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Comment

***Interactive comment on “Aerosol particle measurements at three stationary sites in the megacity of Paris during summer 2009: meteorology and air mass origin dominate aerosol particle composition and size distribution” by F. Freutel et al.***

**Anonymous Referee #2**

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This manuscript reports ambient measurements of air pollutants from three stationary sites of the MEGAPOLI summer campaign which took place in the Paris metropolitan area in July 2009. The authors analyzed the influence of air mass origin and meteorology on aerosol loading, composition, and size distribution as well as on O<sub>3</sub> and NO<sub>x</sub> concentrations. Based on these results, discussions are made on the relative importance of the impact of Paris emissions on local air quality in comparison to the influence of regional, advected pollutants. This work is comprehensive and of good

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quality. It yields new information on the chemical characteristics and the broad source contributions of air pollution in the greater Paris region. The manuscript is also well written. I therefore recommend it for publication after the authors respond to following comments.

The PMF factor results show signs of factor mixing. The time correlations between factors and tracer species are a bit low with  $R^2$  in the range of 0.2 – 0.3, so are the  $R^2$  of  $\sim 0.8$  for comparisons to the reference mass spectra. Performing PMF on the high-resolution spectra can significantly improve the separation of factors and reduce rotational ambiguity. The authors may consider to report the PMF results from analyzing the HR-MS.

The mass spectra of factors shown in Fig. S8 should be processed consistently, i.e., the H<sub>2</sub>O-related signals should be scaled against 44 using the same approach.

It is mentioned on Page 22211 that the Sub NE AMS may have smaller ion transmission at larger  $m/z$ 's than the other AMS's during this study. The mass spectral patterns of this instrument can thus be quite different. I am curious about how this issue affects the PMF results and the comparisons of PMF factors among sites?

Page 22206, what's the flow rate for AMS sampling, was the flow inside the 3 m 1/8" tube laminar? If the flow was turbulent or the residence time too long, is particle loss a concern?

Page 22230, to see the difference between the size distributions of HOA and OOA, another approach is to compare the size distributions of AMS tracer ions such as  $m/z$  57 and  $m/z$  44 (Zhang et al., Atmos. Chem. Phys., 5, 3289–3311, doi:10.5194/acp-5-3289-2005.)

Figure 9, instead of assuming same particle density for all sizes, it's probably better to use size-resolved particle density, which can be estimated using the chemically-resolved size distribution data from the AMS. In addition, the four types of curves are

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hard to differentiate in the current plots. It may be worthwhile to consider using different line thickness or color shades to improve clarity.

In Figures 11 and 12, showing the data of nitrate might be interesting too.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 22199, 2012.

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