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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source analysis of peroxyacetyl nitrate (PAN) in Guangzhou, China: a yearlong observation study" *by* B. G. Wang et al.

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We fully understand the journal of ACP is focused on studies with general implications for atmospheric science, however we hold different opinion regarding whether this manuscript is only a local interest or not.

First of all, this study did not aim to briefly report the local PAN pollution level in Guangzhou China, but endeavored to investigate a more general scientific question, that is, the contribution and potential of individual VOCs to the production of PAN in a typical subtropical area where it is notorious for the atmospheric complex pollution (i.e. coexistence of high-level primary and secondary pollutants), by using the unique yearlong online observations of both PAN and NMHCs in this kind of environment.

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Second, this study aimed to answer another question – is the unexpected high level of PAN due to a regional air mass transport or an amplified trace gas removal in the Pearl River Delta (PRD) in China? – by quantitative analysis of the sources of PAN. It was reported that the measured concentrations of OH radicals in the PRD were significantly larger than expected by the model by a factor 3 -5 at certain conditions (Hofzumahaus et al. 2009) because of a new recycling mechanism of OH radicals. However, no studies have ever applied this finding to understand the unexpected high level of PAN in the PRD.

Through a close look at the yearlong PAN and VOCs data in this specific area, it would help with a better understanding on the PAN production in the atmosphere, gain insight into the interaction of VOCs and atmospheric radicals, as well as provide knowledge on the improvement of photochemical reaction models.

However, the authors admit that the aims of this study were not clearly presented in the manuscript and some parts (e.g. the title) might have seriously misled the readers. In the revised manuscript, a new title (listed below) is proposed to better fit its content: “Underestimated potentiality of VOC precursors on PAN formation by yearlong online observation in a subtropical station, South China“. The introduction is also greatly improved to strengthen the significance of this study. In addition, all suggestions and comments given by the two referees are accepted and addressed in the revised manuscript to make this manuscript more informative and understandable.

Reference

Hofzumahaus, A., F. Rohrer, K. Lu, B. Bohn, T. Brauers, C.-C. Chang, H. Fuchs, F. Holland, K. Kita and Y. Kondo (2009). "Amplified trace gas removal in the troposphere." Science 324(5935): 1702-1704.âĂČ

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 17093, 2015.