

***Interactive comment on* “Observations of sesquiterpenes and their oxidation products in central Amazonia during the wet and dry seasons” by Lindsay D. Yee et al.**

Anonymous Referee #2

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The study by Lindsay D. Yee et al. deals with sesquiterpene observations in Brazil as part of the Green Ocean Amazon (GoAmazon2014/5) campaign. The authors present measurements from a site that is not located inside the pristine Amazon rainforest and discuss the observed oxidation products both in gas and particle phase, during the dry and wet season. Their observations include a vast array of sesquiterpenes (and 4 diterpenes) that are reported to be in the ppq range which is much lower than any other measurements that have been conducted inside the forested area. Nonetheless, the measurement location has provided the opportunity to investigate oxidation products and calculate a low end O₃ reactivity. It is important that throughout the text the authors openly discuss the limitations of their dataset. That said, the study is not as novel and

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conclusive but I still believe that it is an important addition to the limited literature of sesquiterpenes. Overall, the manuscript is very well written and fits within the scope of the special issue submitted. I would therefore suggest publication to ACP after addressing the following issues.

General comments:

1. The calibration procedure has to be described and presented in greater detail. Please include further details on how the calibrations were performed, how often and with what technical characteristics (e.g. detection limits, precision, accuracy).
2. There has to be a section over which the observations are thoroughly presented. The results section starts with a subchapter named “Chemical characterization of observed sesquiterpenes” but there is mainly technical descriptions and not presentation of the observations. In addition, only selected time frames are presented in both manuscript and supplement. I would encourage the authors to include a complete timeline of their measurements and certainly move the largest part of this section (3.1) in the methods.
3. While the uncertainties on the reaction rate constants are discussed for sesquiterpenes, the same rate constant as α -pinene has been applied for monoterpenes. Yanez-Serrano et al. (2018) demonstrated a similar chemodiversity of monoterpenes for both wet and dry season inside the Amazon rainforest. Therefore, the uncertainties of monoterpene reactivity (and hence the relative contribution to isoprene and sesquiterpenes) can be minimized. I recommend re-calculation of the O₃ reactivity based on the monoterpene speciation from the literature with the respective reaction rates and relative abundance.

General technical comments:

1. Please ensure that the supplementary material is appropriately cited in the main text.

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2. Please ensure that your references conform to the ACP style.

Specific comments:

P3L25-28. No need to repeat the measurement challenges as they were already mentioned above.

P4L5. You may keep the definition of IOP but it would be better if you refer to your periods as wet and dry season thereafter.

P4L17. There is no need for this last sentence.

P8L31. Please rename as “Results and discussion”. As mentioned above, I would recommend to include a section over which the observations are described.

P8L36. This class of compounds is referred as sesquiterpenoids in Chan et al. (2016).

P9L24. Please site the “previous literature”. P9L34-36. Did you observe such case? Is there a possibility of presenting a case study?

P10L10-14 and L30. It would be interesting if an upper end of sesquiterpene estimated O₃ reactivity is presented as well.

P10L14-16. Please see my general comment.

P11L21-22. Nonetheless, this is your practice for monoterpenes. Please discuss a quantitative

Figure 6. The filter tracers are not visible. Maybe the use of log scale would help?

References:

Yáñez-Serrano, A. M., Nölscher, A. C., Bourtsoukidis, E., Gomes Alves, E., Ganzeveld, L., Bonn, B., Wolff, S., Sa, M., Yamasoe, M., Williams, J., Andreae, M. O., and Kesselmeier, J.: Monoterpene chemical speciation in a tropical rainforest: variation with season, height, and time of day at the Amazon Tall Tower Observatory (ATTO), Atmos. Chem. Phys., 18, 3403-3418, <https://doi.org/10.5194/acp-18-3403-2018>, 2018.

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Chan, A. W. H., Kreisberg, N. M., Hohaus, T., Campuzano-Jost, P., Zhao, Y., Day, D. A., Kaser, L., Karl, T., Hansel, A., Teng, A. P., Ruehl, C. R., Sueper, D. T., Jayne, J. T., Worsnop, D. R., Jimenez, J. L., Hering, S. V., and Goldstein, A. H.: Speciated measurements of semivolatile and intermediate volatility organic compounds (S/IVOCs) in a pine forest during BEACHON-RoMBAS 2011, *Atmos. Chem. Phys.*, 16, 1187-1205, <https://doi.org/10.5194/acp-16-1187-2016>, 2016.

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