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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 #2

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General comments:

The manuscript presents an investigation of the performance of a novel technique, extractive electrospray ionization time-of-flight mass spectrometer (EESI-TOF), to measure ambient organic aerosol (OA) composition in real-time and characterize it into a near-molecular level. Factor analysis of molecules identified by the new technique resulted in 11 factors comprising five primary organic aerosol (POA) and six secondary organic aerosol (SOA). EESI-TOF allows a more detailed molecular identification of OA compared to the established aerosol mass spectrometer (AMS), and yet the two

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Discussion paper

techniques show a good agreement in terms of bulk analysis and groups of factors. The study is well within the scope of Atmospheric Chemistry and Physics journal. The manuscript flows logically, and the figures are clear. I found a few technical issues as listed below. Also, I have some questions and suggestions as described in the following. Finally, I would recommend publishing the manuscript after addressing the comments.

Specific comments:

a) In Figure 2a, time delay seems to exist between LABB1 and LABB2 and levoglucosan (C6H10O5) for peaks on 28-29 Jan. Also, in Figure 4a, LABB1 has a higher O:C and lower H:C compared to LABB2EESI. These might indicate LABB1 is more oxygenated. It could also originate from a different source from LABB2. How does the wind regression analysis for these factors show?

b) In the discussion of SOA factors (Pg. 15 Lns. 12-15), instead of a time series plot (Figure 6b), a diurnal plot will better show the daytime cycle of SOA2. Also, I am not sure what is the evidence of that both factors (SOA1 and SOA2) are associated with SOA as opposed to the OOA-AMS factors. If it is due to similarities of the SOA factors mass spectra to the monoterpene-related factors (Pg. 15 Lns. 5-6), I think it is more convincing to compare (plot correlation) of the mass spectra.

c) For the nitrogen-containing SOA factor, could the variability in time between the high peak at the night of 3-4 Feb and the small peak at the night of 28-29 Jan associated by a change in temperature, or was it caused by shifting of air masses? What the wind analysis or back-trajectory analysis suggest?

d) The factor dendrogram seems to resolve five groups instead of three (Figure 11); SOA1 and EVENT factors are one group, and SOA2 and NSOA factors are another group. What do these groupings suggest in terms of characteristics? The discussion of factors dendrogram in Pg. 17 Lns. 6-10 could be expanded to include these groups.

Technical comments:

a) Pg. 15 Ln. 21: Ratio of N:C of NSOA in Table S1 is 0.04.

b) Pg. 16 Lns. 13-14: Check the percentage contribution of syringic acid and vanillic acid that are apportioned to MABB factors. Based on Figure 10b, they are supposed to be 52% and 66%, respectively.

c) Pg. 16 Lns. 23-24: Be consistent with the decimal of percentage. The percentage can be off if the decimal is included.

d) Table S2: LAWB1 refers to LABB1? Check the acronyms of factors and make them consistent throughout the main text and supporting information.

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