

## ***Interactive comment on “Source Apportionment of Urban Particulate Matter using Hourly Resolved Trace Metals, Organics, and Inorganic Aerosol Components” by Cheol-Heon Jeong et al.***

**Anonymous Referee #3**

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The study investigated the sources of the main elements of the PM<sub>2.5</sub> based on hourly resolved particulate matter (PM) speciation during two campaign periods by means of Positive Matrix Factorization (PMF) analysis. Separate PMF analyses were conducted using the trace metal only data (PMF<sub>metal</sub>) and organic mass spectra only (PMF<sub>org</sub>), and compared with the PMF<sub>Full</sub> results. The results presented here are not so innovative for the scientific community working on air quality studies and of difficult understanding because there are many problems to interpret the results. The PMF analysis needs to be performed with a study based on PM filters sampled every 24 h to identify and apportion the emissive sources present on a given area and to compare also the obtained results even with similar source apportionment studies performed in other

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sites. A chemical mass closure is not performed due to the lack of a complete chemical speciation of the PM<sub>2.5</sub> on the same filters: the measured elemental concentrations represent a minor fraction of PM. The sum of the estimated source contributions and the simultaneous comparison with total measured PM mass is not possible. The study seems to be quite constrained. The meaning of some paragraphs is unclear and I advise the authors to carefully revise the paper to check for clarity before the resubmission. Therefore, in my opinion, the manuscript is not suitable for publication as current version due to the major deficiencies described above.

Specific comments

2.2 Trace metal measurements Lines 15-20: It could be useful to write what kind of filters are used for this analysis.

3.1 PMF of combined data, PMF<sub>Full</sub> It could be useful to report the parameters of the good quality of the source apportionment study. The comparison between reconstructed and measured mass is not present, the Bootstrap analysis and the evaluation of the errors regarding the contributions are missing too.

3.1.2 Road dust Lines 5-10: the organic component of PM is considered among the variables input of the PMF analysis in the Figure 1 as m/z ratio and not as measure of OC by thermo-analysis instrument. In my opinion, this evaluation should be better explained; anyway, is not enough to apportion the total PM<sub>2.5</sub> mass without this kind of measure. Moreover, the BC concentration is considered in the PMF analysis without a correction for EC measure; is true? Are there any kind of evaluation in this field? I would like to understand the way to apportion in this case the organic component of the PM.

3.1.5 Industrial Sector Lines 25-30. I would like to understand why Pb and As are considered as marker elements of industrial sector; were considered some meteorological parameters as velocity and direction of the wind link to this kind of source?

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3.2 Comparison of results for the PMFmetal and PMForg analysis Lines 10-15. For this aspect, the comparability with other V/Ni ratios reported in literature is not shown to distinguish the different sources of Heavy oil combustion due to ship or industrial emissions.

Figure 1. Factor profiles of the nine-factor solution (Road Dust, Primary Vehicle Emissions, Tire Wear, Industrial Sector, Cooking, Biomass Burning, Oxidised Organics, Sulphate and Oxidised Organics, Nitrate and Oxidised Organics) from PMFFull analysis including ACSM organic mass spectra, ACSM inorganics, Xact metals, and Aethalometer black carbon. The plots presented in this way show the chemical profiles but they are not completely clear. I suggest the author to find a more simple way to show the results. Figure 4. I suggest the authors to show the different contribution in percent and absolute terms one next the other one figures.

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