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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Total OH reactivity over the Amazon rainforest: variability with temperature, wind, rain, altitude, time of day, season, and an overall budget closure" *by* Eva Y. Pfannerstill et al.

Anonymous Referee #1

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Pfannerstill et al. presented OH reactivity observations at the ATTO tower. The observation was conducted mostly above the canopy in three different levels from 80 m to 300 m AGL. Unlike a previous study presenting significant missing OH reactivity inside of the canopy at the ATTO tower observatory, this study illustrates a better agreement between observed and calculated OH reactivity. Overall, this study concludes that most of reactive compounds in the forest canopy are oxidized before it reaches in the observed altitudes therefore better characterizations in OVOCs are necessary to close OH reactivity budget. The comprehensive dataset is well presented and the data

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analysis is easy to follow. Moreover, the conclusion certainly has merits to better understand atmospheric chemistry in remote rain forests, which the community lacks of empirical studies. I would recommend publication of this manuscript after addressing and clarifying following points.

1) Although the contribution of isoprene towards calculated OH reactivity is less in this observation, conducted out of canopy, still isoprene substantially contributes calculated OH reactivity. It seems to me that additional discussion about photochemical aging time scale would be beneficial to make the reasoning of the large contributions of OVOCs towards calculated OH reactivity more convincing by analyzing isoprene to MVK+MACR ratios or some other indicators. I was a bit confused by taking a look at Figure 5 a) that the relative contribution of isoprene does not seem to change too much as observational altitudes get higher. Moreover, if there is any unquantified reactive VOC causing missing OH reactivity inside of the canopy as previously observed, the quantitative analysis may provide clues on the potential contributions of those compounds in the observed altitudes.

2) A more detailed description on sampling, particularly potential sampling loss would be beneficial. I agree that the comparison analysis between observed and calculated OH reactivity was performed for the samples collected from the same inlets so comparison itself is apple to apple comparisons. However, it is certainly possible highly oxidized VOCs or large VOCs such as sesquiterpenes that happen to be soluble and wall reactive may substantially contribute towards calculated OH reactivity. At least, rough estimates based upon empirical proof are highly desirable based upon the wall loss test instead of a short description as presented in the manuscript.

3) A detailed presentation on OVOC speciation would be informative. I would recommend to add more information on relative contributions of each OVOCs and their origins (parent compounds) towards calculated OH reactivity.

4) Figure 6: it is difficult to read out which factor either temperature or PAR (likely both)

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would cause trend. I would recommend to chop out certain ranges of PAR to see the temperature dependence.

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