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Interactive comment on “Identification and quantification of gaseous organic compounds emitted from biomass burning using two-dimensional gas chromatography/time-of-flight mass spectrometry” by L. E. Hatch et al.

Anonymous Referee #1

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The authors present results from an experimental study exploring the identification and quantification of non-methane organic compounds (NMOCs) emitted from 6 fuels. In this study 722 compounds were either positively or tentatively identified and for the first time sesquiterpenes were identified in gas-phase BB emissions. The study and the manuscript are well organized and documented. Nevertheless I have several comments before this manuscript can be accepted for publication in Atmospheric Chemistry

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and Physics.

Questions: Page 23241, Line 24: How were the samples brought back to the lab? Were plants uprooted or just their leaves/pine needles used as samples? Can you describe potential differences in gas-phase products that one might expect between these two types of samples? How long were samples kept prior to experiments? I see that it is listed in section 3.35 but it needs to be listed in the experimental.

Page 23243, Line 6: What percentage of semi-volatile compound loss is expected from the tubing? This can be tested by taking a semi-volatile compound and flowing through your system measuring the concentration before and after to determine loss. This should also be tested for SQT.

Page 23243, Line 20: Typically glass-fiber filters are baked at ~ 600 C to remove adventitious carbon. How do you know that these filters have been baked at a high enough sample to remove impurities?

Page 23244, Line 1: What were the typical masses of the background and after PM collection?

Page 23247, Line 20: What oxygenated compounds displayed high breakthrough? These should be asterisked in tables and charts.

Page 23251, Line 20: Need to direct reader to Table A1 for abundance of benzene and toluene. How much are your measurements under predicting these values? Why are you under predicting?

Page 23257, Line 24: Why could the relative mass of needle vs. wood not be determined? What are you visually observing?

Page 23260, Line 1: Is there information regarding the lignin content of the plant fuels used in this study?

Minor Questions: Page 23241, Line 16: What differences can potentially occur if the

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fuel sample is not standing upright?

Page 23246, Line 25: What vapor pressure ranges are not characterized by this approach?

Page 23247, Line 1: What is the polarity range that can be used for GC?

Page 23254, Line 2: How much higher are 1-alkenes relative to C12. How much higher are terminal alkene SOA yields relative to internal alkenes?

Page 23259, Line 6: How much error do you expect?

Page 23259, Line 16: What are their volatilities and atmospheric lifetimes?

Page 23259, Line 22: What are negligible ozone concentrations?

Page 23261, Line 6: What were the levoglucosan concentrations in WG compared to the other fuels?

Page 23262, Line 14: This sentence should be more quantitative.

Table 3: The estimated SOA mass could be better constrained by using average OH, O₃, and NO₃ atmospheric steady state concentrations, typical gas-phase bimolecular rate constants for the category of interest and SOA mass yields. Assuming that each compound reacts completely is not a fair estimate of SOA mass since some compounds react very slow.

Figures 1-6: Having the GC spectra is not necessary in each figure and should be put in supplemental information. Axis and labels are very small they font should be increased.

Minor Comments: Several sentence need references, some examples below: Page 23238: Line 23, and Line 25; Page 23239: Line 3; Page 23252: Line 26; Page 23255, Line 1; Page 23261, Line 1.

Page 23238, Line 24: Sentence is awkward, revise.

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Page 23251, Line 23: Sentence is awkward, revise.

Page 23251, Line 25: Compilations is an odd word to use here.

Page 23251, Line 3: Extra period after fuels

Page 23253, Line 2: Awkward sentence, revise.

Page 23253, Line 11: There is an additional reference from this group that also shows aqueous-phase reactions with OH and phenols have 100% SOA mass yields.(Sun et al., 2010)

References Sun, Y.L., Zhang, Q., Anastasio, C., Sun, J., 2010. Insights into secondary organic aerosol formed via aqueous-phase reactions of phenolic compounds based on high resolution mass spectrometry. Atmos. Chem. Phys. 10, 4809-4822.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 23237, 2014.

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