

## ***Interactive comment on “Insight into the Composition of Organic Compounds ( $\geq C_6$ ) in $PM_{2.5}$ in Wintertime in Beijing, China” by Ruihe Lyu et al.***

### **Anonymous Referee #1**

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General comments: This paper described the characteristics of organic compounds ( $>C_6$ ) in  $PM_{2.5}$  from Beijing during wintertime. More than 300 organic compounds, accounting for approximately 47% of the total organic compounds in the chromatogram, were detected by GC $\times$ GC-TOFMS. The overall strength of this study is acquisition of a detailed dataset of organic compounds taken over one-month period that spanned non-haze and haze days. The topic of the paper is well suited for ACP, and the data itself are interesting. On the whole, English language requires substantial improvement throughout the manuscript. Many sentences are not clearly written, leaving the reader puzzling about their meaning. In addition, the overall weakness is the data interpretation. More effort needs to be put into presentation of the results. I have some points

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where more information is needed or where I disagree.

Specific comments: 1. Introduction: The characterization and source identification of organic compounds in PM in Beijing have been extensively studied. I would suggest authors to improve the introduction by summarizing these previous studies and providing some results in line with the major conclusion of this study.

2. Line 70: A reference here, regarding the number "96  $\mu\text{g m}^{-3}$ " was taken, would be helpful.

3. Line 73 and throughout the paper: Please give a definition of PAH species at their first appearance in the text, and then the abbreviation should be used. Nomenclature for PAH or PAHs should keep consistent throughout the paper.

4. Line 75: Please clarify the importance of group type used in this study.

5. Line 80: What does "three independent analytical dimensions" here? Not two-dimensions?

6. Line 95: The objective of this study is to identify the sources and formation processes of the organic compounds. Is there any new findings on them which can not be obtained by conventional method? Please clarify in the text somewhere.

7. Line 105: Please check the location of the sampling site. 89°58'28"N, 110°62'16"E is right?

8. Lines 167 and 168: "4 mean concentrations within 18%, 6 within 10-20%", here what are the difference between 18% and 10-20%?

9. Lines 175-185: I would suggest the authors to give a general characteristics of pollutants and meteorological conditions during haze and non-haze days, respectively, since the authors focus on the comparison between the characteristics of organic groups on non-haze and haze days.

10. Line 203: Here, the authors cited the study in Nanjing. It would be better if the

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authors compare their results with the previous studies in Beijing.

11. Line 209: Haze has been defined in Line 176. Here, consider deleting the definition.

12. Line 221: Table 1 shows the comparison of identified organic compounds between the present and previous studies in Beijing. We can see the big differences. Is it possible that the differences may arise from the differences in analytical techniques? or meteorological conditions? Additionally, can the authors speculate something about the data in this table? The n-alkanes make the greatest contribution to the identified OM. Why no alkanes in this table? Why DBP, EDP and so on are classified into the groups of Alkylated-PAHs, and Ester again? The concentrations of phenolic compounds are up to 2739 ng m<sup>-3</sup>? It is impossible in my opinion.

13. Section 3.3: The authors compare the characteristics of five organic compound groups on haze and non-haze days. I feel this section could be greatly improved. I suggest they focus on the more conclusive finding of this study rather than the previous studies. I use the part of n-alkanoic acids to illustrate my main concerns of this section. They have gone to the previous studies too many words, from Lines 224-243. Only two sentences described the present results. And the authors state consistent results for the acids were observed in this study. If so, how is the different? how is the consistent? The concentration levels or the distribution or whatever? From my opinion, they are significantly different in concentrations. I personally suggest to consider these differences and provide an in-depth insights into them. Additionally, section 3.3.1 title includes alkanones, but I can not see any description about them in this section. On the whole, I would recommend rewording Section 3.3 to focus on the new findings of this study.

14. Lines 429-431: The authors attribute the similar increase of n-alkanes and branched alkanes to a common source. I am not really able to follow what authors mean. Does that mean they are from the same source? This needs to be properly

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explained. Not only the sources but also the atmospheric processes that could lead to the similar changes.

15. Section 3.5: I think this section is the novelty of this study. I believe that the tables represented in supplement appear to be more important. So I would suggest bringing some supplementary tables to the main text and providing more discussion in this section.

16. Line 464: A reference would be helpful.

17. Section 3.6: I feel authors draw mostly speculative conclusions in this section. It is not surprising to observe the complex physical and chemical processes of ambient aerosols. In fact, many researches have reported these complexities already. Then, what is the new finding of this study? Please clarify.

18. Figures 1 & 2: I am not able to follow what authors mean. What is the difference OPAHs in "O-PAHs" and "Alkyls-PAHs & OPAHs"?

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