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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Diel and seasonal changes of Biogenic Volatile Organic Compounds within and above an Amazonian rainforest site" *by* A. M. Ya nez-Serrano et al.

Anonymous Referee #1

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The article by Yanez-Serrano and coauthors entitled :" Diel and seasonal changes of Biogenic Volatile Organic Compounds within and above an Amazonian rainforest site" offers an interesting evaluation of atmospheric concentration of VOC. The authors show how atmospheric concentrations change between wet and dry season in response to environmental drivers and discuss possible interaction of biogenic compounds in the chemistry of the atmosphere. The paper reads well, without language flaws. The methods are well described and the combined use of PTRMS and GC-FID is convincing. The dataset produced in a pristine environment is important and certainly helps understanding BVOC dynamics in a biodiverse and representative forest ecosystem. For

this reason it is worth publishing the results. However, given the rich dataset, I would have expected that the authors could try calculating fluxes from concentration gradients using current models, e.g. k-theory, or inverse lagrangian models. I would also have appreciated more correlation of observed concentration dynamics with meteorological parameters and concentration of ozone, NOx and CO measured at the site.

MINOR REVISIONS: pag 29160 lines 22-23: Unclear what you meant to say: what are the differences between wet and dry seasons? Pag 29161 line 14-15: unclear what you meant to say, please rephrase. Pag 29162 line 15-16: what about ozone? Isoprene has a high ozone forming potentential and this may also impact radiative forcing. Pag 29164 line 15-17: Under pristine environmental conditions as in your experimental site with low concentration of nitrogen oxides, isoprene hydroperoxides (ISOPOOHs) have been characterized as the dominant first-generation isoprene oxidation products, and these compounds are observed with PTR-MS at a nominal mass weight (m/z) = 71 (Rivera-Rios et al. 2014). This important contribution should also be mentioned here. Pag. 29166 line 1: having different tubing lengths and different resident times of the air, how can you discriminate between atmospheric reactions at the sampling heights and reactions inside the tubing walls? Wouldn't it be better to just have the lines all of the same length? Pag. 29167: how much volume of air was sampled through the cartridges? How did you calculate uncertainties? Or just provide a reference. Pag. 29168 lines 26-27: form the title it seems that you are showing continuous measurements over the seasons, but indeed you only show data for 10 days in the dry and wet periods. In section 3.2 you mention 4 field campaign. This is a bit misleading, I would suggest dedicating a small section in the Material & Methods right after subsection 2.1 where you describe measurement period. Pag. 29169 line 10-15: do you exclude possible Monoterpene overestimation by PTRMS instead due to overlapping of some isomer masses at m/z 81? Pag. 29170 line 26: Why didn't you include wet season dynamics in fig 4 as you did in figures 6 for isoprene oxidation compounds? Pag. 29171 lines 20-26: it is unclear how you tested emission algorithms based on temperature only and on light + temperature dependencies if you only have concentration data rather than

fluxes. Did you just correlated modelled fluxes with ambient concentration? This does not seem to be feasible. Pag. 29174 lines 11-12: Did you try to calculate air retention time inside the canopy? This may help understanding the reaction time of emitted VOC. Pag. 29175 line 22: I would add also ISOPOOH as possible above-canopy reaction product. Perhaps you may use a term (e.f. iox) to generalize isoprene oxidation products recorded at m/z 71. Pag. 29177 lines 10: Measurements of Nox and o3 are mentioned in the M&M section. Showing a graph with vertical distribution of NOx and O3 may help in the discussion of results. At the moment the discussion is very speculative since you are not showing atmospheric oxidants and you are not showing vertical profiles of turbulence. Concentrations of CO may also help understanding the anthropogenic emissions during the dry season. Pag. 29177 line 20-25: Diurnal dynamics of O3 have been often described to peak at 3PM, this matches with your MAC+MVK concentration dynamics. Possible O3-isoprene interactions? Pag. 29178 line 25: I find difficult to imagine a swithing in a metabolic process which turn plants from emitting de-novo monoterpenes (light+temperature dependencies) to plants emitting monoterpenes from storage organs (temperature dependency only). I would rather think that Amazon is a highly biodiverse ecosystem and perhaps the plant species in the tower footprint are prevalently T-dependent emitters and diverge from plants described by Bracho-Nunez et al. in 2003. Pag. 29179 lines 4-17: I would spend some discussion of the recent paper from Rivera-Rios et al. 2014 in GRL which demonstrate relevant ISOPOO production under low NOx conditions.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 29159, 2014.