

Comment on acp-2021-948

Anonymous Referee #1

Referee comment on "Seasonal characteristics of atmospheric peroxyacetyl nitrate (PAN) in a coastal city of Southeast China: Explanatory factors and photochemical effects" by Taotao Liu et al., Atmos. Chem. Phys. Discuss.,
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Comments on "Seasonal characteristics of atmospheric peroxyacetyl nitrate (PAN) in a coastal city 2 of Southeast China: Explanatory factors and photochemical effects" by Liu et al

The manuscript reports influencing factors to PAN pollution in China. The manuscript reports important results. It is suitable for the Journal Atmospheric Chemistry and Physics. I suggest authors incorporate the below suggestions before its publication.

Major comments:

- In the abstract section, the authors state that the current paper reports the formation mechanism of PAN and its effect on ozone were identified. I suggest the authors explain it in brief.
- In section 2.2, some details of the box model should be added here, although it is explained in the previous study, e.g., details of computation of net production rate of O₃.
- The study used a non-parametric regression model. How good is it? Have you compared it with traditional chemistry models? Have you compared results with them?
- Section 3.2, L226-229, statements are not clear. The statement "PAN pollution was mainly from local production" should be explained.
- L230-235, it is not clear how local mixing is computed.
- Fig. 3 and Fig. S4, nonlinear relations between variables (NO, UV, RH, T O_x) and PAN are well known. What is new in these figures should be explained.
- L261-263: The solar radiations are stronger in spring than autumn; hence UV, T, and O_x will be more effective in PAN formation during spring and vice-a-versa in autumn. Why should you mention it explicitly?
- L292-302. These statements are huge. It is unclear whether they are supported by the model simulations or observations.

- L325-328: All possible factors, meteorological conditions, accumulation of pollution, local transport, etc., are mentioned here. What is the most influencing factor?
- Section 3.4 is lengthy but informative. It should be divided into two sections.

Minor comments:

- The quality of figure 7 should be improved.
- Section 2.1 can be moved to the supplementary material. I have difficulty in reading the x-axis labels in Figure 1.