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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Organic aerosol source apportionment in Zurich using an extractive electrospray ionization time-of-flight mass spectrometry (EESI-TOF): Part II, biomass burning influences in winter" *by* L. Qi et al.

Anonymous Referee #1

Received and published: 4 March 2019

The authors present PMF (ME-2) based source apportionment of organic aerosol measured with AMS and EESI-TOF at an urban background site in Zurich, Switzerland, during a few days in Winter 2017. There exist already quite a few source apportionment studies from this location, which therefore provides a good opportunity to showcase the additional possibilities of the newly developed EESI-TOF, especially related to molecular identification of SOA compounds from different sources. This is an interesting and well-written manuscript and well suited for ACP, and I suggest its publication after addressing the comments below.

General comments

The measurement campaign was very short (January 25 – February 5), so the authors should add a short discussion on the significance and representativeness of their results.

Also a short note should be added on why PMF was done separately for AMS and EESI-TOF data, and if the authors expect results to differ for a combined approach (if possible at all).

Conclusions are a bit meager, and some effort could be taken in better describing the (atmospheric) implications of the results.

A few important references are given as "in prep." (also see specific comments below)– if these references are not available soon the authors should consider removing them and adding more information to the present manuscript.

Specific comments

P. 5, l. 9: What is "most"? Since the paper about the instrument is not available yet, this statement has to be made more quantitative/explicit. Which gas phase species are removed, based on what properties? The denuder only "reduces the gas phase background" – so what is left?

P. 5, l. 12: This might be discussed in the instrument paper, however, as this is not available, a short discussion should be included here: Are artefacts due to extraction to be expected, depending on solvent?

P. 5, l. 15: This implies heating afterwards. Please clarify.

P. 5, l. 26 – 32: Have the authors tried to relate the mass flux to ambient concentrations? Please discuss this. Do the authors expect a simple calibration with levoglucosan to be able to cover "instrument flow rate, EESI extraction/ionization efficiency, declustering probability, and ion transmission"?

P. 6, l. 11 -13: Please include (e.g in the supplementary) more details on error calculations (show data periods chosen, values etc.) This can be very useful for readers / future users.

P. 8, l. 1-2: Why were exactly these factors constrained in the AMS PMF? Please clarify. Does that introduction of subjectivity distort your solution?

P. 11, l. 16 – 18: How do the diel patterns of the nicotine and COA factors compare? Could it be that they are similar due the influence of restaurant opening times, with people gathering outside the restaurants to smoke?

P. 12, l. 6-7: As Figure 2b shows, C8H12O6 has a very prominent signal in the LABB spectra. The authors speculate that this ion represents hydroperoxides from the oxidation of phenolic compounds by OH radicals during daytime. Biomass burning seems to be mostly going on during evening/night times – how come daytime oxidation of compounds primarily emitted at night would have such a bit signal?

P. 12, l. 14-15: Already mention here what this “different” thing is

P. 12, l. 23 – 25: January 27 – 29 was a weekend, and a quick google search revealed that the Zurich game festival (http://www.ludicious.ch/ludicious-2017/) was taking place then, which would mean a lot around Zurich Kaserne, eating, smoking. . .Also LABB2 is high then, despite higher temperatures. How do the authors explain this?

P. 15, l. 31 – 33: How sure can the authors be that the molecular formulae they measure correspond to the mentioned compounds? Please add a short discussion on this uncertainty.

Technical corrections P. 2, l. 19 – 21: Sentence structure

P. 3, l. 16: Family?

P. 3, l. 23: It would be beneficial if this paper was available once this manuscript is online

P. 4, l. 24: I suggest removing this reference unless the paper is available at the time of publication of this one.

P. 6, l. 1: Number fitting?

P. 6, l. 6: Servo and MS? Specify

P. 7, l. 20: Minimizes

P. 17, l. 7: separately?

Fig. 2, 6: Add arrows/lines to clarify the corresponding stick labels

Fig. 10: The figure looks squished

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