

Interactive comment on “Impact of mineral dust on nitrate, sulfate, and ozone in transpacific Asian pollution plumes” by T. D. Fairlie et al.

Anonymous Referee #2

Received and published: 9 January 2010

This paper reports on the results of the 3D global modeling of transpacific transport of mineral dust and its atmospheric chemistry. Modeling results are compared with field observations from the INTEX-B research flights over the Northeast Pacific. Different types of mineral dust constituents and their atmospheric transformations have been accounted, presented and discussed. The analysis is focused to acidification of dust and formation of nitrates and sulfates during the transported air plume. Consistent with previous studies, modeling results compared with the field data indicate overestimation of gas-phase HNO₃ that cannot be accounted by uptake on dust. Therefore, the question of what might be an additional sink of HNO₃ remains open. The subject and data presented in the manuscript merit publication in ACP. The manuscript can be published after the authors will have chance to address a number of issues listed below.

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1. I second anonymous reviewer#1 that brief discussion on the originality of the presented work as compared to previous modeling studies of mineral dust needs to be added to the introduction.
2. Brief discussion of the airborne measurements needs to be presented to indicate what method/s and at what time resolution were used for chemical speciation of dust and gas species discussed in the manuscript.
3. Figs 4a and 4b. It is not clear what does each point mean. Is it the time averaged data or data averaged over specific geographic area? Also, it is hard to distinguish between blue and black points. Use of colors with better contrast between them is recommended.
4. page 24486, lines 12-14: I'm wondering if the discussed bias can be explained by formation of NH₄Cl?
5. page 24490, 23-24: the statement is not correct. Uptake coefficient of 0.1 was reported in laboratory experiments for uptake of nitric acid on calcium carbonate, which is only a fraction of mineral dust. Therefore, use of smaller coefficient for dust is not in conflict with laboratory measurements.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24477, 2009.

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