

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-359-RC2>, 2021
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Comment on acp-2021-359

Anonymous Referee #2

Referee comment on "Measurement report: Fast photochemical production of peroxyacetyl nitrate (PAN) over the rural North China Plain during haze events in autumn" by Yulu Qiu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-359-RC2>, 2021

This manuscript investigated the occurrence of PAN, typical VOCs, PM_{2.5}, HONO and various trace gases during cold season haze events in the North China Plain, to elucidate the cause of rapid increase of PAN. The article was well written with pre-established methodology. The authors provide some useful information about the formation of wintertime PAN. Overall this manuscript should be accepted after the authors address the issues below.

- Title: I don't think it is a representative results for cold-season, exactly in autumn, based on the limited observation data.

- Highlight the new findings of this study. The authors should demonstrate the creative results, especially to differentiate those in previous studies. I think, studies on the occurrence of PAN have been widely obtained. The authors should introduce more studies about them, and discuss the formation mechanisms of PAN, especially in autumn.

- Analytical method appeared adequate; however some key procedural and QA/QC details on the observation of PAN, typical VOCs, HONO and various trace gases are missing. Please provide more details in the manuscript.

- The authors mentioned that, "Formaldehyde (HCHO) photolysis dominates the daytime HOx production thus contributing to fast photochemistry of PAN". Limited VOCs species were measured in this study. How about the contributions of other VOCs species? Other studies had found that acetaldehyde was regarded as the most important precursor of PAN during winter in Beijing, could you explain it?

- For production rates of HOx and PA under different pollution level, do you compare them with OBM-MCM analysis?

- The authors are suggested to discuss the impact of environmental factors (including temperature, wind speed and SLP, etc) on the pollution characteristics of PAN.