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Atmospheric Chemistry and Physics Discussions

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 #2

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"Source apportionment of size and time resolved trace elements and organic aerosols from an urban courtyard site in Switzerland" is an excellent analytical paper obtained with high quality organic and inorganic aerosol data. Both novel techniques AMS and RDI-XRF are used to obtained high temporal trends profile, and I agree with the final sentence of the paper where "This is a considerable improvement compared to 24-h filter analysis, where the attribution to specific sources is possible only on a larger time scale and is mostly based on seasonal variations".

However, the papers does not read well, it is heavy and does not go much behind reporting lots of data, with little advanced in understanding atmospheric chemistry and physics. At this stage, this paper requires substantial revision before considering it publishable.

On the same line of reviewer 1:

1. The replacement of RDI values is highly questionable

2. Some comments should be made about the new evidence (London, Manchester, New York, Beijing) of a cooking aerosol factor reported by the AMS community and a better explanation of what is beyond the 3 factor AMS-PMF solution should be made

3. Peaks of HOA on 10th December should be filtered out

Following additional comments:

âĂć Pg 3740line 10: there is a great amount of confusion in the paper, and the reader has to jump between figures in the article and figures in the supporting information (SI). Looking at figure 2 and figure S4 for example and getting to understand which fine and coarse fraction is and why some of the figures are in the article and some in the SI. Put a label (PMx) on each figure. Moreover, why is not the K in the fine fraction associated with a biomass type diurnal trend?

âĂć Pg 3744. On the traffic source, why is PM coarse and PM fine traffic PMF source so decoupled?

âĂć Pg 3746: section 3.2.3 is the most important part of the paper and yet the most confusing and superficial part. It needs a much in-depth analysis.

Figures:

âĂć Figure 1: ok, good

âĂć Figure 2: Very confusing, why fine and coarse mode put together (with no labels)

ACPD

11, C1401–C1403, 2011

and different from figure s2? Very confusing

âĂć Figure 3: Any comment on what is the 25% unexplained (after detailed organic and inorganic characterization?)

âĂć Figure 4-6: Diurnal trends of the different factors are not presented, and would be interesting to see them. At the same time, lots of interpretation is missing. Why secondary sulphate for fine and coarse are temporally so different? Again why de-icing and industrial are again so different? Surely some of these classes do not present much difference in the size distribution between fine and coarse. Perhaps a correlation plot or an interpretation of the temporal profile of Figure 4-6 would be good.

âĂć Figure 7 ok

âĂć Figure 8: perhaps merge with figure 13 and call it 8c giving they are the same data

âĂć Figure 9: why not putting the inorganic species too so it can be compared with other figures?

âĂć Figure 10-11. Whilst this is an excellent figure coupling numbers and charts, it is really superficial. Why only some data are presented here and not all? Surely an important one would be BBOA AMS and biomass PMF and many others for example.

âĂć Figure 12. Again confusion on what is fine, what is coarse.

Whilst this paper has huge potential to be a really good one, I feel at the moment there are lots of data collected, quickly analysed and reported without much advance in the science. I suggest a deeper analysis between correlations between organic and inorganic sources, and between PMF results from the different PM samples (specially PM0-1 and PM1-10)

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