Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2020-395-RC3, 2020

Atmospheric Measurement Techniques Discussions

Interactive comment on "Airborne Extractive Electrospray Mass Spectrometry Measurements of the Chemical Composition of Organic Aerosol" *by* Demetrios Pagonis et al.

Anonymous Referee #3

Received and published: 8 December 2020

General Comments: The authors present a detailed characterization of the deployment of an EESI-ToF-MS for on-line measurements of biomass burning aerosol particles on the NASA DC-8. The sensitivity, size dependence, and an inter-comparison with both the AMS as well as a CHARON PTR-MS are presented. Overall, the authors are able to quantify and measure the time series for two major biomass burning components: levoglucosan and nitrocatechol. This paper is very well written and clear and it provides detailed discussions of the limitations of all the measurements. I especially appreciate the comparison with off-line HPLC-ESI-HRMS analysis to confirm the assignment of the molecular formulas measured in these flights. Overall, I recommend acceptance after the following minor comments are addressed.

Minor comments: 1. Page 6 second paragraph: "Semivolatile gases are removed by the denuder during sampling to prevent their detection by SESI, which disturbs gas-particle equilibrium, leading to aerosol evaporation inside the inlet." What are the time scales for sampling in the EESI inlet? Would a significant amount of re-equilibration be expected?

2. For negative mode EESI, formic acid was added to the droplets. However, the addition of acids is more common in positive ion mode ESI as it provides additional protons for the analytes. Formic acid can increase the signal in negative ion mode for some systems, but I suspect that is not universal. Were other dopants tested? This may be an area for further characterization on EESI-MS to improve negative ion mode signal for different systems.

3. Figure 1: this can be added to the supplemental, but it would be good to include information on the sizes and distances shown in the figure. Specifically the distance between the electrospray tip and the entrance to the capillary (or a reference for these values if provided elsewhere). As mentioned in the manuscript, focusing the aerosol particles into a smaller volume may improve signal, I also suspect that changing the distance (time) for dissolution and drying/Coulomb explosion to occur will be another variable that would be helpful to optimize in the future.

4. On pages 10-11, the detection limits for levoglucosan are reported with the note that there was variation with the sampling history of the instrument which persisted for hours. Were these same sustained signals observed for levoglucosan calibration runs, or is this signal coming from other components in the biomass burning plumes?

5. For figure 4, I would recommend a small change to the labels as the black trace is labeled "Background" but the caption lists it as "Raw".

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-395, 2020.