Atmos. Chem. Phys. Discuss., 14, C5499–C5500, 2014
www.atmos-chem-phys-discuss.net/14/C5499/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evolution of aerosol chemistry in Xi'an, inland China during the dust storm period of 2013 – Part 1: Sources, chemical forms and formation mechanisms of nitrate and sulfate" *by* G. H. Wang et al.

Anonymous Referee #1

Received and published: 1 August 2014

In the current work a semi-continuous observation on aerosol chemistry in Xi'an, a mega-city near Loess Plateau, was performed by characterizing the hourly collected TSP samples during a dust storm event. Moreover, size distributions of inorganic ions, WSOC and WSON in the dust storm period were also investigated. Hourly changes in aerosol compositions including chemical forms of nitric and sulfuric salts were explored. Kinetics of nitrate and sulfate formation during the dust storm event and the post-event were discussed. Finally, the authors proposed a mechanism for the nitrate formation on the dust surface. The results of this paper are quite interesting. Their

findings on chemical forms of nitrate and sulfate in the dust particles and size distribution patterns of nitrate, sulfate and ammonium for first time revealed the infant state of atmospheric ageing process of East Asian dust in the area near the dust source regions, which is very helpful for researchers to improve their understanding on the full image of physicochemical evolution of Asian dust from the desert to the continental outflow region. The work was well designed. The organization of the paper is in good format, and related discussion is reasonable. Therefore, I believe this paper should be accepted by the journal after a minor revision. Following is the detailed comments.

1) Page 17442, line 3, of East Asian dust ageing process is better than "... of dust ageing process...". 2) Page 17444, lines1-5, can author give the specific numbers of concentrations of sulfate and nitrate in 1997 and 2012, could author give a brief explanation why sulfate has sharply decreased in the city? 3) Page 17444, line 4, gas not gases; lines 7, "...10-30% of the dust mass...", give the reference; line 8-9, should be HNO3(g), which is more accurate. 4) Page 17444, line 20-22, It's better to change as "We first investigated.... The we identified...", which is consistent with the following statements. 5) Page 17444, line 25, delete the "dust". 6) Page 17445, what is the brand of the size-segregated sampler, I think this information is important. 7) Page 17447, line 8-11, this sentence is a little bit of confusing to me. Please re-write. 8) Page 17449, line 5, should be originated not originates; line 11, anthropogenic sources not species. Page 17451, line 4, NaCl, not NaCl-. 9) Page 17452, line 7, what is the meaning of the slope 0.28, if it means the 1:1 molar ratio of NH4+ to NO3-, i.e., the value of 0.28=18/64, please clarify. 10) Figure 2b, the maximum of EC in the dust storm period is around 30 μg m-3, but in Table 1, the range is 0.0-3.2μg m-3, is this number wrong?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 17439, 2014.