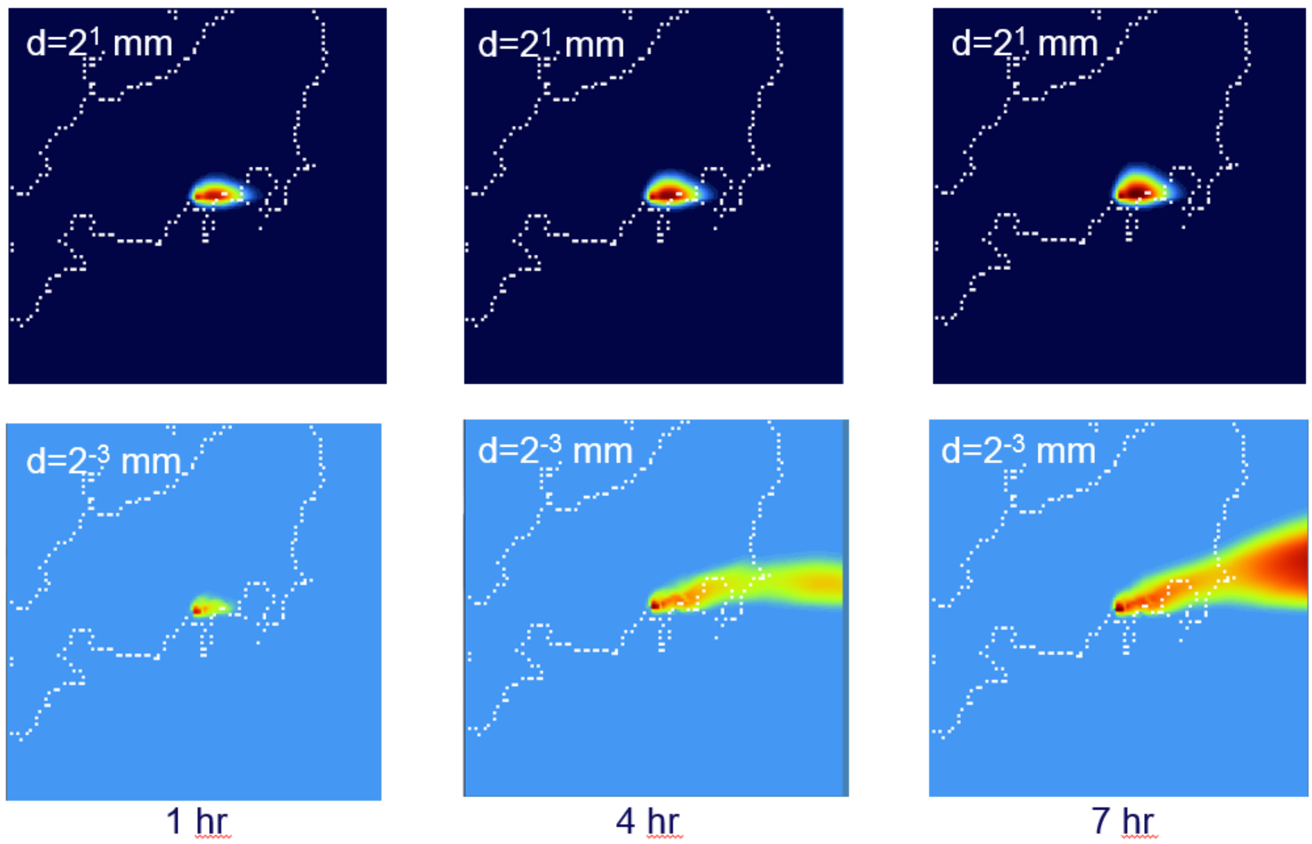
We performed numerical simulations for transport processes of volcanic ash with eruptions of Mt Fuji, especially paying attention to the effects of unsteady wind fields.
We used a three-dimensional Eulerian model for transport and deposition of volcanic ashes, FALL3D (Costa et al. 2006) with the volcanic inputs, corresponding to the stage1 of AD1707 Hoei eruption of Mt Fuji, i.e., the eruption column height is approximately 20 km with the erupted mass of 10^11 - 10^12 kg during 6 hr (Miyaji et al. 2011, Magill et al. 2015). The meteorological inputs were set with the 53 years reanalysis meteorological dataset, CRIEPI-RCM-Era2, which has temporal- and spatial-resolutions of 1 hr and 5km, and a weather forecasting and analysis system, NuWFAS (Hashimoto et al. 2011, Hashimoto et al. 2013). The typical wind profiles in the vertical direction at the vent for winter (DJF) were selected with clustering analysis of CRIEPI-RCM-Era2, and the four dimensional meteorological dataset were reproduced with NuWFAS.
After confirming the agreement of tephra thickness isopaches between the present numerical simulation and previous studies (e.g. Miyaji 1984, Miyaji et al. 2011, Magill et al. 2015), we discussed temporal change in the ground concentration and the deposition of volcanic ash. The increase in concentration at Tokyo was observed after 2 hr of the eruption, which also agree well with previous studies (Miyaji et al. 2011, Magill et al. 2015), indicating that the traveling time of volcanic ash from Mt. Fuji mainly depends on the wind speed in the atmospheric boundary layer (ABL). The temporal change in wind direction in the ABL yielded the skewed p.d.f. (probability density functions) of grains size along the principal axis of the tephra thickness isopaches, which is reported by previous studies (Miyaji 1984, Ui et al. 2002). This was because that the traveling time of the volcanic ash also depends on the diameter of ash (Fig. time-series of tephra thickness isopaches for diameter class of 2^1 and 2^(-3) mm); the setting velocities are functions of the diameter.
More details will be presented in the presentation, and we believe that our study oust be helpful to comprehend essential characteristics of volcanic ash transport process with AD1707 Hoei eruption.

Keywords: tephra, ash transport- and deposition-model, numerical weather prediction, grain size distribution, isopach map


d=2^1 mm
d=2^1 mm
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1 hr
4 hr
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