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 #4

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The paper by Beddows et al. described a two-step source apportionment methodology on a combined database of both PM mass and number size distribution measurements carried out in London. A previous source apportionment study using the same database had been reported by Beddows et al. (2015). Thus, the novelty of this study could be represented by the methodology development. The topic is interesting, and the methodology would be useful in deal with mixing data types as input in PMF, which provide a better defined source factor and better fit diagnostics compared to when non-combined data were used. However, I found that some aspects are not clear and

improvements should be made before the work be published in ACP.

Major comments: 1. The motivation of this study is to clarify the source contribution when a combined database was used in PMF. As the authors state, the combined PM chemical composition and size distribution data in a single PMF analysis could not allow quantitative attribution of either particle mass or particle number to the source factors. However, one could calculate the source contributions either by PM mass or by NSD base on the output results of PMF. The following reference is an example described the source contribution using combined database in PMF. Please clarify this item. Sowlat et al., 2016. Source apportionment of ambient particle number concentrations in central Los Angeles using positive matrix factorization (PMF). Atmos. Chem. Phys., 16, 4849-4866,

2. The two-step PMF-PMF method is new but the results maybe questionable. The G1 time series from the PMF analysis of PM10 chemical composition (Step One) could be considered as a constraint in Step Two, which means that six factors identified by PM mass was also applied to NSD. I think this is why the results from two step PMF-PMF method was different from results using combined dataset of PM and NSD in PMF reported by Beddows et al. (2015). Thus, what about the results if using the G1 time series from the PMF analysis of NSD as step one? Please clarify this item.

Specific comments 1. Line 157-160. The particle number greater than 600nm is calculated from the difference between PM10 and PM0.6 estimated from SMPS. Except PM0.6-10, particle density, particle shape (spherical) and size distribution should be know when calculated the PN0.6-10. Please provide more description about the calculation process. 2. Line 355-356. Why the secondary factor be expected to be strongest at night? 3. Line 362-363. These is not Fig.7 in the text.