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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristics and source apportionment of fine haze aerosol in Beijing during the winter of 2013" *by* Xiaona Shang et al.

Anonymous Referee #1

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General Comments:

In the current work, the authors presented a time series of filter measurements of PM chemical composition at a northern suburban site in Beijing. The measurement documented the serious winter pollution in Beijing. And the authors performed a NMF source apportion analysis of this dataset. They found Traffic emissions, Coal combustion, Industrial emission, Biomass combustion, and Soil dust were the five factors that contribute to the PM pollution. This work can serve as a useful document of that seriously polluted winter in Beijing 2013. I have the following comments for the authors to consider.

NMF is an approach which is less widely used by the community of PM source appointment than PMF or PMF/ME-2. It would be useful for the readers to judge the quality of the analyzed results if the authors could provide more details about the possible difference between NMF and PMF in the part of methods. It is well known that the use of such kind of statistical analysis tool is quite arbitrary. There are some plausible interpretations about the extracted factors in the paper. But please add uncertainty analysis of the NMF results.

The authors concluded that "To abate the severe haze in Beijing, therefore, it is necessary to reduce vehicle emissions in Beijing and further sulfur emissions from industrial complexes in surrounding cities." But this is not fully supported by the data presented in this work. Can you prove that local emissions are dominated by vehicles? Can you prove that sulfur emissions are mainly from industrial complexes in surrounding cities? How about the uncontrolled coal burning for sulfur emissions?

Specific Comments:

1. In the part of introduction, the authors may add descriptions on the current alert system implemented in Beijing. 2. The term "pseudo-carbonaceous" in Figure 2 and other place of corresponding text sounds strange. Maybe the authors can use "Particulate organic matter". 3. Line 260 – 261 "This study was performed in winter, during which the chemical composition of PM2.5 was likely to be more dependent on source strength rather than photochemical oxidation," this argument is ambiguous. The secondary species like NO3- and SO42- must come from atmospheric oxidation processes. I think even in winter chemical composition of PM2.5 was also related to both source strength and oxidations. Also as shown in Figure 2, sulfate and nitrate were always dominate chemical compositions especially for the conditions of pollution episodes. 4. Line 262 – 264 "In addition, NO2 is more likely sourced from local emissions, but SO2 is expected to be transported from nearby regions." This is a good argument. But more discussions or evidences are required to support this argument.

5. Line 273, what could be the high VOCs emitting industries? Please be more specific.

Technical Comments:

Line 202, 203 et al., I suggest the authors to present the concentrations of PM consistently for the significant figure as Line 177, 180 and 187, e.g. change 168.4 μg/m3 to 168 μg/m3.

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