**Atmospheric
Chemistry
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Discussions**

Interactive comment on "Quantitative estimates of the volatility of ambient organic aerosol" *by* C. D. Cappa and J. L. Jimenez

Anonymous Referee #3

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General comments The authors have used TD-AMS data from Mexico City to derive quantitative estimates of organic aerosol volatility in terms of Raoult's Law absorptive partitioning theory within the framework of volatility basis set. The results presented should be of great interest to the scientific community focused on measuring and modeling evolution of atmospheric organic aerosol. The manuscript is well written and appropriate for publication in ACP. While I am generally satisfied with the current version, there are a few issues that need to be addressed before the manuscript is promoted to ACP.

Specific Issues 1. The effective saturation concentration (C^*) spectrum (as it is currently used in the model) for a given POA, SOA, or ambient data is strictly valid only under the conditions (i.e., aerosol composition, RH, and T) the spectrum was obtained.

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Interactive Discussion

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For example, an oxygenated organic compound may have a high C* value over diesel POA, but its C* value may be much smaller over a highly oxygenated SOA or over aqueous ammonium sulfate solution. Similarly, a hydrophobic/non-polar POA (such as lubricating oil aerosol) may not absorb oxygenated SOA species, thereby considerably increasing the C* values of such oxygenated organic species over hydrophobic POA and vice versa. Glyoxal is a good example of a compound whose C* depends strongly on the aerosol composition and possibly also the ambient relative humidity. Volkamer et al. (2007) showed that the glyoxal imbalance between the expected and observed levels in Mexico City corresponds to several ug m-3 of equivalent SOA mass, and can explain at least 15% of the SOA formation. The model as it stands, does not appear to take into account such aerosol composition and relative humidity effects on the C* spectrum. Can the authors comment on the potential effect of this assumption on their results?

2. Page 1905, line 6: Ci,sat has not been defined. Should it be Ci* instead?

3. What is the relative humidity at each measurement point shown in Figure 1?

4. At what temperature is each volatility distribution in Figure 2?

References: Volkamer, R., F. San Martini, L. T. Molina, D. Salcedo, J. L. Jimenez, and M. J. Molina (2007), A missing sink for gas-phase glyoxal in Mexico City: Formation of secondary organic aerosol, Geophys. Res. Lett., 34, L19807, doi:10.1029/2007GL030752.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 1901, 2010.