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Interactive comment on "Seasonality of isoprenoid emissions from a primary rainforest in central Amazonia" *by* E. G. Alves et al.

Anonymous Referee #1

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Review of Alves et al.

Summary

The authors present isoprene, monoterpene, and sesquiterpene profile measurements from central Amazonia during the dry, dry-wet, and wet seasons. They apply a Lagrangian dispersion approach to relate to vertical profiles to sources within the canopy, and interpret the results in the context of predicted fluxes from the MEGAN emission model and inferred fluxes from GOME-2 satellite data.

The data shown, and the overall analysis approach, is novel and useful for helping improve our limited understanding of BVOC emissions in this area. My main concern, as discussed below, has to do with drawing conclusions from the model-measurement

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comparisons without any explicit discussion of the uncertainties contained in either. Most of the figures contain error bars but we're not told what these represent. Lagrangian inverse schemes and BVOC emission parameterizations contain a lot of embedded assumptions and potential errors and the authors need to assess these in a rigorous way before the reader is able to determine to what degree the model-measurement differences are meaningful.

Once this issue is addressed the paper should be published. There are a few other, more minor, points listed below.

Comments —————-

28884, 14-22, this section is weak and unconvincing without a robust assessment and discussion of the various uncertainties in both the Lagrangian flux estimates and the MEGAN values.

28885, 9-10, similar comment. Clear error analysis is needed to interpret these comparisons.

28878, 18-20. Need to state what the error bars represent - it appears visually that this sub-canopy peak is not statistically significant.

28878, 24, same comment for sesquiterpene profiles

More detail needed on the Lagrangian modeling. Does this include any chemical or deposition terms? It's also not clear how the time dimension comes into play. I presume the concentration measurements are not being related to emissions only in that particular time step but also to emissions in preceding time steps? Such details need to be clarified.

Section 2.2, It's fine to refer to other cited papers for method details, but we need some basic information here: how calibration, blanks, humidity dependence were quantified and accounted for. Also, overall uncertainties and LODs for the compounds examined.

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28877, 15-19, note that GOME-2 passes overhead at ~9:30am and does not directly give information related to 24-h integrated emissions. A model is needed to relate the morning measurements to a 24-h average.

28878, 4-16. The inverted vertical gradient at night implies that the isoprene lifetime is shorter near the ground than aloft. Is Nox sufficiently low that NO3 loss would be negligible?

28879, 8: sesquiterpene ozonlysis: what are ozone levels and what is the corresponding sesquiterpene lifetime?

28881, 13-21: is there reason to think this area could have anomalously low emissions compared to the rest of Amazonia? You refer to the canopy openness and the density composition of isoprene emitters, how do these characteristics compare in this area to elsewhere?

28883, 10-15, since you have ozone data, it seems odd to resort to hand-waving when discussing sesquiterpene chemical losses. Couldn't a quantitative estimate (or at least a range) for this be easily derived, given some reasonable assumption for species composition?

28887, 8-12: why do you expect leaf phenology to differ at your site compared to the broader region?

28869, 4-5: awkward phrasing, "profiles were collected of the vertical profile"

28874, 10: "concentration vector for each level", shouldn't this be "concentration vector for the 6 levels"

All figures: need to indicate what the error bars represent

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 28867, 2015.