Atmos. Chem. Phys. Discuss., 7, S2453–S2455, 2007
www.atmos-chem-phys-discuss.net/7/S2453/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Nitrate aerosols today and in 2030: importance relative to other aerosol species and tropospheric ozone" *by* S. E. Bauer et al.

X. Ma (Referee)

Xiaoyan.Ma@ec.gc.ca

Received and published: 18 June 2007

Interactive comment on "Nitrate aerosols today and in 2030: importance relative to other aerosol species and tropospheric ozone" by Bauer et al.

This paper studies the nitrate and its change in the current and future climate conditions. The model and validation is discussed in detail, and appears to be sound. The sensitivity experiments show some very interesting results. It would be good if the authors could give more explanations and discussions about these results. I recommend this paper should be published, but there are several issues that should be clarified.

Specific comments:

P5560, line 19-20: many models still use the prescribed DMS concentrations, parameterizion of DMS in this study is an asset, could you show more details on the difference of sulfate between this parameterization and prescribed one, e.g. Kettle's data set?

P.5560, line 21-29: The radiative effect of nitrate and sulfate in coarse mode are not taken into account, the paper mentioned that is due to the coarse nitrate are attached to mineral dust particles. As shown in Fig.2. The coarse mode particles contribute significantly to the total concentrations. The optical properties of mineral dust and nitrate particles differ considerably. So the thing that how much coarse mode nitrate are attached to mineral dust while how much are remained as themselves (nitrate) will make a difference to radiative forcing.

p.5563, line13-19 and Fig.5: These results give a strong indication that including heterogeneous dust chemistry clearly improves the simulated nitrate concentrations. I am just curious that how important this effect to sulfate is? Since many models haven't included this effect yet.

p.5563, line 19-28: This paper suggests that there may be a general bias in Asian emissions. I agree with it. However, it is also noticed that the model do have a good agreement in East Asia (see the middle and lower panel in Fig.2). The big difference is only in some areas off the coast of China, is it possible that transport scheme contribute at least part of this?

p.5564, line 25: how about the humidity? Also, it would be good to show how wind speed change in the future climate condition as mineral dust and sea salt are strongly dependent on it.

p.5568, line 1-6 and Fig.9: it is a bit surprising that the change of ammonia emission have no impact on the sulfate in NH3. I assume that this happens when there are only limited SO2 emissions; otherwise the NH3 is more likely to produce ammonia-sulfate instead of ammonia-nitrate.

ACPD

7, S2453–S2455, 2007

p.5586, Fig.3: can you explain why the modeled ammonium-nitrate concentrations in winter are systematically higher compared to the observed in most of locations? How about the precursor emissions in winter?

p.5592, Fig.9: in CTR-00 (yellow one), compared to CTR-30, the change of SO2 and NOx are rather small, why the changes of sulfate (SO4) and nitrate (NO3) are rather large?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5553, 2007.