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Data analysis of meteorology and sulfur oxides observed at Mt. Fuji during summer seasons

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We have concerned sulfuric acid and the sulfate in the atmosphere, which are products of sulfur dioxide (SO₂) oxidations, among pollutants from the continental sources, and have carried out the observational research by using Mt. Fuji (Igarashi et al. 2004; 2006; Igarashi et al., JAAST2008). The sulfate aerosol is mostly a minute liquid droplet scattering the solar radiation and working as cloud condensation nuclei, so it is deeply involved in the climate change. Also, sulfate has impacts on the ecosystem as acidic matter. Therefore, SO₂ is very important pre-cursor gas to be monitored, but many of the observations are done within the atmospheric boundary layer = surface of the earth. In order to obtain the vertical distribution information, aircraft or mountain observations have been carried out. However, the continuous observation of the SO₂ in the atmosphere over East Asia is still scarce. The long-term monitoring data at high mountains are valuable for the clarification of various processes in the atmosphere as well as for the model verification.

It was revealed by previous work (Igarashi et al., 2004; 2006) that the SO₂ concentration at the summit of Mt. Fuji didn't show a diurnal variability, being characterized by the long-range transport of pollution that arises from the change of the weather pattern of the cyclonic scale. Such transport events were found a lot in winter but not in summer. However, concerning the observed interesting phenomena in summer remains unclear; full analysis has not been given yet (Igarashi et al., JAAST2008). In order to achieve a further analysis of the temporal-spatial variation of the mountain air quality during summer, simulation of the atmospheric chemical fields along with meteorology in the Mt. Fuji surrounding area is given in the present study (association with a poster in the same session; Igarashi, Katata, and Kajino). Targets are diurnal variation of SO₂ at Nana-gou Hachi-shaku (7.8-gou; about 3,200masl) during early August 2007 and trans-boundary pollution events in late August 2007. A chemical transport model, WRF-Chem, which is able to express precise geographical features of/around Mt. Fuji was used to simulate the regional as well as local meteorological and chemical fields. Detailed analysis with the comparison between simulation and observation will be given in the present work.

Keywords: Mountain meteorology, Mt. Fuji, Meteorological observation, Sulfur oxides, Summer season, WRF-chem