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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Bulk and Molecular-Level Characterization of Laboratory-Aged Biomass Burning Organic Aerosol from Oak Leaf and Heartwood Fuels" *by* Claire F. Fortenberry et al.

Anonymous Referee #1

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Fortenberry et al. present a study that examines links between chemically speciated fresh and aged BBOA data to more bulk measurements of the AMS. They use PMF technique to pull out mass spectral trends in the speciated data and looked mass spectra from compounds that eluted during the thermal decomposition window of the TAG. Their results show 60 m/z, a traditionally used ion for the AMS to track biomass burning, depends on fuel type and aging of the aerosol particles. They also suggest that 44 m/z ion could be used as an estimate for aerosol particle's aging state. This manuscript is written clearly and contributes to the understanding of both the complexity of BBOA and interpreting results from the AMS. I recommend this paper be published in ACP with some minor revisions.

Minor Comments:

Line 38: parallel structure, change to "and impacts" or something along those lines

Line 39: awkward sentence starting with "Organic aerosol. . ." In addition, aerosol refers to both the particle and gas phase. When the authors mean particle phase, please change aerosol to aerosol particle.

Line 164: Traditionally, the radical dot of OH is left off, though the authors are technically correct. The dot just looks a bit strange when used, for example, in line 580.

Line 166: How well-mixed in the PAM reactor? Could large concentration gradients in aerosol particles affect the observed results?

Line 180: add fuels after leaf

Line 210: What is the rate at which the cells are heated to 310ËŽC? There is some discussion that heating rate will affect which compounds desorb vs. thermal decompose. The authors do illustrate the ramping time in Figure 1, but it would be helpful to have it written down in the text.

Line 222: combustion chamber were clean

Line 469: have specific standards been observed to decompose at these ions in this thermal decomposition window?

Line 534 (though may happen earlier): No comma after Kessler. This comma is not needed as Kessler and others (in English) requires no comma even when used in line. Please remove comma in previous+subsequent usages.

Figure 2 (a): The three types of green are very difficult to distinguish. I understand the authors were aiming for green=leaf and warm colors for heartwood, but greens all look the same. Maybe cool colors for leaf and warm colors for heartwood?

Figure 3 (b): Why are syringol, syringaldehyde, and vanillin dotted lines? Is it because

they are observed to increase with aging time? If so, please mention that in the caption.

Figure 8 (a): The greens are hard to distinguish.

Figure 10 (a): The green color gradient is not great and implies there was a near-continuous gradient of samples collected for that range of aging time. There were only three sampled times, so a gradient seems a bit misleading. Also, the colored right-hand and top axes are a bit confusing because the reader is trying to match the green points to the green axis instead of TAG to green. Also, the caption says the dotted lines are guidelines for where the points tend to be concentrated. This doesn't seem to be the case for the green AMS points. The blue dotted line for these points would look more like a rectangle covering the bottom half of the graph then a downward pointing cone. Is there greater meaning behind this cone?

Figure 15 (A): same comment about the green.

Even more minor comments for the SI:

Figure S4: the TAG collection 1 blue shaded region does not look to start at 30 minutes after start of heat pulse as the caption indicates.

Table S5-6: The raw SIC integration numbers have too many significant digits (and is difficult to read). Maybe consider limiting it to 2-3 with scientific notation.

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