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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dust aerosol effect on semi-arid climate over Northwest China detected from A-Train satellite measurements" *by* J. Huang et al.

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We are very appreciative of the reviewer's thorough review of the paper and recommend to "accepting". Our point-by-point responses to the comments made by the reviewers are as following.

-The major contribution of this paper is to study the impact of dust aerosols on the semi-arid climate of Northwest China by comparing aerosol and cloud properties over semi-arid regions between China and United States, using surface and A-Train satellite observations during active dust event seasons. They found that the local anthropogenic dust aerosols due to human activity, such as agriculture and industrial activity,

accounts for 44% of the average absorbing aerosol index and for 77% of the liquid cloud water path difference between the China and US semi-arid regions. It suggests that the local anthropogenic absorbing aerosols also make some contribution to the regional interaction among aerosol-cloud-radiation-precipitation processes and need to be further investigated. In general, I found that the paper is well written and is appropriate for ACP readers. I recommend the paper for publication with addressing the minor comments listed below.

Specific Comments: -Page 12466, line 23: 'occured'→ 'occurred',

The "occured" has been corrected by "occurred" in the revision by following reviewer's suggestion.

-Page 12467, line 3: "changes in the climate" → "climate changes",

The "changes in the climate" has been corrected by "climate changes" in the revision by following reviewer's suggestion.

-Page 12467, line 6: "large quantities"→ "large amount",

The "large quantities" has been corrected by "large amount" in the revision by following reviewer's suggestion.

-Page 12467, line7: Author should explain whether the FD and BD have the similar visibility less than 10 km.

FD and BD do have the similar visibility less than 10km. There are two important differences between FD and BD, one is the wind speed of BD must larger than FD, the other is the suspending particle size in FD is smaller than that of BD.

-Page 12467, line 6: "High winds" → "strong winds",

The "High winds" has been corrected by "Strong winds" in the revision by following reviewer's suggestion.

-Page 12468, line 19: Among the string ‘Clouds and Clouds and Earth’s Radiant Energy Experiment (CERES)’, the first ‘Clouds and ’ should be deleted.

The first “Clouds and” has been deleted in the revision by following reviewer’s suggestion.

-Page 12471, line 7: "The thickness of the saturated layer "should be explained in the text as its first appearance.

We have added the definition of "The thickness of the saturated layer" in the text.

-Page 12472, line 4: “The climate type” → “the type of climate”,

The “The climate type” has been corrected by “the type of climate” in the revision by following reviewer’s suggestion.

-Page 12472, line 10: “northwestern” → “the northwestern”,

The “northwestern” has been corrected by “the northwestern” in the revision by following reviewer’s suggestion.

-Page 12473, line 2: “the meteorological” → “meteorological”,

The “the meteorological” has been corrected by “meteorological” in the revision by following reviewer’s suggestion.

-Page 12476, line 25: ‘from late spring and the later summer’ should be replace as ‘during the late spring and the late summer’

The “from late spring and the later summer” has been corrected by “during the late spring and the late summer” in the revision by following reviewer’s suggestion.

-Page 12488, Fig. 4: Author should explain whether Fig.4 is for the spring only or for the whole year.

Fig.4 is just for the spring, which is consistent with Fig.5∼Fig.11.

-Page 12476, line 2: “the meteorological” → “meteorological”

The “the meteorological” has been corrected by “meteorological” in the revision by following reviewer’s suggestion.

-Page 12476, line 4-6: How can the mean RH be 25.3% when there are so many thick saturated layers with RH>85%?

The RH was observed at 1.5m above ground level, while the bottom of the saturated layers are approximately 2km above ground level, as calculated from the NCEP data. In general, the water vapor above 2km is transported from other regions by weather system. So, the mean RH be 25.3% when there are so many thick saturated layers with RH>85%.

-Page 12476, line13: Author should explain how is the "saturated layers" defined exactly.

The thickness of the saturated layer used in this paper is that of contiguous layers having NCEP RH > 85%. The thickness of the saturated layer is derived from NCEP humidity and geopotential height data. Additional explanation is given in the paper.

-Page 12478, line 2: “the evaporation” → “evaporation”,

The “the evaporation” has been corrected by “evaporation” in the revision by following reviewer’s suggestion.

-Page 12479, line 2: “aerosol” → “aerosols”

The “aerosol” has been corrected by “aerosols” in the revision by following reviewer’s suggestion.

-Page 12479, line 7: “Jing Su et al.”→ “Su et al.”,

The editor said that he/she did not change the Jing Su reference, because the citation i inserted is the official one. He/She also adapted this reference in the text. It is now

"Jing Su et al.".

-Page 12479, line 13: The sentence reads not correct. I would suggest to change it to “The results presented in this paper are based on satellite observations, which further confirm the semi-direct effect of Asian dust,”

The whole sentence is “The results presented in this paper are based on satellite observations and further confirm the semi-direct effect of Asian dust, which includes not only transported natural dust, but also local anthropogenic aerosols.”

-Page 12482, line 4: ‘51 (23) 2913–2925, 2006’ should be replace as ‘51 (23), 2913–2925, 2006’

The “51 (23) 2913–2925, 2006” has been corrected by “51 (23), 2913–2925, 2006” in the revision by following reviewer’s suggestion.

-Page 12483, line 13: ‘D,’ should be deleted.

The “D” has been deleted in the revision by following reviewer’s suggestion.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 12465, 2010.