

## **Response to reviewers' comments to ACP-2012-539 by Nie et al.**

Dear Editor,

We have revised the manuscript in response to the comments/suggestions of referee #4. The itemized replies are listed below. The revised texts are highlighted in blue in the manuscript.

### **Anonymous Referee #4**

Received and published: 10 September 2012

General comments: This paper compared the concentrations and size distributions of inorganic ions in dust storm aerosols collected at Mt. Heng, southern China with those reported by another research group for the same dust storm event at Mt. Hua, an upwind site in central China. Based on the comparison the authors discussed the chemical evolution of aerosols during the dust transport. Many studies have reported the measurements on Asian dust, but most of them have performed on the ground surface and very few conducted such an observation in southern China. This paper reported a sharp increase in HONO concentration during the dust event, and ascribed it to the TiO<sub>2</sub>-photolysis, which is interesting to me. The topic raised in this paper is important for understanding the impact of Asian dust on the downwind atmospheric chemistry. The paper presents a nice data and is organized well. However, the authors only focused on the dust event without sufficient discussion on the non-event aerosols. It is necessary to give the data including concentrations and size distributions about the non-event particles, and then make a comparison with those in the event. I believe such a comparison is essential for readers to understand the difference of aerosol chemistry caused by the dust storm event. Therefore, I think this paper could be accepted after adding more discussion about the non-event aerosols. More detailed comments given below.

**Response:** we have added a paragraph to compare the aerosol characters in the dust and non-dust periods (also see table 1) and added a reference of a previous study (Gao et al.,2012) which gives more detailed analysis of the particle size distribution for the

non-dust periods during our campaign at Mt. Heng.

*“Gao, X., Xue, L., Wang, X., Wang, T., Yuan, C., Gao, R., Zhou, Y., Nie, W., Zhang, Q., and Wang, W.: Aerosol ionic components at Mt. Heng in central southern China: Abundances, size distribution, and impacts of long-range transport, Science of The Total Environment, 433, 498-506, 10.1016/j.scitotenv.2012.06.095, 2012.”*

Detailed comments: 1. Page 19138, line 15-18, authors mentioned the higher temperature and humidity in southern China could result in a different impact on dust. I could not find any information on temperature and humidity. I think the meteorological parameters during the sampling periods should be given.

Response: we have added the temperature and humidity in Fig. 2 in the revised manuscript.

2. Page 19141, line 7-10, the experimental section, what are the cutoff sizes of the MOUDI sampler?

Response: We have added the information on the cutoff sizes of MOUDI in section 2.2 in the revised manuscript.

3. Page 19141-19142, section 3.1, how about the particle level during the non-event period? Is there any difference of aerosol composition and size distribution between Mt. Heng and Mt. Hua during the nonevent. I think the non-event data are very helpful for readers to understand the impact of dust storm on the downstream aerosols.

Response: we have added a paragraph to compare the aerosol characters in the dust and non-dust periods.

4. Page 19141, line 22, the reference should be Wang et al ,2011 not Wang et al, 2010.

Response: changed.

5. Page 19142, line 14, should be Figure 5 not Figure 4.

Response: changed.

6. Page 19145, line 17-24, here the nitrite concentration is TSP, PM2.5, or the sum of concentration on each stage? Please clarify.

Response: Have added the information of “in TSP” in the revised manuscript.

7. Page 19146, line 24-27, here I could not find any data of PE in Table 1. 8. Page 19147, line 18, where is Table 3, it should be Table 1. 9.

Response: Have changed and added the related information.

8. Section 3.3, is there any evidence or reference to show that Ti in Gobi dust particles exists in chemical form of TiO<sub>2</sub>?

Response: A recent published paper on *Chemical Reviews* has summarized TiO<sub>2</sub> distribution in different source regions. We have cited this new reference in the revised manuscript.

“Chen, H., Nanayakkara, C. E., and Grassian, V. H.: Titanium Dioxide Photocatalysis in Atmospheric Chemistry, *Chemical Reviews*, 10.1021/cr3002092, 2012, in press”