

Interactive comment on “Improved source apportionment of organic aerosols in complex urban air pollution using the multilinear engine (ME-2)” by Qiao Zhu et al.

Anonymous Referee #2

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This manuscript presents a source apportionment study on the organic aerosols (OA) collected by an Aerosol Mass Spectrometer in two urban environments in China. The study compares the source profiles and temporal variations of factors (sources) derived from a “traditional” Positive Matrix Factorization (PMF) method versus a more advanced Multilinear Engine (ME-2) method with constrained parameters. The authors found that the ME-2 method yielded more reliable results in terms of separation of different primary OA. Six OA factors were resolved using the ME-2 techniques. My general concern about the PMF technique on AMS OA spectra is that, is it reasonable to assume the number of factors and their profiles are always the same in different locations? Is it mathematically true that the more factors you allow PMF to resolve, the

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better the overall results would be? For example, in Line 133-135, the authors stated that BBOA and CCOA factors could be properly resolved by traditional PMF when the total number of factors was flexed up to 10. Also, the BBOA in Dongguan seems to be much more oxygenated than that in Qingdao, suggested by the much higher O/C ratio and OM/OC ratios. Could that be due to some factor mixing (i.e. BBOA mixed with OOA), or is it more reasonable to not assume they are both BBOA? E.g., maybe the Dongguan-BBOA should be characterized as aged BBOA or something similar? What are the reported ranges of O/C and OM/OC ratios for BBOA in literature?

Other comments: Section 2.1: Are there any industrial sources near the sampling sites at both cities? If so, please specify.

Figure 3: I highly recommend the authors reorder the source profiles and time series plots in (a) and (b) so that they follow the same order for both sites for easier cross-comparison.

Line 259: Please add some more details on how PAHs are derived from the OA spectra. You can also consider moving the details to Section 2.

Line 269: Are the ratios of PAHs to COA at the two sites in this study comparable to each other and other cities in the literature? Is there any compositional difference in the coals used for heating (and/or cooking) in the e.g. Northern and Southern China?

Line 275: correspond with -> are consistent with

Line 282: pollutants -> organic aerosol pollutants

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