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Atmospheric Measurement Techniques
Discussions

Interactive comment on "Quantitative capabilities of STXM to measure spatially resolved organic volume fractions of mixed organic/inorganic particle" *by* Matthew Fraund et al.

Anonymous Referee #1

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I have read "Quantitative capabilities of STXM to measure spatially resolved organic volume fractions of mixed organic/inorganic particles" by Fraund et al. This manuscript discusses how organic volume fractions should be calculated for organic/inorganic particles using analysis of STXM/NEXAFS data. Because this is a powerful single particle technique, the results will be useful to the community. However, I found the paper unsatisfying in two main aspects: 1) Most of their results that they discuss at length in 3.2.1 and 3.2 likely have a lot to do with the viscosity of the system. Yet, viscosity is not discussed. A organic other than sucrose should have been used to minimize the effects of viscosity. 2) There is a huge spread in the organic volume fractions calculated for individual particles, even if the average value is close to the bulk value. The

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authors acknowledge this, but do not have a good explanation. It is unclear, then, how useful this technique will be for the calculation of organic volume fraction.

pg 2, line 11-12: It is not clear what “is assumed” means. Did you use sucrose, but then figure out the OVF difference if you assumed sucrose was adipic acid? Or is there a higher error with adipic acid and sodium chloride rather than sucrose and ammonium sulfate?

pg 3: Single-particle mass spectrometers should also be included in this discussion.

I suspect the multiple inorganic rich areas in Figs. 3 & 4 are due to fast drying in a viscous solution. Could you comment further about the origin of having multiple inorganic-rich regions?

pg 7, line 30: NaCl is visible in the C speciation map due to the thin coating of organic compounds on the particles. This could be more clearly explained in the text.

Section 3.2.1: The size regime is much larger than that in Altaf and Freedman 2017 and Altaf et al. 2016. Viscosity likely has a large effect on your results, and should be addressed in the manuscript. See for example Fard, Krieger, and Peter JPCA 2017, 121, 9284. It would have been better to use a much less viscous organic for these studies.

Fig. 6: There is such a spread in the 1:1 ammonium sulfate/sucrose data. Even if the average error is 4% compared to bulk measurements, the determination of OVF is not accurate for this system. The authors don’t have an explanation for this large spread. It does not seem like ambient measurements will be very accurate, though perhaps this paper provides insight into how these measurements should be made and what sort of error is associated with them.

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