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Comment

***Interactive comment on “Peroxyacetyl nitrate (PAN) and peroxypropionyl nitrate (PPN) in urban and suburban atmospheres of Beijing, China” by J. B. Zhang et al.***

**J. B. Zhang et al.**

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Received and published: 4 April 2011

Thanks for the valuable comments. We have fully replied as follows just for your consideration:

For the first question, the reaction of  $\text{CH}_3\text{CHO}$  with OH and  $\text{NO}_2$  might be important for the source of PAN formation. However, in this paragraph, most of our focus here is on the thermal decomposition of PAN and PPN. 1. Foremost, the topic of this section was ‘thermal decomposition of PAN and PPN’, namely, we emphasized on PAN and PPN’s thermal decomposition. Therefore, the study of PAN’s sources would be another study for further research. PAN and PPN’s thermal kinetics had been well investigated in

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laboratory by other colleagues, the discussion of their thermal decomposition behavior can be easily obtained by mathematical methods as shown in eq. (1-13) numbered in the full text. 2. Next, the detection of OVOC itself had a great uncertainty; therefore, their actual concentrations were not that specific, such as  $\text{CH}_3\text{CHO}$  and  $\text{CH}_3\text{CH}_2\text{CHO}$ . Your indicated  $\text{CH}_3\text{CHO}$  concentration from Shao et al., 2009 was an average value. Due to its high reactivity, the time resolution of Shao's instrument was almost 1 hr for  $\text{CH}_3\text{CHO}$ , which was pretty long compared to 5 min for PAN and PPN of our instrument. Namely, to combine  $\text{CH}_3\text{CHO}$  value with PAN was difficult, since taking average of PAN would result in greater uncertainty. 3. Finally, OH radical detection wasn't done at that time during the campaign. On the concentration of OH radical, although its concentration range can be estimated, however, for further calculating the contribution of  $\text{CH}_3\text{CHO}$  to PAN formation was problematic, especially for data assimilation. In this study, the sink of PAN and PPN was considered by their thermal decomposition, relevant reaction constants and atmospheric temperature were easily obtained, and therefore, based on this approach, calculated thermal decomposition values were more accurate and meaningful.

For the second question, we have introduced the method of PAN and PPN in the full text; please see Page 15 Line 16-17. And what's more, data used in Fig. 9 was also indicated in Page 15 Line 18-19. Details for the equations were eq. 6 and eq. 7. Integration method was used to obtain the thermal losses of PAN and PPN, respectively. As K4-PAN, K4-PPN and K1-PPN/K2-PPN were obtained in Page 15 Line 5-Page 16 Line 13, therefore, the calculation was easily conducted.

Thanks for your kind comments for the improvement of our study.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 8173, 2011.

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