Reviewer #3 (Nga Lee Ng)

I have a few quick comments for the authors to consider:

Thank you for adding a few questions and comments.

1. It appears that Experiments #1 and #3 were conducted under conditions that were almost identical (Table 1), why is the maximum SOA different by a factor of ~3? Same question applies to the data shown in the figures, how shall the results from Experiments #1 and #3 be explained and interpreted? Shall one expect the results to be comparable or different?

For the experiments we performed we attempted to be as reproducible as possible. However, one downside in doing injections of N2O5 from solid crystals comes from the short injection times (1-10sec.) due to the large concentration present from the solid. We attempted to mitigate this by mixing the chamber for a short period by injecting air (~100 L min^{-1}) along with the N2O5. However, this will create plume effects in the chamber which can produce inhomogeneities throughout the chamber. Because of these inhomogeneities, differences in the yields of formation are certainly possible. Though, the mass spectra presented in both Exp 1 and 3 are similar suggesting the overall reaction pathway is similar. Additionally, the radical domain (RO2+RO2 or RO2+NO3) does not impact the type of condensed phase processes occurring (nor their magnitude). We believe the observations are robust despite the clear differences.

2. Line 42-45: For the sentence "When experiments were conducted in the dark….", it might be better to separate this sentence into two to avoid confusion, as Takeuchi and Ng did not use the changes in elemental ratios (N:C and O:C) to evaluate organic nitrate hydrolysis (NO3,org/Org is used as a proxy to infer hydrolysis in Takeuchi and Ng).

Thank you for this comment, we tried to clarify this sentence by changing it to (Line 42):

"When experiments were conducted in the dark, monoterpene + NO_3 products were shown to steadily evolve, with a steady change in O:C and N:C ratios as reported by Nah et al. (2016). In Takeuchi and Ng (2019) ~9-17% of organo-nitrates from either α-pinene or β-pinene SOA hydrolyze at moderate relative humidities (~ 50% RH)."

3. Line 208-211: As the experimental conditions in the study by Takeuchi and Ng and the study by Claflin and Ziemann are different (e.g., RO2+NO3 dominant, low OA loading at ~60 ug/m3 and RO2+RO2 dominant, high OA loading on the order of hundreds of ug/m3, respectively), it is hard to directly use these studies to note that similar differences were observed between ESI and FIGAERO-CIMS in this work.

Additionally, because we are looking at different systems (α vs. β pinene) we decided to remove the sentence that mentions the difference between the ESI and FIGAERO from the different studies.

The removed sentence: ~~"This is similar to differences observed between offline ESI and online FIGAERO-CIMS measurements for β-pinene SOA (Takeuchi and Ng, 2019;Claflin and Ziemann, 2018)."~~

4. Line 352-353: As seed aerosols are not used in this work, perhaps the relative small amount of particle water could be the reason for negligible hydrolysis observed for dimer dinitrates? Also, it would be useful to note in Section 2.1 that seed aerosols are not used.

We have added a note about the possibility of the water content making a difference on Line 376:

"The lack of hydrolysis could come from the lack of water in the particles, which could differ from other experiments that have used seed aerosols (Takeuchi and Ng, 2019;Nah et al., 2016)."

We have added a note in the experimental section (Section 2.1) regarding the seed aerosol:

Line 79: "No seed particles were used in this study, in contrast to other studies that have been performed on similar systems (Takeuchi and Ng, 2019)."

References:

Claflin, M. S., and Ziemann, P. J.: Identification and Quantitation of Aerosol Products of the Reaction of β-Pinene with NO3 Radicals and Implications for Gas- and Particle-Phase Reaction Mechanisms, The Journal of Physical Chemistry A, 122, 3640-3652, 10.1021/acs.jpca.8b00692, 2018.

Nah, T., Sanchez, J., Boyd, C. M., and Ng, N. L.: Photochemical Aging of α-pinene and β-pinene Secondary Organic Aerosol formed from Nitrate Radical Oxidation, Environmental Science & Technology, 50, 222-231, 10.1021/acs.est.5b04594, 2016.

Takeuchi, M., and Ng, N. L.: Chemical composition and hydrolysis of organic nitrate aerosol formed from hydroxyl and nitrate radical oxidation of α-pinene and β-pinene, Atmos. Chem. Phys., 19, 12749-12766, 10.5194/acp-19-12749-2019, 2019.