Atmospheric Measurement Techniques Discussions

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Comment on amt-2021-186

Anonymous Referee #2

Referee comment on "Fragment ion–functional group relationships in organic aerosols using aerosol mass spectrometry and mid-infrared spectroscopy" by Amir Yazdani et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-186-RC2, 2021

The manuscript "Fragment ion-functional group relationships in organic aerosols using aerosol mass spectrometry and mid-infrared spectroscopy" presents an attempt to combine two methods, aerosol mass spectrometry (AMS) and mid-range spectroscopy, to extract information and gain further inside into the composition of organic aerosols, especially regarding functional group information.

Information from the Aerodyne AMS with its very good temporal resolution but strong fragmentation due to thermal desorption and subsequently electron ionization is combined with mid-infrared spectroscopy with low temporal resolution but very detailed analysis of the functional groups of the analyzed organic aerosol. Together with the thorough mathematical framework presented by the authors this results in very detailed profiles of the temporal evolution of the analyzed organic aerosol.

Thus, the study presented by the authors is a very important contribution and justifies publication after some minor changes and corrections.

The manuscript could benefit from a small revision regarding readibility due to the large number of used abbreviations and acronyms, wrong punctuation, and unnecessary filler words.

Another general point are the concluding remarks. These are quite short for such a long manuscript with important results which could prove quite useful for the AMS comunity. A more conclusive summary of the manuscript would be very helpful for the audience.

One last general remark (respectively question): while title suggests that the manuscript deals with organic aerosols in general, the experiments conducted by the authors are all combustion related. Can the developed methods and comparisons be applied to other

types of organic aerosols (e.g., SOA from VOC precursors), or did the authors already try this?

Specific comments and technical corrections:

L32: In which way are these functional groups influential to AMS OM?

L58: I believe "electron ionization" is the correct term for the ionization method used by the Aerodyne AMS.

L172: Should be "… show the production of fragments from FGs". Same in L177, the fragment ions are not produced by the functional groups!

L176: I recommend using "small" instead of "light".

L191: Please rephrase this sentence: "Thereafter, the high-resolution O:C ratios separated … were calculated from the high-resolution resolution FG compositions …".

L265: Should be "… which is reflected …".

L266: What is a "local slope"? Please rephrase.

L270: Could there be other reasons for the bend in the van Krevelen aging trajectories (e.g., wall losses)? Where the mass concentrations similar for all those experiments?

L309 (also L311, L322, …): I recommend using "large" instead of "heavy".

L310: "… these aerosols is …" should be "… these aerosols are …".

L310-L311: What are "relatively longer chain hydrocarbons"? Relative to what?

P15, Fig. 5: The chemical composition? of the individual fragments in the plot is illegible and superfluous since all the important fragments are labelled. The same applies to Fig. 6.

L462: Again, I recommend to use “small” and “large” instead of “light” and “heavy”.