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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of Chinese SO_2 emissions on submicron aerosol concentration at Mt. Tateyama, Japan" *by* K. Osada et al.

Anonymous Referee #3

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The paper 'Impact of Chinese SO2 emissions on submicron aerosol concentration at Mt. Tateyama, Japan' explains seasonally resolved trends of SO4(2-) and mass concentration at the Japanese Tateyama mountain observatory with Chinese SO2 emission developments. The observatory represents free-tropospheric conditions during nighttime and is affected by seasonally changing airmass transport from China. Transport, chemical transformation and the relative Chinese contribution to SO4(2-) immisions at Mt. Tateyama are simulated with a 3-D regional-scale CTM covering the east-Asian domain. The paper is topical, well written and reaches substantial novel conclusions about pollution export from one of the world's largest and most emerging source regions. I support publication in ACP with only few comments to be taken into account. Particularly the seasonality of the trend analysis could be discussed in more detail.

Emission inventories: the use of climatological values for the biomass burning emissions and the only annual resolution of the REAS database may limit the significance of the simulation results but I'm not sure whether the use of novel products like e.g. GFEDv2(http://ess1.ess.uci.edu/∼jranders/data/GFED2/readme.pdf), GEIA for SO2 could yield a closer agreement with the stations observations. Admittedly, the effort of implementing new databases into the model system would be beyond the scope of this paper. Mayby the authors could comment on respective future plans.

p 16532, line 6ff

Can you estimate how the SO4(2-) immision (and it's seasonal contribution) at Mt. Tateyama in the CTM would change if increasing Chinese SO2 emission are anticipated instead of keeping them at the 2005 level? Is it likely that Chinese emission control is that effective during the recent years to suggest your approach?

P16533, line 5ff:

How stable are the general weather situations during the flow regimes in early summer and in winter. What could be the relative contribution of trajectories in summer reaching back to the fire regions?

P16534, l 677:

Can it be excluded that the percipitation rate and its seasonality at Mt. Tateyama deviates significantly from that the Kamiichi station, e.g. due to different orograpic flow conditions? Can the model uncertainty due to sub-grid scale scavenging be estimated?

Fig 4. and correcponding discussion of trends:

Add vertical axis annotation μg/m^3. The linear trend analysis does not take into account the seemly levelling-off of the observed particle volume in the recent years in spite of the presumably increased emissions. Possible contributions from sources other than China. As the model does not know emission seasonality: what trend does it produce for the other periods selected in Fig 4?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16527, 2009.