Atmos. Chem. Phys. Discuss., 9, C156–C158, 2009
www.atmos-chem-phys-discuss.net/9/C156/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simultaneous factor analysis of organic particle and gas mass spectra: AMS and PTR-MS measurements at an urban site" *by* J. G. Slowik et al.

Anonymous Referee #3

Received and published: 9 April 2009

Slowik et al. present a topical analysis of ambient aerosol- (AMS)/ gas-phase (PTR-MS) data by means of PMF (positive matrix factorization). The manuscript is well-written and contains novel concepts, e.g. an elaborate technique to combine two and more datasets from different instruments for PMF. The authors give some evidence – for their specific data case – that the factor solution for the unified dataset is superior to the solutions based on isolated AMS and PTR-MS datasets, for example with respect to the identification of secondary/oxygenated organic aerosol, SOA/OOA, a major aerosol component in non-refractory PM_1. This latter point is very important and should be stressed even more and supported further (e.g. by rigorously comparing the different OOAs (computed by factor analysis) with time series of AMS inorganics, backwards

trajectories, and other auxiliary data). Apart from this open issue, the article is of great interest for ACP readers and it should be published as soon as possible (after considering the technical details mentioned by the other referees and the specific/minor issues below).

Specific/minor issues:

P6740, L15–16: Please rewrite the following sentence: " ... such as apportionment of oxygenated VOCs to direct emission sources vs. secondary reaction products..."

P6740, L21 *sqq.*: add some relevant references.

P6741, L19: PMF applications on PM compositional measurements date back to the 90ies (e.g. Ramadan et al., 1998, J. Air Waste Manag. Assoc., 50, 1308–1320).

P6744, L18: what do you mean by "dwell" time?

P6745, L21-L24: This is only true if the two instruments have comparable scaled residuals/errors for all mass channels.

P6746, L4-L7: This sentence might cause some confusion, because if Δe > 0 then $Q_{(AMS)} > Q_{(PTR-MS)}$, meaning that the AMS has more "weight" and will determine the factors' shape (because PMF2 strives to minimize large Qs). You probably mean that in the upper case the AMS error is underweighted relative to the PTR-MS error.

P6747, L20: revise "foolproof"

P6748, L3–L7: refer to the corresponding figure. As a matter of taste, I would rearrange the figures (factor time series/profiles first, technical Q-plots second).

P6749, L27: write "strong signals"

P6750, L4, L14, L27 etc.: Please indicate the uncertainty associated with this average. Also indicate whether you calculated the percentages for each time stamp first,

and then calculated the total average – or if you calculated first the absolute averages (in mass concentrations for each factor) and then calculated the average percentages. (This can make a difference).

P6750, L8: replace “HOA-I” by “HOA”

P6751, L5: what do you mean exactly by “instrument background”?

P6751, L6: is it plausible that road salt contributes to PM_1 (maybe to PM_{10})? De-icing salts are mainly NaCl and $CaCl_2$ I believe.

P6751, L20: does the total aerosol loading depend on wind direction in the same way as the time series of factor 5?

P6752: L27: replace “the similar sources” by “similar sources”

P6753, L4 (and at other instances): sort references in chronological order

P6762, L17-L18: Please note that Ulbrich et al. (2008) did not study charbroiling emissions.

P6763, L11: “. . . to the(?) analysis . . . ”

P6755, L14: indicate the convergence criteria used in PMF2.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6739, 2009.