Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "**Receptor modelling of both particle composition and size distribution from a background site in London, UK – the two step approach**" *by* **David C. S. Beddows and Roy M. Harrison**

Anonymous Referee #1

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General comment The paper regards the description of a two-step approach for performing source apportionment using the PMF receptor model and an input composed by variables having different measurement units. The approach has elements of originality and potentially several applications. The topic is interesting considering that source apportionment is a major topic in nowadays research and the possibility to use an approach that use input variables having heterogeneous measurement units is certainly appealing. I also believe that the topic is suitable for the Journal and the paper generally well written and understandable. However, I found that some aspects are

not completely clear (see my specific comments) and the paper need a revision before publication.

Specific comments

Lines 59-62. This sentence is not completely true and I would suggest to modify it. This happens only if number size distributions are mixed with chemical composition (in mass), however, there are examples in which size-segregated chemical composition is used in PMF analysis to obtain quantitative evaluation of size distribution of sources (see for example Contini et al., 2014 Science of the Total Environment 472, 248–261 and references therein).

Lines 140-141. Better to write 16-604 nm (like in line 149) because two decimal digits for size is an illusory precision.

Lines 159-161. The conversion of mass difference in PN0.6-10 is likely quite uncertain. Some details should be given because I believe that some assumptions have been done regarding size distribution in the range o.6-10 micron and the result of the conversion would be strongly influenced by these assumptions. A comment on this aspect is needed.

Lines 312-314. This could happen because nanoparticles have a limited mass to influence significantly PM10 mass composition, however, it could be different if NSD are mixed with PM1 chemical composition for example. A comment on this aspect would be useful.

There is a particular reason for using PMF2 and not the more advanced PMF5 that is becoming the standard version of source apportionment with PMF?

Lines 215-216. How much is it the X value chosen? This should likely be reported for completeness.

Line 259. I believe that the number of factors is six rather than seven.

Lines 358-360. Looking at figures 4 and S3, it seems that the marine source is dominated by nanoparticles. Considering that this is a source generally made of coarse particles, and also authors mention this aspect, this result appears unusual and some discussion and explanations are needed.

Minor comments

Lines 148. "spherical"

Line 351. "there is..."

The source "NET and crustal" is reported in the text but repeated in the figures as "NET and coarse". I would suggest to use "NET and crustal" in all the paper that is more understandable and appropriate.

Title Section 3.4. Why hidden? Moreover, this section s dedicated to several factors...what is the hidden one the nucleation? An explanation or a change of the title is needed.

What is the meaning of the "*" reported in figures 4 and 5?