

Interactive comment on “Advanced source apportionment of size-resolved trace elements at multiple sites in London during winter” by S. Visser et al.

Anonymous Referee #3

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Visser and co-authors describe the Multilinear Engine implementation of the Positive Matrix Factorization model used on datasets of trace metals collected in three size ranges (PM_{10-2.5}, PM_{2.5-1.0} and PM_{1.0-0.3}) at three sites in London during the ClearLo campaign in winter 2012. The implementation of the model was conducted on datasets comprising all three sites but segregated by size. This approach is very useful for the separation of sources with high temporal covariance but significant spatial variability. The main contribution of this study is the use of “anchor profiles”, which were retrieved by analyzing data subsets in which a particular source was evident. The author’s used those anchor profiles in ME-2 for rotational control of the solution.

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This approach although it introduces some subjectivity in the analysis is in my opinion a very nice and useful approach. Rotational ambiguity is the main source of uncertainty in this kind of analysis, so a technique that helps to control the rotation using profiles/information that derive from the datasets and not some external source can be very useful if properly implemented. The ME-2 analysis on the datasets resulted in a total of nine source profiles, three for each size fraction, which were namely brake wear, sea salt, resuspended dust, secondary sulphate, fuel combustion and industrial emissions. The attribution of the factor profiles to sources is well justified in all cases. The final results include information about the relative contribution and the spatial variability of the sources as well. Overall I find this study to be very well written and scientifically sound. For these reasons, I recommend it for publication with a few minor suggestions. General comments: I suggest adding a paragraph comparing the results of the unconstrained run of the model with that of the constrained run. It will help the reader to understand the benefits of using an anchor profile, especially for the profiles that were not well defined on the initial run. In addition to that it will help the authors justify why they selected those specific sources to apply the constraints.

Minor Comments:

Page 12, lines 359-364: Have the authors considered the possibility to check the Si/Ca ratio to investigate possible influence from construction works?

Page 16, lines 397-399: Maybe not all aged sea salt is resuspended. At least a part of it might be fresh sea salt reacting with HNO₃ in the atmosphere. Thus it would be expected that the availability of HNO₃ would affect this source at least partially. Because HNO₃ is expected to have higher concentration in polluted areas, this source might not be site-independent.

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