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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Environmentally dependent dust chemistry of a super Asian dust storm in March 2010: observation and simulation" *by* Qiongzhen Wang et al.

Anonymous Referee #1

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Comments to the Author (General comments) In this paper, the impact of dust chemistry on regional air quality is studied deeply from a super dust storm on March 2010, especially the differences of the two paths. What's more, this study also highlight that the dust also can enhance the heterogeneous reactions, resulting high pollutions, different from the previous study that the dust has a clean effect on the local pollutants. I'm interesting to see this paper published before revised as below suggestion. (Specific comments) 1. Line 20, please reconfirm the dust storm date of "March 19-27" is right. I think it should be "March 19-23". 2. Line 124, same to the question above. 3. Line 163. How get the Chigh and Clow to calculate the C? It seems that you can derive the Ihigh and Ilow from the API grading limited value table according your description.

Can you derive the ihigh and Ilow directly from the table? 4. Figure3, please add the description of the x axis that if it is local time or UTC, it sometimes make me confused. 5. Figure4, I suggest that you can add the direction of north to south and east to west to give a clear direction of the wind. 6. Line 288, in Fig.4 there are obviously decrease of NO2 and SO2 before they increase to the maximum during 6-18 on March 19. 7. Line 389, why the number of Ca2+ in DS1 is larger than that in in DS1, although the intensity of DS1 was much stronger than DS2? 8. Line465, I suppose the ratio of "[NH4++Ca2+]/[SO42-+NO3-]" should be change into "[NH4++Ca2++Mg2+]. . ." as Fig.7 shows. 9. Line, 576, from the Fig.9d, I also see there is a high mineral aerosols center at Gobi Desert, but the satellite can't show the same phenomenon. Please explain it. 10. I would recommend the authors include and discuss these studies about dust transport over East Asia especially in March 2010 in the introduction. ïČŸ Zhao, T. L., S. L. Gong, X. Y. Zhang, et al., 2006: A Simulated Climatology of Asian Dust Aerosol and Its Trans-Pacific Transport. Part I: Mean Climate and Validation. J. Climate., 19, 88–103. doi: http://dx.doi.org/10.1175/JCLI3605.1. ïČŸ Eguchi, K., I. Uno, K. Yumimoto, et al., 2009: Trans-pacific dust transport: integrated analysis of NASA/CALIPSO and a global aerosol transport model. Atmos. Chem. Phys., 9, 3137-3145. ïČŸ Fu, X., S. X. Wang, Z. Cheng, J. Xing, B. Zhao , J. D. Wang, and J. M. Hao, 2014: Source, transport and impacts of a heavy dust event in the YangtzeRiver Delta, China, in 2011. Atmos. Chem. Phys., 14, 1239–1254. ïČŸ Huang J., T. Wang, W. Wang, Z. Li, and H. Yan, 2014: Climate effects of dust aerosols over East Asian arid and semiarid regions. J. Geophys. Res.: Atmospheres, 119, 11398-11416. ïČŸ Chen S., J. Huang, L. Kang, H. Wang, X. Ma, Y. He, T. Yuan, B. Yang, Z. Huang, and G. Zhang (2017). Emission, transport and radiative effects of mineral dust from Taklimakan and Gobi Deserts: comparison of measurements and model results. Atmospheric Chemistry and Physics, 17(3):1-43, doi: 10.5194/acp-17-2401-2017.

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