

Interactive comment on “In-situ, satellite measurement and model evidence for a dominant regional contribution to fine particulate matter levels in the Paris Megacity” by M. Beekmann et al.

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The authors thank the referee for its positive evaluation.

In the following, we respond to the referees specific comments, which all have been taken into account.

P8650, L12: Use 'the' North-Eastern US. This is done.

P8654, L16: Do you mean that the uncertainty of PMF analysis is corrected by the error analysis? Or, the error analysis of PMF analysis yields an uncertainty of several percent? It should be made more clear so the ambiguity with PMF analysis and thus

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the confusion with the errors used in the weighting matrix can be avoided.

We mean the second statement : The error analysis of PMF analysis yields an uncertainty of several percent tens of %. To make this more clear, we have rewrote the sentence as follows :

'Error analysis for PMF output is performed by varying the algorithm parameters (seeds, fpeak). A relative uncertainty for different factors of usually several tens of percent has been obtained (Freutel et al., 2013).'

P8656, Last paragraph continued to P8657: Please make the sentence and concept clear. The statement is contradictory to previous statement on P8655,L22-24. Does it mean that the larger concentrations for OA in winter were failed to detect due to the non availability of AMS measurments on three days of pollution episode in Januray?

Both statements are not contradictory. On P8655, L22-24, we stated the much larger PM1 concentrations in winter than in summer on the basis of observations from the three urban and sub-urban sites. In the last paragraph of page P8656, we present results from a sector analysis performed for the NE suburban site only. The missing data during a polluted period in January 26-28 with winds from NE cause indeed more pronounced differences for a subset of data (NE sub-urban site, winds from te NE sector), than for the combined data set of winter measurements at three sites.

P8657, L1-4: Make the sentence clear. Please explain what is meant by 'having accumulated the corresponding emissions'.

To make this point clear, the sentence is rewritten to : 'Thus contrary to intuitive expectations, PM levels for most components are larger in air masses advected to the agglomeration (from NE) than in air masses (from SW) leaving Paris and having accumulated urban emissions when crossing the city.'

P8658, L23: Is it PMF analysis the authors mean by saying 'a specific source apportionment method'? Or do you use any other methods? Make it clear here in order to

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avoid confusion.

Skyllakou et al. (2014) used a tagging method in their simulations with the PMCAMx model to discern local and advected contributions to particulate matter. This is made clear in the following sentence in the revised text:

'They are similar to those obtained by Skyllakou et al. (2014) for Paris using a specific tagging method imbedded in their PMCAMx model simulations, and capable to discern the geographical origin of fine PM.'

P8663, L14: Which meteorology are you using in the model? The surface winds in march shows Cyclonic circulations over most of Europe in March in the ECMWF meteorology. The authors might have meant Cyclonic circulation, which could explain the continental air bringing pollutants to Paris. Clarify this part.

In the revised text, we precise the dates of this pollution period, from 7. to 18. March. During this period, indeed anticyclonic conditions were prevailing over Western and Central Europe advecting polluted continental form Central Europe to Paris, and causing additional local pollution build-up due to very light winds. This anticyclonic situation is for example shown by surface pressure maps which can be consulted at <http://meteocentre.com/analyses/>.

Figure 1: Increase the colour contrast between the map and the labelling on the figure./ Otherwise use numbers or symbols to represent the locations and give the legend outside of the map.

The text on the map appears now on white background, which makes it easily readable.

Figure 3: What is the undefined here? Is it the uncertainty percentage?

"Undefined" denotes the mass fraction that could not be attributed to any species in the mass closure exercise presented in Bressi et al. (2013). It is synonymous to "undetermined".

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Figure 4: Figures are very small. Make the figures larger to fit to the page.

Figure 4 has been enlarged to fit to the page.

Figure 5: Again figures are very small and not clear. Make it fit to the page.

Figure 5 has been again enlarged to fit to the page. Also text in figure 5c has been made easier to read.

Figure 6: Figures small and unclear. Make larger fit to the page figures. The labelling on the colour bar is not readable, also this needs to made with a larger font size.

Figure 6 has been enlarged to fit to the page. Labelling of the font size is now easier to read.

Figure 7: The legend within the figure is not readable. Increase the font size.

Figure 7 has been made larger, so that the font size become readable

Figure 9 and 10: Make figures larger and fit to the page so that it is properly readable. Figures 9 and 10 have been enlarged to fit to the page.

References :

Bressi, M., Sciare, J., Gherzi, V., Bonnaire, N., Nicolas, J. B., Petit, J.-E., Moukhtar, S., Rosso, A., Mihalopoulos, N., and Féron, A.: A one-year comprehensive chemical characterisation of fine aerosol (PM_{2.5}) at urban, suburban and rural background sites in the region of Paris (France), *Atmos. Chem. Phys.*, 13, 7825-7844, 2013. Skyllakou, K., Murphy, B. N., Megaritis, A. G., Fountoukis, C., and Pandis, S. N.: Contributions of local and regional sources to fine PM in the megacity of Paris, *Atmos. Chem. Phys.*, 14, 2343-2352, 2014.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 15, 8647, 2015.

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