

## Comments

In the paper entitled “Chemical composition, source and formation mechanism of urban PM<sub>2.5</sub> in Southwest China”, the authors used different techniques to investigate the properties of fine aerosols in Chengdu at the beginning of 2023. The investigated time period was divided into two pollution events and the reasons causing these pollution events were clarified. Although this paper showed us many pieces of information about the pollution, my feeling is that this paper is more like a report than a scientific paper. The methods used in this study are normal. The results are plenty but I did not find many new scientific findings from this paper. However, considering the hard work made in this study, I would like to give the authors a chance to revise their paper by highlighting the new findings in the revised manuscript. Thus, my suggestion is a major revision for this paper. The detailed comments are listed below.

1. Blank lines should be added between paragraphs.
2. Line 146, as the author mentioned, aerosols in China show new features recently. However, I did not find many new features presented in this paper. The one I found is that a less importance of sulfate and a stronger importance of nitrate in Chengdu. But what is the situation in other cities of China? I guess the situations are perhaps the same due to the policy released by the national government. Thus, I suggest the authors summarize the major new findings they found in this study and highlight them explicitly in the revised manuscript.
3. Line 231, please explain OM and EC here so that readers who are not familiar to these abbreviations can understand them.
4. Line 242, similar “to” the ....
5. Line 257, local sources include anthropogenic and natural emissions. The authors made a sensitivity test by switching off only anthropogenic emissions, so the results can only depict the influence of local anthropogenic sources
6. Lines 295-345, as the information given here is not very related with the topic of the paper, I suggest the authors largely shorten it.
7. Line 378, lower than that of Feb. 3 or Feb. 4? It was written that a haze alarm was released on

Feb. 4.

8. Lines 378-382, the reasons can be various such as the change of meteorological conditions, so please give your evidence here.
9. Table 2, is that better to show a figure instead of the table here as the numbers may not be that important.
10. Line 495, should we look at Fig. 1(a) or Fig. 1(b)?
11. Line 698, how did you calculate these contributions? Please give the definitions of the contributions and the methods obtaining them.
12. Line 698, again, the local sources here include only anthropogenic sources.
13. From Fig. S2 in the supplementary information, the model results of  $PM_{2.5}$  and observations are not in a good consistency. Therefore, I doubt about the validity of the results shown in Section 3.6. In addition, my feeling is that the WRF-Chem simulation is not very associated with the topic of the paper, is that possible to remove this part?
14. Line 755, it is always better to share the data to the public instead of giving this sentence.