

Interactive comment on “Urban increments of gaseous and aerosol pollutants and their sources using mobile aerosol mass spectrometry measurements” by M. Elser et al.

Anonymous Referee #3

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The paper by Elser et al. summarizes mobile springtime measurements of aerosol concentrations and several gas phase species in two Estonian cities. The measurements allowed the authors to identify 4 classes of OA in both cities. Overall, aerosol composition in both cities was similar and was dominated by higher concentration of primary types of OA during the day and by lower amount of secondary OA at night. Contribution of the secondary inorganic species was low except during a transport event.

The manuscript is very well-organized and well-written. There are two aspects that need some work in my opinion. One is related to wind direction and its variability during day and night sampling and how it might affect the interpretation of the results (see my comment below). The other aspect is that since the measurement was done

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in two cities, I think more can be done to compare quantitatively aerosol air quality in these two cities. Since measurements of CO are already available, I think it will be valuable to look at the enhancement ratios (not by subtracting a background) but considering scattering plots of say OA vs. CO, BC vs CO (or the PMF-resolved factors or other species vs. CO) in comparable times of the day to separate out the differences in dynamics, boundary layer heights, dilution, etc. and be able to determine a more valuable comparison of the aerosol sources in these cities. This will also allow the authors to compare the measurements with other measurements (ground based on airborne) in other cities around the world. I support publishing the paper after my comments (above and below) are addressed.

Abstract: indicate which month/season the measurements were carried out.

P5, L3: It is mentioned that stationary measurements were made at night. Were there any mobile measurements also carried out at night?

P8, L2: Explain why $A(\text{abs})=1.7$ was used for wood burning BC? And why was it that the lower wavelength of 370 nm was not used? Doesn't it make sense to use 370 nm since BrC would be stronger there?

P8, L16-17: Just looking at Figure 2, it seems standard deviations of the averages would be really high, and maybe that's why they're not indicated along with the average values in Panel B. I wonder if estimates of the median values (or to be more complete, box and whisker plots) of the tracers will be more valuable than the average values.

P11, L15: missing a word "...of ?? (data??)..."

P12, L1: replace kurbside with curbside

Figure 2: I suggest having the inorganics on a separate axis, with max $\sim 10 \mu\text{g}/\text{m}^3$, so you can see the tracers better.

Figure 5: For some species, it appears that the conc. were very different on different sides of the loop, suggesting that the sources are towards the center of the loop (as

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opposed to one side, e.g., BBOA and sulfate). In other words there is gradient in the latitudinal direction as well as longitudinal direction. To further investigate the source regions, it makes sense to consider wind direction data with these distribution maps. Were wind directions consistent during the day and night sampling time? It seems the averages include both daytime and nighttime. Could you add average wind barbs representatives for daytime and nighttime or at least discuss the wind patterns in the text? Correct interpretation of the mean and median values in Table 2 with relation to the source regions also needs some knowledge of the wind direction.

Figure 7: Indicate in the legend that enhancement is relative to P05 values.

Table 2 legend: Indicate which city the stats refer to.

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