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Interactive comment on “Asian dust storm observed at a rural mountain site in Southern China: chemical evolution and heterogeneous photochemistry” by W. Nie et al.

Anonymous Referee #4

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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 TiO₂-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

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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

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. 2. Page 19141, line 7-10, the experimental section, what are the cutoff sizes of the MOUDI sampler? 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. 4. Page 19141, line 22, the reference should be Wang et al ,2011 not Wang et al, 2010. 5. Page 19142, line 14, should be Figure 5 not Figure 4. 6. Page 19145, line 17-24, here the nitrite concentration is TSP, PM2.5, or the sum of concentration on each stage? Please clarify. 7. Page19146, line 24-27, here I could not fine any data of PE in Table 1. 8. Page 19147, line 18, where is Table 3, it should be Table 1. 9. Section 3.3, is there any evidence or reference to show that Ti in Gobi dust particles exists in chemical form of TiO₂?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 19135, 2012.

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