**Atmospheric
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Comment

Interactive comment on "**Mixing of Asian mineral dust with anthropogenic pollutants and its impact on regional atmospheric environmental and oceanic biogeochemical cycles over East Asia: a model case study of a super-duststorm in March 2010**" *by* J. Li et al.

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This paper has examined the mixing degree between mineral dust and anthropogenic pollutants, and the associated regional atmospheric environmental and oceanic bio- geochemical cycles in the duststorm event using a NAQPMS model. The model re- sults are validated with satellite and ground observations, which is comparable each other. Consequently, the authors suggested that the mixing processes result in in-

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creasingly polluted particles, which has a considerable impact on the regional-scale atmospheric composition and oceanic biogeochemical cycle. While the paper is well organized, some aspects of the paper are not clear. For potential publication in ACP, some answers to following comments need to be required.

Comments:

1. In the paper, the authors used several observational data (e.g., MODIS, API, Lidar) to validate the model performance. It would be preferable to have a section that describes all data used. 2. The authors estimated aerosol optical depth (AOD) by the converted method proposed in Malm et al. (2000). It is questionable how exact or uncertain the method to estimate AOD. 3. In Fig. 1, there is no a value for weighting factor over other regions except the Gobi desert. Isn't there dust loading in the regions? Additionally, it is necessary to describe weighting factor determined by soil or land type. For example, what is the range of weighting factor? What is a meaning for its small or large values? 4. The authors explained that the reason for significantly overestimated model result of fine particles in Shanghai is due to locally re-suspended dust particles by strong wind. I thought it would be required to show wind fields. 5. According to the paper, it is agreeable that the overall patterns are well matched between model results and observations. However, it is also important to determine whether quantitative range between the two values. 6. In the Fig. 8, is there any reason for the high concentration of DNO_3/NO_3 over the Gobi desert with relatively low RH conditions? 7. In section 4.2, due to the mixing between dust and anthropogenic aerosols, the concentration of HNO_3, So_2, and O_3 is decreased. What do the authors think about the meaning of these decreasing trends in view of atmosphere in the region? 8. In the figures showing map (e.g., Figs. 2, 4, 7, 8, 9, and 10), the size of characters denoted on the x- and y-axis is somewhat small.

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