

## ***Interactive comment on “Airborne Extractive Electro spray Mass Spectrometry Measurements of the Chemical Composition of Organic Aerosol” by Demetrios Pagonis et al.***

### **Anonymous Referee #2**

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This work describes results from an aircraft deployment of the EESI-MS instrument over Western U.S. fires. The study obtained high altitude, fast time resolution, soft ionization measurements of particle-phase biomass burning marker compounds. The manuscript is very well written and clear to follow. Details of instrument operation, data processing and interpretation, and comparison with two other measurement methods are included. The manuscript focuses more on the development of a new technique for a new application, and less on the science question of biomass plume composition, aging, and transport. It is my opinion that it is an appropriate body of work for inclusion in AMT.

C1

Here I include several specific comments and questions.

1. Line 53: What happens to aerosol components that don't go into solution with electro spray drops?
2. Also, what happens to any extremely low volatility components that don't evaporate and may remain clustered in capillary transfer? (over the  $m/z$  700 that was recorded here)
3. Do all particle sizes interact/contact with the electro spray drops at the same efficiency/extent? I guess the later Fig3b indicates there is size dependence. What about mixing state dependence, although not tested in this study, would you expect to have core-shell type coated aerosol?
4. Is there any chance of ESI liquid composition concentration drifting through the course of a measurement period? This would of course have potential to impact the starting size of sprayed droplets and perhaps the solubility of analytes.
5. Line 105: Applause for attempting and achieving this challenging operation condition. I'm guessing there is much more data not included here that has been filtered out due to instrument operation state transitions
6. Line 110: Did background signals drift significantly over time?
7. Figure 2: Did you intentionally collect any gas-phase signal in this study, beyond what is shown here? (that is, filtering particles and bypassing denuder)
8. Line 245: Agreed, even if all conditions seem unchanged, the technique can be unpredictable and challenging to establish an identical taylor cone at the spray tip.
9. Line 271: why do you think the background levoglucosan signal was so high? Is it slowly evaporating off of non-heated surfaces in the inlet, that had deposited in past samples and standards? Perhaps a deuterated levoglucosan standard could be used in future?

C2

10. Figure 4: a little confusing which mass spectra are being plotted in black and green, raw – background – background subtracted. Please add description.

11. At this point in the paper I'm forgetting where you even did this study. Maybe adding a map at the beginning (even if in supplement) would be helpful so the reader has that visual memory.

12. Any other ions stand out beyond these two for levoglucosan and nitrocatechol? Any oxy-PAH's that may have been soluble?

13. Figure 6: relationship below 10ug/sm<sup>3</sup> of OA seems to deviate.

14. Line 368: AMS C<sub>2</sub>H<sub>4</sub>O<sub>2</sub><sup>+</sup> has been observed to also come from organic acids in laboratory aged biomass burning samples, potentially offering an explanation for the higher AMS biomass signal here (Fortenberry et al, 2018, ACP)

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