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Interactive comment on “Contrasting organic aerosol particles from boreal and tropical forests during HUMPPA-COPEC-2010 and AMAZE-08 using coherent vibrational spectroscopy” by C. J. Ebben et al.

Anonymous Referee #2

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The authors present a new analysis of biogenically derived atmospheric organic aerosol using vibrational sum frequency generation (SFG). The paper is largely a proof of concept study showing that SFG can be used to differentiate between samples which are expected to primarily originate from isoprene, and those which are expected to form via monoterpene oxidation (based on the emissions profiles in the field sampling regions). Some further insight into particle formation and growth is obtained by analyzing the size dependence of the SFG signal in each location. The information provided by SFG is similar to that provided by FTIR spectroscopy of aerosol particles, but this tech-

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nique is sensitive to sub-nanogram levels of material. The paper is interesting and should be published in ACP after the following issues are addressed.

- I agree with Anonymous Referee #1 that some more discussion of whether just the top surface layer of the collected particles is being sampled by SFG, and what this means for the interpretation of the data in this and future studies, is in order.

- Some more discussion should be provided regarding the chemical identity of the lab-generated SOA, and what differences are expected compared to the ambient SOA. The reference to “reaction cascades” leading to SOA formation from isoprene on page 8 is too vague. Was the relative humidity similar in the chamber experiments and the field? 40% RH is below the deliquescence RH of ammonium sulfate – isoprene SOA formation on deliquesced aerosols vs. “dry” aerosols is expected to be mechanistically different since most isoprene oxidation products are volatile but water-soluble. Could this have contributed to the observed differences in the spectra of the submicron Amazon aerosols as compared to the lab aerosols?

- One of the stated findings of this work is that the organic composition of submicron aerosols formed by monoterpenes is similar, but for larger particles it is not. The authors need to provide some insight as to why that might be. Are the larger particles associated with primary biogenic emissions?

Specifics:

- Page 8: As far as I am aware the use of an ozone monitor to track H₂O₂ concentrations is not common practice so more explanation is needed in this passage.

- Page 13: How was plasma cleaning carried out? If a commercially available instrument was used please provide some specifics.

- Page 21: The sentence “Consistent with work by Riipinen et al. . . .” needs to be clarified (as is it essentially reads: growth is associated with increase in aerodynamic size). Also, that reference to Riipinen et al. is incomplete.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16933, 2011.

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