

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-141

Anonymous Referee #1

Referee comment on "Evolution of source attributed organic aerosols and gases in a megacity of central China" by Siyuan Li et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-141-RC1>, 2022

This study presented concurrent measurements of detailed mass spectra of aerosol particles and gases in an urban environment in Wuhan, a megacity in central China. The authors emphasized the two most intensive anthropogenic sources, the traffic source and cooking, and in details investigated the primary emission, secondary production/transformation of organic aerosols and gases, under the influence of two typical meteorological conditions. The results and analysis provide insights and improve the understanding on the organic aerosol-gas conversion and SOA formation, for the important sources on high population exposure in a typical anthropogenically polluted environment. Because the concurrent measurements in both phases are rare, in particular for the region in central China, it is also a very valuable dataset. I would recommend for its publication after addressing the following minor comments.

1) It will be useful to add some diagnosis for the PMF results from measured VOCs. More discussions on the choice of PMF factors should be given for VOCs. The conventional PMF analysis on VOCs only used a few species. Here a bunch of species are used. The difference regarding the species input for PMF should be given, and what is the advantages and disadvantages between both approaches.

2) It is interesting to see a substantial fraction of secondary oxygenated VOCs and even for oVOCs, a few factors can be resolved with different levels of oxidation. This reflects the feature of PTR measurement using proton as ion source, which prefers to measure oVOCs. Some discussions will need to discuss the nature of oVOCs you observed rather than primary hydrocarbons, which may place some limitation for the conclusion here.

3) It would be useful to point out what the policy maker could benefit from current study, such as the potential benefits to regulate the nighttime and daytime emissions. The importance in controlling the highly oxidized species in the daytime may be emphasized. This will help increase the impacts of this study.

Other technical correction:

Line 26, needing to define O/C

Line 41, before? Needing changing a word.

Line 42, allow the online attribution

Line 69, in a typical region of mixed sources of ...

Line 74, initializing

Line 75, The cluster analysis

Line 102, VOC compound

Line 103, at which temperature?

Line 121, the model fits the data well

Line 149, high temperature

Line 127, electrical mobility diameter

Line 130, need a slope value for the PM closure

Line 137, non-refractory

Line 146, temporal evolution

Line 150-154, what these different air mass histories can tell?

The quality of Fig. 1 needs to be improved.

The y-axis are very confusing for Fig. 1d, is the green for OA?

Line 168, contained some fragment markers... may have been overwhelmed

Line 173, maybe needing more decimal.

Line 174, marker fragment

Line 174, a major peak

Line 179, account for a mass fraction?

Line 180, which was popular

Line 181-182, needing to rewrite, as it already mentioned about the two factors, how could it be "further" separated.

Line 184, the oxygenated fragment

Line 186, but higher concentration

It needs some emphasis that OOA1 was highly associated with the RH.

Line 191, similar to what factors in those studies? The discussions here need to be specific.

Line 193, at round noontime of up to ..., indicating the photochemical production

Line 195, the reference here needs to be specific, what kind of agreement.

Line 204-206, this sentence needs rewriting.

Line 207-209, the sentence needs some breakups.

Line 210, in addition to its consumption

Line 212, not preferred, is more likely

Line 213, for nocturnal chemistry

Line 217, cooking emissions

Line 219, surged?

Line 220, this sentence is hard to understand.

Line 239, the mean contribution

Line 243, the vapor pressure needs a reference temperature, is it in logarithmic?

Line 259, was. You need to check through the tense.

Line 260, but increase?

Line 268, showed

Line 275, as intermediately involved

Line 276, in the OOA2 factor

Line 277, by the traffic source, via the oxidation, partitioning, further condensation

Line 291, remove or add a bracket

Line 310, the concentrations are normalized

Line 314, is the main driving factor

Line 315, showed

Line 323, reaction rate

Line 356, the different

Line 357, remove as