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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Non-polar organic compounds in aerosols in a typical city of Eastern China: Size distribution, gas-particle partitioning and tracer for $PM_{2.5}$ source apportionment" *by* Deming Han et al.

Anonymous Referee #1

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This study analyzed the molecular composition of non-polar organic compounds (NPOCs) in PM2.5 and their size distributions at Jiujiang city. The target NPOCs include n-alkanes, PAHs, and hopanes. Diagnostic ratios and PMF model were applied to the compositional data to evaluate the sources and atmospheric processing of PM2.5. In general, this work is well organized and written. However, I still think this work lacks novelty, and would not recommend this manuscript to be accepted for publication at Atmos. Chem. Phys., although a lot of chemical and data analysis work have been done.

General comments:

1. PMF model was utilized to apportion PM2.5 components to factors/sources. However, the author did not provide any information about the method in the manuscript or supporting information. Which version of PMF model (PMF2 or EPA PMF 5.0) was used for source apportionment? How did the author determine the factor number? How did the author deal with the missing values or measurements blow detection limit? Measurement uncertainty was required for PMF input, where were these data from or how were they calculated? Are there any uncertainty analysis related to the PMF modeling? Are the PMF results valid?

2. Page 23, line 449-457. This manuscript stated that the PMFP and PMFT profiles are similar, and should be attributed to the fact that the major NPOCs are enriched in particle phase. This might not apply for factor 6, 7 and 8 (Figure 8f, g and h). The impact of G-P partitioning process will mainly affect the factors highly loaded with low molecular weight species. So the author might need to discuss the impacts of G-P partitioning on these factors.

3. From the title, it seems that the manuscript focused on the size distribution, G-P portioning of NPOCs, and the application of NPOCs on source apportionment of PM2.5. While this study did not measure the gas-phase NPOCs, the gas-particle portioning is only simulated basing on Pankow's theory, and could not be validated. As such, it might not be appropriate to put G-P partitioning in the title, or we can say "G-P partitioning simulation", or "the impacts of G-P portioning on source apportionment". Size distribution was measured for NPOCs, which should be related to other parts of this manuscript. For example, does the size distribution help to explain the PMF results?

4. Diagnostic rations of n-alkanes, PAHs and hopanes were intensively used to evaluate the sources of NPOCs in previous work. The criteria of diagnostic ratios are qualitative and confusing.

Besides the above comments, the lack of enough novelty is the main issue for this work.

The size distribution and diagnostic ratios of NPOCs in typical Chinese cities were intensively investigated (Bi et al., 2005; Zhou et al., 2005; Wang et al., 2009a, b, 2011; Duan et al., 2012). The impacts of G-P portioning of semi-volatile organic compounds (SVOCs) on PMF source apportionment have been observed and validated by Xie et al. (2013, 2014), and the method of using gas + particle phase SVOCs have been intensively applied in PMF source apportionment studies (Gao et al., 2015; Wang et al., 2016; Zhai et al., 2016). Moreover, this work did not provide any new phenomenon or viewpoints that add our knowledge on size distribution or G-P partitioning of NPOCs, or sources apportionment using NPOCs data.

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