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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evidence for a significant proportion of Secondary Organic Aerosol from isoprene above a maritime tropical forest" *by* N. H. Robinson et al.

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1 Response to reviewer 1:

We thank the reviewer for carefully reading the manuscript and for all of their comments. Responses to all of the comments are detailed below:

1. In Figure 2b the CxHzNz, CxHyONz, or CwHxOyN are not legible. It would be less confusing to either omit them from that figure or show them separately in a blown up region.

We will enlarge the font of this legend and place it in the room freed-up by the removal of the inset m/z 82 peak (see point 2).

2. The inset of Figure 2b is very difficult to read, the resolution is too low for that size of figure. I recommend removing the background grey color, the vertical grey lines, the black circles overlying the data, the red and pink boxes and lines, and enlarging the figure.

The inset figure in 2b will be simplified as the reviewer suggests and split into a separate subfigure of Fig 2.

3. In Figure 3 the left hand axis is unreadable. If this is too difficult to change in the figure a note could be placed in the caption below identifying the axis.

A more full explanation of the axis will be added to the caption stating "The first and second retention times are plotted against the x- and y-axis respectively."

4. In Figure 5 the text indicates that the points are for one flight. Is that one flight for each point? The paper indicates that there were 8 individual flights on line 151. Also in Figure 6 the points are averaged over 14 flights. Why were the other 6 flights not included in Figure5?

Each point represents the median value for one flight. Only flights with similar flight plans were included in Figure 5 in order to get a consistent picture of natural day-to-day variation. These flights were over the same regions of rainforest and oil palm agriculture each time (as described in Section 2). The profiles shown in Figure 6 are averaged over all flights, including marine flights. We thank the reviewer for pointing out this inconsistency between the figures. The profiles in Figure 6 will be changed to reflect only data from the flights used in Figure 5 so as to reflect data from consistent sources.

5. Lines 137-138 state that the pure 3MF mass spectrum showed only $C_5H_6O^+$ ions and that it comprised 13% of the total organic mass. What is the other 87% if the

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sample is pure 3MF in deionized water?

The remaining 87% arises from fragments of molecular 3MF created by the vapourisation/ionization used in the AMS. There may also be contamination from equipment (nebulizer, lines etc) although this was minimized by subtracting the mass spectrum of the same equipment run with dionised water.

6. Lines 242-3 state that "these time series have a ratio of mean values of 80%". Please clarify the significance of this statement and what the ratio refers to.

This refers to the ratio of the mean $C_5H_6O^+$ loading over the whole data set to the mean m/z 82 loading over the whole data set i.e. the ratio of the average values as opposed to the average fraction of $C_5H_6O^+$ at m/z 82. This value is included to demonstrate that $C_5H_6O^+$ is responsible for the vast majority of the m/z 82 peak. This is relevant as the C-AMS has no high resolution capability and the implicit assumption is that the m/z 82 peak it measures is due to $C_5H_6O^+$. The sentence will be changed to read: "Averaged over the whole data set, these time series have a ratio of mean values of 80%**, showing the $C_5H_6O^+$ ion to be the major contributor to the m/z 82 mass"**

7. Lines 251-2 state that "The mean ambient $C_5H_6O^+$ signal measured at the ground site during OP3 was 1.0% of the mean total organic aerosol loading", is the total organic loading referring to the ambient or the laboratory measurements? This is confusing when compared with the following statement that the mean ambient loading is 8% of the organic aerosol. If not referring to the laboratory measurements please clarify the difference between these two statements.

This statement refers to the fraction of the ambient organic signal at $C_5H_6O^+$. The 1% figure is different to the following 8% figure, which accounts for fragmentation of the molecular MF ion. The sentence will be changed as followed to make this clearer: "The mean ambient $C_5H_6O^+$ signal measured at the ground site during OP3 was 1.0% of the mean **ambient** total organic aerosol loading. **Accounting for fragments of the molecular MF ion, this gives a mean MF_{amb} loading of 0.06 μg m^{-3}, or 8% of the**

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organic aerosol.”

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