Atmos. Chem. Phys. Discuss., 8, S1702–S1703, 2008
www.atmos-chem-phys-discuss.net/8/S1702/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of sea-salt emissions and heterogeneous chemistry in theair quality of polluted coastal areas" *by* E. Athanasopoulou et al.

Anonymous Referee #3

Received and published: 17 April 2008

The authors have investigated the impact of sea salt aerosols emissions and their heterogeneous interactions with gas-phase acids (H_2SO_4 and HNO_3) and NH_3 on PM2.5 and PM10 mass with nested 3-D model simulations over Greece, with a focus on the areas with an extended Archipelago.

The manuscript is generally well-written, but some parts need additional clarification. It could be accepted for publication in ACP if the issues noted below are adequately addressed:

Page 3812: line 18: The threshold diameter in the hybrid model of 2.5 um seems too high, which could introduce appreciable errors in the predicted distribution of nitrate.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

This diameter was typically set at 1 um in some of the previous studies. A discussion on the sensitivity of the results to the threshold diameter is warranted to ensure that the errors due to this assumption are acceptable.

Page 3816, line 14: Mg^{+} should be Mg^{2+}, Ca^{+} should be Ca^{2+} and K^{-} should be K^{+}. Also, what are the percentages of Ca^{2+}, K^{+}, and Br^{-}. Finally, give Na^{+} also in percentage to be consistent.

Page 3821, line 4: The equilibrium constant is a function of temperature only. I am not sure I understand how the presence of additional salts could reduce it?

Page 3821, section 5.3: This section is very confusing.

Line 14: If chloride is mainly displaced by H_2SO_4 in the bulk equilibrium approach, then why is there little production of sulfates? All H_2SO_4 that is condensed would lead to production of sulfates, whether it is calculated by dynamic mass transfer or by equilibrium approach.

Line 15: Why does the rest of the NaCl remain inert? Why doesn't some if it react with HNO_3 to produce $NaNO_3$ and HCl(g) as dictated by thermodynamic equilibrium?

Line 16: I fail to understand how low concentrations of HCl(g) in the bulk equilibrium solution leads to large underprediction in nitrate. It should the other way around - less displacement of chloride by nitrate leads to low concentration of HCl(g).

As noted above, a discussion on the sensitivity of the results to the threshold diameter is needed in addition to sensitivity to the bulk equilibrium approach.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3807, 2008.

ACPD

8, S1702–S1703, 2008

Interactive Comment