



EGUsphere, referee comment RC1
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Comment on egusphere-2022-667

Anonymous Referee #2

Referee comment on "Source apportionment of VOCs, IVOCs and SVOCs by positive matrix factorization in suburban Livermore, California" by Rebecca A. Wernis et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-667-RC1>, 2022

The author deployed a state-of-the-art instrument named cTAG to simultaneously measure speciated VOCs, IVOCs, and SVOCs. Such instrument is a powerful tool to study atmospheric organic carbon, given its wide range in volatility and degree of oxidation in the atmosphere. The sources of measured compounds were apportioned using the PMF model, and 13 factors were finally resolved. The results described comprehensive and detailed sources of organics in the real world (e.g., personal care products and asphalt emissions), and also the secondary oxidation processes. The measurement and calibration appear to be carefully performed, and the paper is clearly written. In reading through the preprint, it is considered that the article still needs to address the following concerns:

- The sources of organic carbon might be closely associated with the sampling site and surrounding environments. I suggest the author provided a map to describe the geographical location of the sampling site, which is also helpful for readers to better understand the source interpretation in the following context.
- Hourly VOC, IVOC, and SVOC speciated measurement was designed for this study. Compared with I/VOC channel, the SVOC analysis needs online derivatization. I recall in the previous AMT paper (Wernis et al., 2021), the authors measured SVOCs in a bihourly cycle. I wonder if the reduced time resolution affects the derivation efficiency.
- Some problems are related to PMF analysis.
- I noticed that the author put much effort into interpreting the source profile for individual sources. However, the contribution of individuals should also be presented, which is helpful to evaluate the effects of the individual source on atmospheric organic carbon abundance. I made a rough estimation for the individual source contribution based on Figure 3. It seems that Factor 3 (gasoline) and Factor 5 (consumer) should be the two largest contributors. However, the represented compounds in these two factors are most I/VOCs. As the author has mentioned in line 268 and shown in Figure S6, the I/VOCs compounds dominated the total measured compounds (87%) and resolved source profile. It is not surprising that the fraction of compounds of high volatility will be dominated all measured compounds across wide volatility, as they are more easily dispersed in the atmosphere. Therefore, my major concern is if you input species across such wide range of volatility into PMF, will the high mass fraction of high-volatility species also dominate the apportioned source? In other words, if you only use

the SVOCs dataset, will some new sources be resolved?

- Factor 1 represents the long-lived and continuously emitted. If the factor is continuously emitted, why did the peak value of this factor occur at night (Figure 3)? Moreover, for the cooking/diesel factor (Factor 11), why the peak value was also found at night? To my understanding, this factor should be associated with human-related activities. It would be helpful if the author could clarify these trivial issues in the manuscript.
- Figure 4: the association of arrow length and wind speed should be added as a legend on the graph. Besides, it would be more helpful if the author could add some dashed lines for the readers to separate each day.