**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Source apportionment of size and time resolved trace elements and organic aerosols from an urban courtyard site in Switzerland" *by* A. Richard et al.

Anonymous Referee #1

Received and published: 16 February 2011

This paper covers the PMF analysis of AMS data and the analysis of drum impactor samples analysed for elements taken at an urban background site in Switzerland. While both types of analysis have been presented before, there is real novelty in the combination of the two. Through the comparison of the outputs, a more comprehensive assessment of particulate composition can be made.

The paper is very well written and relevant to ACP and the methods are sound overall, however there are a couple of big problems (detailed below) in the data treatment that might affect the conclusions when acted on. I also do not feel that the authors have documented their choice of solution sufficiently. There are also other problems,

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Interactive Discussion

Discussion Paper

but these are fairly minor. I therefore recommend publication after the authors have considered the following:

General comments:

The handling of replaced RDI values is highly questionable. In using interpolated values in place of missing values, the values adjacent to the missing one are, in effect, being used twice each by the PMF algorithm and can therefore skew the solution. While substitution in this manner is permissible (due to the algorithm not being able to handle missing data points), the uncertainty associated with the inserted points should be set to a very high number (effectively infinity), such that they do not have any influence on the final solution.

The authors provide insufficient information regarding their choices of the number of factors. They should explain why the higher-order solutions were rejected. In particular, there is evidence to suggest that the HOA factor contains a contribution from cooking. Lanz et al. (2007) found that this could be resolved if higher-order solutions were used. Also, Allan et al (2010; http://www.atmos-chem-phys.net/10/647/2010/acp-10-647-2010.html) were able to see this with 4-factor solutions in London and Manchester.

The AMS PMF output seems to feature a very significant spike late on Dec 10 in the HOA series. Given that this is unlikely to be representative of the general behaviour of HOA, it should have been filtered. Either way, the scale of its trace on Fig 8 should be expanded, because the reader isn't able to easily see its temporal behaviour currently.

Specific comments:

P3732, L11: Given the number of artefacts associated with the Aethalometer (http://www.atmos-meas-tech.net/3/457/2010/amt-3-457-2010.html) the authors should specify if any corrections were made.

P2732, L25: At certain sites, the local primary emissions become more distinct during the winter rather than the summer. The authors should cite any previous studies where

they have determined this to not be the case here.

P3739, L7: The authors state that many different combinations of data sets were tested, but do not discuss the results of these tests

P3751, L27: Agreement between PMF2 and ME2 does not confirm the robustness of the solution; it merely shows that that the two algorithms are producing equivalent results. To properly test numerical robustness, the authors should try varying the initialisation seed or perform bootstrapping analysis.

Technical corrections:

P3737, L22: Rather than the Igor Pro version number, the version number of the analysis code should be given. Also, the web address given is obsolete and does not host TOF-AMS analysis code; the reader should be directed to http://cires.colorado.edu/jimenez-group/ToFAMSResources/ToFSoftware/index.html instead.

P3738, L12: Presumably, the PMF2-equivalent script was used for ME2. In which case, this should be stated.

P3745, L10: Technically, ME2 was the algorithm used by Lanz et al., not the model.

Fig. 3: The y axes should extend to the full range of the data.

Figs (general): Much of the text on the axis labels are so small as to be unreadable.

Figs. 10, 11 and 10S: The variations in font size of the Pearson's r values only serve to make the figure harder to read (especially on figure 10S). I would make the font size uniform.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 3727, 2011.