

Interactive comment on “Linking biogenic hydrocarbons to biogenic aerosol in the Borneo rainforest” by J. F. Hamilton et al.

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Reponses to reviewers

We would like to thank all three reviewers for their constructive and helpful comments and have addressed their concerns below

Referee 1:

General comments: NO_x levels in the chamber: The statement in the paper was meant to convey that although there are higher levels of NO_x in the chamber, which will of course impact the chemistry through NO+ROO₂ chemistry, at least some of the compounds (and in some cases the major tracer compounds) are also be observed under

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low NO_x conditions. Reviewer 2 does a good job of answering this question. Once the NO is converted to NO₂, the remaining BVOC will react with ozone or with OH under low NO conditions. No OH precursors were added and NO₂ was added to kick start this chemistry in the chamber. The chamber used ambient scrubbed air, which unfortunately still contained up to 5 ppb NO. In hindsight, the experiments would be better under much lower NO_x conditions. However, many of the compounds have been identified in previous chamber studies under low NO_x or from ozonolysis and so we are confident that these tracers are appropriate. The text has been amended to make this clearer.

The value of BVOC:NO_x stated is given in Hewitt et al., 2010. The NO_x values in Borneo were in fact very low, even considering a soil source. The measurements were taken above the canopy and so most of NO_x emitted by the soil had been converted to NO_y by the top of the canopy. The average daytime NO_x was around 20–30 ppt. The BVOC term also includes methacrolein, methyl vinyl ketone, 2-ethyl hexanol and glyoxal.

We agree with the reviewer that only having one LC-MS measurement is unfortunate. The daily samples do show some of the individual compounds observed but the peak heights are small and insufficient for MS₂ analysis. Therefore we are confident that the analysis is robust.

Referee 2: Minor comments

1. We have changed this to reflect the referees suggestion 2. This has been added 3. see discussion above. 4. Reference has been added 5. Changed 6. We have included a sentence discussing other potential isoprene organosulfate formation pathways. 6b. In the aerosol sample LC-MS there is a peak at *m/z* 199 that elutes just before the isoprene *m/z* 215 peak. It coelutes with another peak at *m/z* 217 that dominates the spectrum and in MS₂ it shows a loss of 18 (H₂O) to form a product ion at *m/z* 199. There is no MS₂ data for the *m/z* 199 and so its identity cannot be confirmed at present.

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It may be that m/z 217 is a water adduct but this cannot be known without a standard. Again for both m/z 260 and m/z 119 there are numerous, low levels peaks and no MS2 information available. We therefore felt that there was insufficient information to support the identification of these compounds.

Referee 3 General comments: There is no sample left and so it is impossible to quantify the species present or to calibrate retrospectively. This would have been a great thing to do, but due to the low concentrations of aerosol, the minimum solvent was used (200 μ l) allowing only 3 injections.

Specific comments The majority of typos and grammar have been corrected as requested.

P18120 L6: This data was used to select the BVOCs to be measured but it has not been published. We do not think this merits authorship on this paper. Can the editor confirm that a personal communication is not acceptable as this is not clear from the submission guide?

P18123 L16: Although we have not run the synthetic standards suggested, we have compared our MS2 product ion spectra to those in the literature and we show the same ions in a similar intensity distribution. Now that these samples can be synthesised, this is a route to quantify these compounds in the future.

P18124 L12: The fit score indicates how well the masses and intensities of the library spectra agree with the acquired spectrum. Other masses in the acquired spectrum are ignored. The maximum fit is 1000 indicating a perfect match at the library ions. The reverse fit indicates how well the masses and intensities in the acquired spectra agree with those in the library spectra. Again a perfect fit is given a value of 1000. The two fits account for any coeluting peaks in the library and sample spectra.

$F = 1000 (A^2/TL)$ where A = Sum of the product of the intensities in the unknown and library spectrum, T = sum of the square of the intensities of the unknown spectrum

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where the library has intensity above 0, L = Sum of the square of the square of the intensities in the library spectrum.

So a match of 991 is still an excellent fit (99.1 % match to library spectrum ions)

P18124 L19: This has been made clearer in the text.

P18138 table 3: This compound m/z 227 was previously observed from α -pinene SOA (2- or 3-hydroxyglutaric acid OS). We cannot find evidence of this ion in any of the isoprene OS papers so we have left it as monoterpene in the table.

P18139 Fig 1: The reason for showing the TIC is to show that the baseline is considerably higher in the Borneo sample as a result of constantly overlapping peaks at low concentration. This has been expanded in the text. Due to the low concentrations, the base peak chromatogram is also not particularly informative. Therefore we have retained the total ion chromatogram in the manuscript. However, we could add the base peak chromatogram to the sup info if the editor feels it is required.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 18113, 2013.

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