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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Acyl peroxy nitrate measurements during the photochemical smog season in Beijing, China" *by* Z. Xu et al.

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Thanks for your valuable comments. We have tried to make a revision corresponding to your comments. They are shown as follows: 1. Page 3 Line 5-6, the cited reference for NOx transportation was corrected by (Singh and Hanst 1981). And corresponding citation in the references was also updated. 2. For Figure 1, since Beijing was the international city in the world and our study mainly focused on the urban of the city, therefore, a larger or even regional scale map for this study was not that necessary. In addition, we only conducted a measurement in one site, namely, it was also so hard to build a link to large scale or regional scale PANs pollution. 3. Page 3 Line 9, the ratios of PANs by ECD were estimated by peak area. 4. Page 3 Line 20, we agreed with the reviewer's comments. We just tried to estimate the "actual NO2". The reviewer indi-

cated NOX analyzer also responded to HNO3, please provide related references for it. For RONO2 species, even if, they were pretty low based on other studies. Therefore, the method for estimated NO2 was practical even with some uncertainty. 5. For Table 1, we accepted the opinion to remove Table 1. 6. The first three sentences of paragraph 2 under section 3.1 were rewritten as follows: "The ambient pressure ranged by 994.3-1004.1 hPa and Std. dev. was 2.47. Wind speed was from 0 to 3.98 ms-1 as shown in Fig. 3. 81% of the measured wind speed (total number was 862) was lower than 2 ms-1." 7. Unfortunately, the statement of reviewer's comments towards "daytime maxima. . ." was hard to response. If the reviewer can provide us with more clearly statement about the mentioned discussion. It would be more helpful to us. 8. We have changed "400 micrograms/m3" to "400 mg/m3". 9. We agree with the reviewer's statement that the ratio of PAN to MPAN was an indicator of the impact of AHCs. However, due to the instrument detection limit (5 pptv), the obtained data of MPAN was so limited and most of them were behind the detection limit. Therefore, the calculation of PAN to MPAN ratio was difficulty. Furthermore, the generation of MPAN mainly contributed by isoprene. Conversely, isoprene can transform to other secondary pollutants rather than MPAN. In this study, the PPN data was available. So, we used the ratio of PAN to PPN to instead. 10. HC emission inventories were so hard to be established, due to the limited data on this aspect. On this page, we just tried to use the ratio to generally identify AHCs or BHCs control types. 11. We wondered to know the problem for figures were used in the numbers reported. 12. We expected you to provide more statement about the "backwards" here. Did it have something to do with our study? 13. Regression method was a common method which had been comprehensively used in PANs studies (Roberts et al., 1998a; Roberts et al., 2007; Roberts et al., 1998b; Wang et al., 2010). There was lack of reasons whether we should image a situation in which someone has PPN and MPAN data, but not PAN data. Did it have something to do with this study? 14. The derived equations of 1-4 were based on the linearity of PAN, PPN and MPAN. Since PPN and MPAN mainly formed by AHCs and BHCs, respectively. 15. After a deep discussion within our group, we decided to accept the reviewer's advice

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to delete the Section 3.4. 16. On Page 13 Line 22-24, the mentioned “an appropriate range for heterogeneous reactions” was a hypothesis based on Figure 12. 17. We had added the citation by (Roberts et al., 1996). 18. The conclusion of this study was new to some extent. Since there was a lack of extensive PANs measurement in Asia, especially in China. The reported data itself was meaningful for us to have a better understanding about PANs pollution in metropolis city. For heterogeneous reactions, they mainly focused on observation study. We planned to conduct kinetic study in lab. For this study, the major aim was on field study. 19. We sincerely expected the reviewer to provide use the reasons for his or her statement about the possibility of overlapping interference. 20. The green data represented the ratio of PAN formed by AHC to BHC.

References: Roberts, J. M., Bertman, S. B., Parrish, D. D., Fehsenfeld, F. C., Jobson, B. T., Niki, H.: Measurement of alkyl nitrates at Chebogue Point, Nova Scotia during the 1993 North Atlantic Regional Experiment (NARE) intensive, Journal of Geophysical Research-Atmospheres, 103, 13569-13580, 1998a. Roberts, J. M., Marchewka, M., Bertman, S. B., Sommariva, R., Warneke, C., de Gouw, J., et al.: Measurements of PANs during the New England air quality study 2002, Journal of Geophysical Research-Atmospheres, 112, 1-14, 2007. Roberts, J. M., Parrish, D. D., Norton, R. B., Bertman, S. B., Holloway, J. S., Trainer, M., et al.: Episodic removal of NOy species from the marine boundary layer over the North Atlantic, Journal of Geophysical Research-Atmospheres, 101, 28947-28960, 1996. Roberts, J. M., Williams, J., Baumann, K., Buhr, M. P., Goldan, P. D., Holloway, J., et al.: Measurements of PAN, PPN, and MPAN made during the 1994 and 1995 Nashville Intensives of the Southern Oxidant Study: Implications for regional ozone production from biogenic hydrocarbons, Journal of Geophysical Research-Atmospheres, 103, 22473-22490, 1998b. Singh, H. B., Hanst, P. L.: Peroxyacetyl Nitrate (PAN) in the Unpolluted Atmosphere - an Important Reservoir for Nitrogen-Oxides, Geophysical Research Letters, 8, 941-944, 1981. Wang, B., Shao, M., Roberts, J. M., Yang, G., Yang, F., Hu, M., et al.: Ground-based on-line measurements of peroxyacetyl nitrate (PAN) and peroxypropionyl nitrate (PPN) in the Pearl River Delta, China, International

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Journal of Environmental Analytical Chemistry, 90, 548-559, 2010.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/11/C5464/2011/acpd-11-C5464-2011-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10265, 2011.