We thank the reviewers for their comments. Our specific response can be found below. The reviewers' comments are in italics and changes made to the manuscript are in quotation marks. All changes made are minor and do not affect the conclusions in the manuscript.

Response to Reviewer 1

1. In my opinion, the paper under discussion is very well structured, showing the data in a concise manner. The great complexity of the NO3-BVOC chemistry is highlighted through the paper and I agree with the authors that coordinated research projects on this subject is strongly recommended to provide a more complete view of the nighttime chemistry of areas with high levels of biogenic emissions. After addressing the comments/suggestions given below, this review is publishable in the Atmospheric Chemistry and Physics journal.

Response: We thank the reviewer for the positive comments.

2. To be consistent through the paper the term "rate constant" or "rate coefficient" should be unified.

Response: In the revised manuscript, we will use term "rate constant".

3. Comments on Table 1: As this table compiles all data reported for the gas-phase rate constants of NO3+BVOC reactions, alignment of columns is needed to correlate the value of k with the reference. Is it possible to include the temperature range in the T-dependence expressions? Is the second value for k in isoprene 1.21e-13 cm3 molecule-1 s-1? In alpha-pinene, what is the uncertainty in 5.82e-12 value? What about the stated uncertainties? I guess they are those reported by the authors, in some cases one standard deviation and in others, twice the standard deviation. Add a footnote to clarify this aspect. In my opinion, in a review the presentation of data should be done in order of publication (or inverse order, if you wish), but not mixed.

Response: Rows in the table have now been aligned. Ranges of temperature have been specified for all rate constants, including single temperature measurements. The second value for k in isoprene has been corrected to 1.3×10^{-12}. Uncertainty in the α-pinene value is now specified. The stated uncertainties are as given in the references in the table, and the reader is referred to the individual studies. Rate constants are now also given in order of publication.

4. Comment on Table 2: In my opinion, there is a lot of information of the last column. Can it be split in two columns: OA loading and relevant information?

Response: We agree that this column is messy, but unfortunately this is unavoidable because it arises from the information available in the papers cited. The "relevant information" included in this column often substitutes for direct knowledge of the OA (e.g., where reacted N_2O_5 was reported but not total OA), so we don't think that splitting the column will necessarily help – where OA information is

available, that is listed; where not, other relevant information substitutes. Nevertheless, prompted by this reviewer comment and in an effort to make the table more readable, we have moved some information that could better be characterized as "additional notes" on the analysis methods to footnotes. We have also added another study for the NO_3 + α-pinene yields for completeness, and have added some additional notes to that footnote.

5. Comment on Table 6: As in the heading of this table it is stated that the data presented are relative to SOA formation, delete "SOA" from the third column. What was exactly intended to highlight in the last column named "References"? What do the author want to state by SOA/monoterpenes/chemistry/etc included in the last column? Is it possible to include a column with references for isoprene separately from monoterpenes?

Response: "SOA" deleted from third column as suggested by the reviewer. For clarity, last column had been eliminated in favor of footnotes at the bottom of the table to clarify which aspect of the mechanism each references is for.

6. Comment on Figure 5. Include the permission of the journal in the caption.

Response: Permission has been updated.

7. Abstract, Line 17: "The first section. . .." could be replaced by "The first PART OF THIS REVIEW summarizes" or "The first SECTIONS. . .". In fact, the first section is sole the Introduction.

Response: The sentence "The first section summarizes the current literature on NO_3-BVOC chemistry, with a particular focus on recent advances in instrumentation and models, and in organic nitrate and secondary organic aerosol (SOA) formation chemistry" is changed to

"The first half of the review summarizes the current literature on NO_3-BVOC chemistry, with a particular focus on recent advances in instrumentation and models, and in organic nitrate and secondary organic aerosol (SOA) formation chemistry"

8. Page 5, line 8: "....BVOC, such as....monoterpenes, are..."

Response: Commas are added as suggested.

9. Page 5, line23: "BVOC-NO3-derived organic nitrates" could be replaced by "organic nitrates derived from BVOC-NO3 reaction"

Response: Modified.

10. Page 7, line 10-11: "field observations relevant to the understanding of NO3 and BVOC". This sentence is weird or seems to be incomplete. The understanding of?

Response: The sentence is changed to "field observations relevant to the understanding of NO_3 and BVOC chemistry".

11. Page 14, line 26: "...hydroxyl nitrates FORMED from..."; "hydroperoxides FORMED from..."

Response: Corrected.

12. Page 16, line 23: (RH) should be placed after "Relative humidity" in line 21.

Response: Modified.

13. Page 16, line 22: Add "...heterogeneous uptake of N2O5, PRECURSOR OF NO3."

Response: The sentence refers to the competition between NO_3 and N_2O_5. Since N_2O_5 is not a precursor of NO_3 (rather it is in equilibrium with NO_3), we feel that the suggested change would not be accurate.

14. Page 24, line 6: Replace "peroxy-radical" by "peroxy radical".

Response: Modified.

15. Page 24, line 17: Replace "H-atom" by "H atom"

Response: Modified.

16. Page 25, line 16-17: ". . .predicts [NO3] between. . ." Use the multiplication symbol in the concentration values. Remove the semi-colon after the last concentration. The sentence "The higher values are associated with urban clouds, with rural and marine clouds an order of magnitude lower" can be rephrases as "High NO3 concentration levels are associated with urban clouds, while in rural and marine clouds these levels are an order of magnitude lower". Is this a general trend?

Response: The sentence is modified to read "Model studies with the CAPRAM mechanism (Chemical Aqueous Phase RAdical Mechanism (CAPRAM; (Herrmann et al., 2005;Tilgner et al., 2013)) predict [NO_3] between 1.6×10^{-16} mol L^{-1} to $2\times7\cdot10^{-13}$ mol L^{-1}. High NO_3 concentration levels are associated with urban clouds, while in rural and marine clouds these levels are an order of magnitude lower. Since the NO_3 concentrations are related to the NO_x budget, typically higher NO_3 concentrations are present under urban cloud conditions compared to rural and marine cloud regimes."

17. Page 26, line 15. "Eq. 5" should be "Eq. 2"

Response: The reviewer is right. This is corrected in the revised manuscript.

18. Page 27, line 14: hydroxyl and nitrate radicals have been already defined previously in the manuscript.

Response: The sentence "Figure 4 shows a comparison of the modeled chemical turnovers of reactions of organic compounds with hydroxyl (OH) versus nitrate (NO_3) radicals distinguished for different compound classes" is changed to

"Figure 4 shows a comparison of the modeled chemical turnovers of reactions of organic compounds with OH versus NO_3 radicals distinguished for different compound classes"

19. Page 28, line 10: Delete the hyphen after 10-2.

Response: There is no hyphen after 10^{-2} in line 10. The review could be referring to the hyphen in line 12. It is now formatted to be the same as in the previous two lines to show the range of the NO_3/OH ratios.

20. Page 39, line 32: Replace "+/-" by "±"

Response: Modified.

21. Page 40, line 13: "...from 2-900 ppt" is better to be written as "...from 2 to 900 ppt"

Response: Modified.

22. Page 47, line 10: In my opinion, the heading is not necessary.

Response: We respectfully disagree, and have retained the heading in this instance, since it separates the summary of the text from the specific descriptions of different regions.

23. Page 47, line 15: Delete an extra period.

Response: Corrected.

24. Page 48, lines 33-34: The rate constant units in cm3 molecule-1 s-1 for consistency with the rest of the manuscript.

Response: The rate constant units has been changed from "$molec^{-1}\ cm^3\ s^{-1}$" to "$cm^3\ molec^{-1}\ s^{-1}$".

25. Page 49, line 1: The rate constant units in cm3 molecule-1 s-1 for consistency with the rest of the manuscript.

Response: The rate constant units has been changed from "$molec^{-1}\ cm^3\ s^{-1}$" to "$cm^3\ molec^{-1}\ s^{-1}$".

26. Page 51, line 6: Replace "and Odum" by "AN (or THE) Odum"

Response: Corrected. The sentence now reads as "…most models parameterize SOA formation separately from gas-phase chemistry using either the Odum 2-product…".