**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "A new method to discriminate secondary organic aerosols from different sources using high-resolution aerosol mass spectra" by M. F. Heringa et al.

Anonymous Referee #2

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Review of "A new method to discriminate secondary organic aerosols from different sources using high-resolution aerosol mass spectra," by Heringa et al.

Overall: The manuscript describes urban SOA observed using aerosol mass spectrometry. The high resolution AMS data of four types of SOA were differentiated using principal component analysis (PCA). Comparisons of the aged SOA and ambient urban spectra are made using PCA. The manuscript is well written and contains new information of interest to ACP readers. I would like to see more emphasis on the PCA results to clarify the significance of the manuscript.

Comments: 1) The application of principal components analysis to mass spect data

is not new, thus the title should be revised. 2) The paper appears to be written for AMS users. Attention to information pertinant to the larger community should be included and/or emphasized. 3) The abstract is ackwardly written with too many details. 4) SOA may also result from accretion reactions and oxidation reactions that occur in the aerosol phase. Review the following for more information: Chacon-Madrid et al., Functionalization vs. fragmentation: n-aldehyde oxidation mechanisms and secondary organic aerosol formation, PCCP, 2010 and related papers. 5) It is said that the "properties of fresh and aged SOA…" will be described. The composition emphasis is on the aged SOA with very little discussion of the fresh SOA composition. 6) It's not clear why the authors discuss the details of the UMR mass spectra. I think the authors made a point that HR spectra are needed to differentiate SOA sources. Inclusion of both spectra in the discussion and PCA analyses is confusing as written. 7) Please describe the 4 PCA models with more detail. More description will inform the reader of the critical differences between model 2, 3 and 4. Were models run with fresh SOA spectra or only aged? At what point in the 10 hr experiment were the spectra collected? or what time span was averaged? 8) What components make up the PCs? What differences in the PCs do you observe? Can you say that the PCs represent the unique aspects of the spectra that constitute a specific SOA type? More details are needed here.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29055, 2011.