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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The link between organic aerosol mass loading and degree of oxygenation: an α-pinene photooxidation study" *by* L. Pfaffenberger et al.

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The authors present an interesting study of SOA formation from the OH oxidation of alpha-pinene at different precursor concentrations and different OH exposures. Studies such as this are important to understand how the intensive properties of SOA depend on reaction conditions.

I have but one specific comment/request.

They use as their primary metric for interpreting the extent of oxidation the normalized relative intensity of the peak(s) observed at m/z = 44 at unit mass resolution (f44) from an Aerodyne Aerosol Mass Spectrometer (AMS). They additionally use the equivalent

signature at m/z = 43 (f43). Both are uniquely instrument specific metrics. However, from the instrument description it appears that they were operating a "High Resolution Time-of-Flight" AMS (HR-ToF-AMS). With this instrument, it is possible to explicitly extract the oxygen:carbon and hydrogen:carbon atomic ratios, which are physically more meaningful than f44 and f43 (Aiken et al., 2008). Although there are empirical relationships (e.g. Aiken et al., 2008 and Ng et al. 2011) that relate f44 to O:C and f43 to H:C, these relationships can break down when SOA from individual compounds are considered (e.g. Chhabra et al., 2010). Thus, when data from an HR-ToF-AMS are available, I believe it is preferable to use the explicitly determined O:C and H:C and not O:C and H:C values that are simply calculated from f44 and f43.

Although f44 and f43 are useful in their own right, I believe that the fact that they are instrument specific can limit their broader applicability and interpretation. Thus, I suggest it would be desirable if the authors were to additionally present their results using experimentally determined O:C and H:C unless there are specific reasons that this cannot be done. Providing information on the actual atomic composition, as opposed to only f44 and f43, would make the results more relevant to modelers and to people (such as myself) who do not have an AMS in our lab.

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