Atmos. Chem. Phys. Discuss., 11, C211–C214, 2011
www.atmos-chem-phys-discuss.net/11/C211/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Role of sea surface temperature responses in simulation of the climatic effect of mineral dust aerosol" *by* X. Yue et al.

X. Yue et al.

hongliao@mail.iap.ac.cn

Received and published: 14 February 2011

Response to the comments on "Role of sea surface temperature responses in simulation of the climatic effect of mineral dust aerosol"of referee 1

For major comments:

1. We have cited the above mentioned latest publications in the revised manuscript.

2. As you point out, the maximum $\triangle$SAT in North Africa (Figs. 4a and 4e) does not match the location of the largest reduction in MCA in the middle latitudes. The reason is that the change in MCA is only one of many factors that can influence the changes

in $\triangle$SAT. Over central and East Asia, although the maximum reductions in MCA are predicted, lower burdens of dust there (relative to the burdens over the Sahara Desert) do not lead to as strong SW and LW warming as the warming by dust over northern Africa (10W-30E, 15N-30N).

3. We agree with the reviewer that the omission of aerosol indirect effect is one of the uncertainties in our study and we have discussed this in the last paragraph of the manuscript with the references mentioned by the reviewer cited "The indirect of dust aerosol is not considered in this work. Observations have shown that mineral dust can interact with cloud water droplets and influence the formation, lifetime, and optical properties of clouds (Sassen, 2002; Lohmann and Diehl, 2006; Huang et al., 2006a), leading to changes in cloud RF and precipitation (Huang et al., 2006b; Wang et al., 2010). Further consideration of dust indirect is the subject of our future study". As for semi-direct effect of dust (evaporation of clouds by dust absorption), it is considered in this work since the changes in clouds because of dust LW and SW forcing are considered in the model as shown by our Figure 6.

4. This is a good suggestion. We analyzed the dust-induced changes in SAT during spring (MAM) period for four different experiments. The results are shown as Fig.1 of this response, which are similar to the annual mean cases shown in the manuscript. Based on this comment, we further investigated dust-induced SAT changes in different seasons (New Table 3 in the revised manuscript). In all seasons, dust-induced changes in SAT are negative with SST responses whereas positive in simulations with fixed SST, which agree with our conclusions based on annual mean SAT. With SST responses, the dust-induced cooling are stronger in SON and DJF than that in MAM.

For minor comments:

5. We have added the full name of SSTs at the first time it appears in the text and removed the repetition at the wrong place.

6. The full name of SAT is given when SAT appears the first time in the text (except

Abstract).

7. We have removed all the repetitions in the explanation of 'net' in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 1121, 2011.

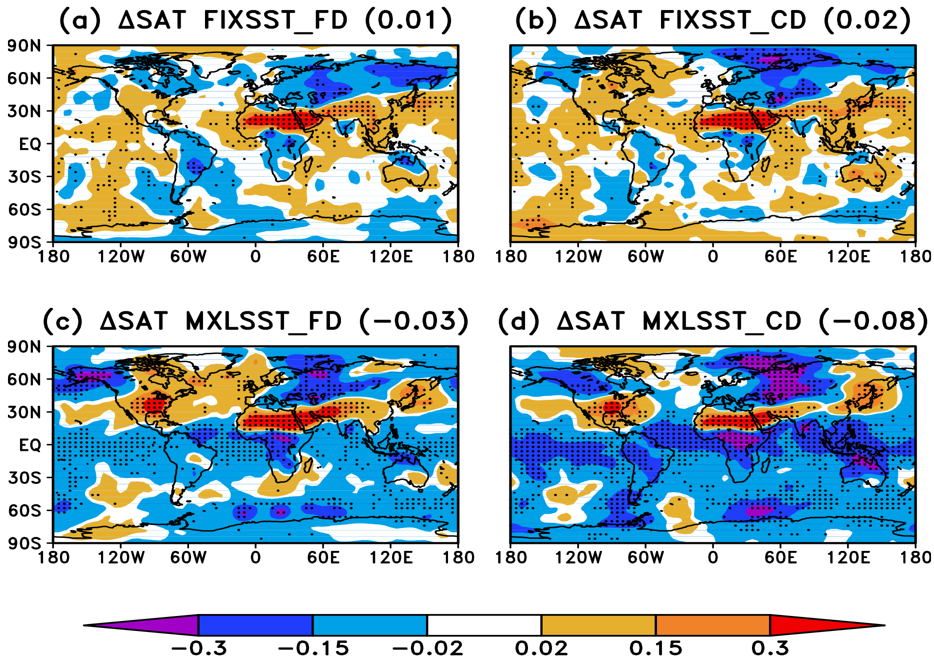

Fig. 1. Simulated dust-induced changes in SAT in spring (MAM) for four different experiments. Units: K.