

Atmos. Chem. Phys. Discuss., referee comment RC3  
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## Comment on acp-2021-1007

Anonymous Referee #3

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Referee comment on "PM<sub>2.5</sub> Source Apportionment using Organic Marker-based CMB Modeling: Influence of Inorganic Markers and Sensitivity to Source Profiles" by Yingze Tian et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-1007-RC3>, 2022

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### Interactive comment on "PM<sub>2.5</sub> Source Apportionment using Organic Marker-based CMB Modeling: Influence of Inorganic Markers and Sensitivity to Source Profiles" by Tian et al.

The manuscript investigated the influences of source markers (e.g., with or without inorganic markers) and source profiles (e.g., local or nonlocal/nonnative) adopted in CMB model on the PM<sub>2.5</sub> source apportionment results based on a dataset collected in Chengdu City in China. Several papers on similar topics have also been published in recent years (e.g., Srivastava et al., 2021 ACP; Chow et al., 2022 STOTEN). Generally, the statement and discussion in this manuscript are too general and bland. The authors should clearly highlight their scientific questions and contributions, and improve the manuscript to make it meet the standards of high quality of ACP journal.

### Major Comments

**(1) Title:** The meaning of "sensitivity" in the title was not clear.

**(2) Abstract:** The topic of the first sentence is the CMB model, which was not the focus of this study. The authors should clearly present the scientific questions especially those unsolved questions. Generally, the authors need to tease out their new contributions and

findings of this study more clearly and forcefully in the abstract.

**(3) Introduction:** There are many common and insignificant descriptions which are not favorable for the understanding of current knowledge and research progresses on PM<sub>2.5</sub> source apportionment based on receptor models. Furthermore, the authors should also introduce/summarize the research status based on other source apportionment methods, and address the advantage of using CMB compared to other methods.

**(4) Methodology:** More details should be given in this section. For example, the authors should clearly present the detailed inorganic and inorganic markers they used in the OM-CMB and IOM-CMB models. Besides, it is better to list/present the source profiles used in this study in the Table or Figure. Furthermore, the authors should clarify how they convert the OC source apportionment results to PM<sub>2.5</sub> source apportionment results in this section.

**(5) Results and discussion:** In this section, the authors presented their results more like a technique report by reporting numbers, lacking further interpretation and discussion. The similarity and difference of using OM-CMB versus IOM-CMB, or local source profiles versus nonlocal source profiles, which were the main focuses of this paper, were not clear. Please revise and improve.

**(6) Figures:** The presentation of the figures in this manuscript should be improved to match the journal figure styles. The figures were not well presented or interpreted, and were not that straightforward. Furthermore, "Sensitivity of source apportionment to source profiles" should be an important section as it has been addressed in the title. However, there was no figure or table related to represent and support the discussion about this section. Please add one.

**(7) Conclusion:** The conclusion section looks quite similar with the abstract. Please revise it. Conclusions should be drawn and atmospheric implication should be given in the section.

### **Other Comments**

Line 45-46: revise to "exposed to high PM<sub>2.5</sub> mass concentrations".

Line 46: "impacting sources" can be replaced by "PM<sub>2.5</sub> sources"

Line 64: Do the authors mean that such studies were conducted based on individual organic and inorganic markers together? or just with bulk OC?

Line 71: Please add references.

Line 88-89: Please clarify what "the other source contributions" mean.

Line 104: "The sampling points" can be replaced by "The sampling sites".

Line 106: "each sampling lasted for 22h" can be revised to "the sampling duration was 22h."

Line 117: The first sentence of this paragraph can be revised to "Source specific inorganic and organic markers were analyzed, including OC, EC, ions....".

Line 120-121: What types of extraction and digestion methods were used in this study?

Line 144: "Fifteen ml" should be replaced by "15 ml". And please check the number. 15 ml/10 ml was not equal to v/v 1:2.

Line 150-152: Please explain why levoglucosan was not analyzed by GC-MS together with other polar compounds.

Line 154: Please clarify what "the other organic markers" represent here.

Line 164: Do the authors mean that they use desiccators to balance the filters? Please explain why and how to control the RH and temperature conditions.

Line 167-170: This sentence should be revised.

Line 175: What "most organic compounds" include? Please give more information about the recoveries of different compounds.

Line 197-202: It is not quite clear how nitrate and sulfate source contributions to  $PM_{2.5}$  were determined based on OM-CMB methods.

Line 210-211: What about the influences by other sources that might be not included in the current source apportionment results? BTW, do the authors mean that they used 1.8 for the conversion of OC to OM and SOC to SOA? Please add references and explain why this conversion factor (1.8) was used.

Line 212-213: Please explain why "vegetation detritus did not work in this calculation".

Line 213-215: I cannot understand why there was vegetation influence on soil dust. Please further explain why.

Line 240: Maybe better revise "which were measured by ourselves" to "which were reported in our previous publication (Tian et al., 2021b)".

Line 305-306: not well presented in the current figures.

Line 317-321: Please give/show the information of meteorological parameter and gases precursors data during the study period in figure or table. Or add references here.

Line 347: It should be unified to use " $SOA_{EC}$ ". Besides, the authors should further explain or present the evidences to support that the SOA estimated by the IOM-CMB were consisted with the  $SOA_{min}$  than that estimated by OM-CMB.

Line 365-366: Since organic markers and inorganic markers were both input in IOM-CMB model, why C31 was not used for dust in IOM-CMB model? Please show what sources markers were used for different source identification.

Line 368-370: Please clarify and detail what "other source categories" might influence the determination of cooking contributions.

Line 382-383: Please add references here or provide related data for evidence.