

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 3:

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. Page 25549, lines 12-23: I suggest stating the material used for the 30 m sampling tube and also calculating estimates of possible gas and particle losses by diffusion in this tube and subsequent sampling lines.

The inlet was made of polypropylene and this will be stated on page 25549, line 14. The inlet losses were characterized using GRIMM OPCs and DMPSS as detailed in Whitehead et al. 2010, ACP, doi: 10.5194/acp-10-9369-2010. A reference to this will be included on page 25549, line 18 as follows:

C12154

“Comparison of size distributions at the top and bottom of the inlet show that the aerosol transmission efficiency is approximately 70% in the size range 0.3-1 μm^{-3} and comparison of total number series show a transmission efficiency of <4% for the smaller particles that dominate the number mode (Whitehead et al. 2010).”

we also propose adding the following to page 25550, line 11 to make it clear that PTRMS measurement were performed using an inlet separate to the one described in the text:

“Ground and airborne VOC measurements were made using Proton Transfer Reaction Mass Spectrometry (PTRMS) (Lindinger et al., 1998). **Ground VOC measurements were made using an inlet separate to the one described above and** further details can be found in Langford et al. (2010) and Murphy et al. (2010).”

2. Page 25557, Section 5: *I think it should be stated somewhere in the text that an important (unstated and not clearly justified) assumption of the mass estimate of MF related aerosol is that the ambient compound(s) that give m/z 82 decompose to MF on the vaporizer and not after electron ionization. Otherwise, there is no reason to expect that the ratio of the m/z 82 signal:total MF organic signal is the same for the ambient sample and MF standard. This is because electron ionization of MF and the types of compounds suggested here to possibly be responsible for the ambient m/z 82 signal are very unlikely to have similar fragmentation patterns. Some justification for this assumption might be available if the retention time of the m/z 82 peak in the GC x GC analysis that is attributed to the ambient aerosol compound(s) has the same retention time as MF, indicating that at least when heated during GC analysis the ambient compound(s) decompose to MF.*

We believe this is a reasonable assumption given that the MF molecule is a complete, stable molecule so is not likely to be an ionization fragment of some precursor. We will make this clearer by including a statement on page 25557, line 13 saying:

C12155

“This estimation method assumes that $\text{C}_5\text{H}_6\text{O}^+$ is entirely from the molecular ion of a thermal fragment rather than a fragment ion produced during ionization. Given that the GC-MS retention times of the m/z 82 peak from analysis of field and laboratory samples were the same, and the tendency of oxygenated organic species to generate odd m/z fragments under ionization (McLafferty Turecek 1993), this is considered to be a reasonable assumption.”

McLafferty, F.W., and Frantisek Turecek. 1993. Interpretation of Mass Spectra. University Science Books, U.S.

3. *Figure 5 caption: I do not understand what these data points are. The caption says median values for the boundary layer for a single flight. From that description it sounds like there should be a single point that was representative of the boundary layer. Further description of what each point represents is needed.*

Each of these points is representative of one flight. All data from a single flight that were recorded in the boundary layer were used to calculate median values of AMS m/z 82 signal and PTRMS MVK+MACR for that flight. These values were then used to plot each point. We propose changing the last sentence of the caption to read:

“Each data point represents the median of all boundary layer data collected during a single flight. Bars are 25th and 75th percentiles.”

Technical Corrections:

1. Page 25549, line 6: “Eath’s” should be “Earth’s”.
2. Page 25551, line 11: Should “(2010)” be “(2011)”?
3. Page 25553, line 24: I think perhaps “atmosphere” should be “boundary layer”.

We thank the reviewer for raising these mistakes. All technical corrections will be changed as suggested.

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