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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Photochemical processing of organic aerosol at nearby continental sites: contrast between urban plumes and regional aerosol" *by* J. G. Slowik et al.

Anonymous Referee #2

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General Comments:

In this paper the authors present results of a field campaign in the Detroit/Windsor area of Canada. The study included AMS measurements of aerosol composition at two nearby sites as well as VOCs, NOx/NOy (to estimate photochemical age) and other relevant data. PMF analysis of the AMS data was used to determine the contributions of different OA fractions to the overall OA mass and investigate processing of freshly formed and regional aerosol. The data are of high quality and the analysis and interpretation are thorough and the conclusions regarding the extent of processing

between Detrot/Windsor, Harrow, and Bear Creek are convincing. The manuscript is well written and presented. I think it should be published in ACP. I have only a few minor comments.

Specific Comments:

1. Page 24998, line 13: Please state the value(s) or range of values that were used for the collection efficiencies.

2. Page 25002, line 11: It is my understanding that large alkenes are not present or are very minor in vehicle emissions, such as in unburned diesel fuel or oil. Might this pattern be from alcohols, which dehydrate to give a similar pattern? I suggest providing a reference from emissions literature that supports the alkene speculation by analyses of speciated composition via GC-MS (perhaps by Schauer and co-workers), in addition to the citations of previous AMS observations.

3. Page 25003, line 1: In addition to m/z 82, there is also a large peak at m/z 31 in UNKN. I think the most reasonable identity of this is a CH3O+ ion with either structure CH3-O+ (probably from a methyl ester or maybe an ether) or H2C=OH+ (probably from an alcohol). It may be worth pointing this out.

4. Page 25009, lines 20-30: The observation of significant SOA formation during Harrow-to-Bear Creek transport but only small SOA formation during Bear Creek-to-Harrow transport seems to suggest that the major source of SOA is early-generation reaction products rather than aged, well-oxidized VOCs. This indicates that the SOA can achieve a highly oxidized composition without the need for extensive gas-phase oxidation of VOCs. This sounds similar to the Mexico City results and counter to the idea that aging on long time-scales is important in SOA formation. Some comments or discussion along these lines might be worthwhile.

Technical Corrections:

1. Page 2501, line 27: Should read ". . .Detroit/Windsor plume at Harrow. . ."

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24993, 2010.