

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-548

Anonymous Referee #1

Referee comment on "Elucidate the formation mechanism of particulate nitrate based on direct radical observations in the Yangtze River Delta summer 2019" by Tianyu Zhai et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-548-RC1>, 2022

This study investigates the characteristics of particulate nitrate formation and its precursors based on a field campaign in the eastern China. It provides valuable data sets, including measurements of in-situ OH, N₂O₅ and other relevant parameters, for analyzing summertime nitrate formation, which still needs more elaborated research. The relative importance of daytime and nighttime pNO₃⁻ chemical formation pathways was determined, and the response of O₃ and pNO₃⁻ to precursors reduction was calculated by a box model. The results improve the knowledge on occurrence of summertime nitrate pollution in China. Overall, this work is well organized, while some clarifications are still needed. I recommend publication of this paper in *Atmospheric Chemistry and Physics* and I have following comments for the authors to consider.

Major comments:

As is indicated by the authors in section 3.3, the N₂O₅ uptake coefficient could vary within a large range. Using a constant coefficient for the whole campaign seems to be less convincing, although 0.035 was a reasonable value in this area. I suggest to perform some uncertainty tests or at least choose different coefficient for clean days and polluted days, respectively, as the aerosol composition and water content were not supposed to be the same

Please explain the reason for the significant difference between gamma_s and gamma_p. And then, it would be reasonable for the authors to used gamma_p for the following calculation fo pNO₃⁻.

Specific comments:

Line 88: What does the 'impact factor' represent? I found that the authors intended to investigate the controlling factors of nitrate formation rather than its impacts in section 3.4.

Line 194: Please change 'since' to 'due to'.

Line 240~241: Please change 'appeal' to 'appear'.

Line 276~279: Is there any evidences from the campaign or references to support this conclusion?

Table 2: The max and min values of both SOR and NOR are in wrong position for this work.