

Atmos. Chem. Phys. Discuss., referee comment RC3
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Comment on acp-2021-32

Anonymous Referee #3

Referee comment on "Tracer-based source apportioning of atmospheric organic carbon and the influence of anthropogenic emissions on secondary organic aerosol formation in Hong Kong" by Yubo Cheng et al., Atmos. Chem. Phys. Discuss.,
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Overview:

Cheng et al. performed comprehensive chemical analyses on 49 air filters collected in Hong Kong using GC-MS. They used chemical tracers and standards to characterize the organic species from the filters and then applied both PMF and TBM methods to perform source apportionment. Their results show that the temporal trend of these two methods agree with each other however TBM factors only account for a small portion of the PMF factors. They also show that IEPOX pathway is the dominant pathway to form isoprene-derived SOA during their sampling period by combining chemical characterization with box modeling. Lastly, the team performed correlation analyses to examine the correlation between each SOC factors and common ambient chemicals such as ozone, nitrate, particle sulfate, and acidity and showed different compositions of the SOC may be affected by different chemical species. Overall the manuscript is well written and the chemical analyses are rigorous. The manuscript is recommended for minor revision. I have the following comments for the authors to consider before publication.

Major Comments:

The first major comment I have is mainly related to the description of the PMF method and how they are related to the conclusions. Did the author use the EPA PMF or the Igor based PMF? Which version of the software did the author use? Why the uncertainties of OC/EC and other tracers were set to 20% and 40%, respectively? In addition, any intermediate results on the PMF showing the optimal number of factors to use should be six instead of other values? The author could provide more information about PMF in the SI section to further validate the analysis.

Similarly, when the author characterized the filter samples into three different categories, i.e., the local sources, the long regional transport, regional source, the back trajectory data and the related information should be provided in the SI as well.

Another comment I have is about the correlation analyses. The author did both Pearson R analysis and the multivariate linear regression (MLR) analysis. The correlation factors in these two analyses do not agree with each other for many categories based on the results in Table 3 and 4. Can the author provide some discussions to explain why the correlation factors from these two analyses do not agree with each other, or even showing opposite trends? And how would the author determine which values to trust?

My last major comment is about the sample collection time. The filter sample collection spans almost a year. The VOC emissions and atmospheric oxidation chemistry might be quite different for summer and winter seasons. Would combine all the samples from different seasons together miss any seasonal variabilities and lead to misinterpretation of the data?

Minor Comment:

L19: Should SOC be defined first?

L80: the sample collection

L223: "b" in beta should be lower case and "C" in Caryophyllinic should be upper case. Beta should be italic as well.

The categories in Table 3 and 4 should be in the same order for easy comparison.