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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulating secondary organic aerosol in a regional air quality model using the statistical oxidation model – Part 2: Assessing the influence of vapor wall losses" *by* C. D. Cappa et al.

Anonymous Referee #1

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The authors have evaluated the performance of the Statistical Oxidation Model (SOM) within the UCD/CIT regional model for the South Coast Air Basin and Eastern US. The version of SOM used here was fit to laboratory chamber data after accounting for vapor wall losses. Low and high values of wall loss rates were considered to approximately account for the uncertainty in this process. Predicted SOA mass concentrations using the "high wall loss" fits are found to be in much better agreement with observations compared to "no wall loss" and "low wall loss" fits. The results are very interesting, the paper is well written and is recommended for publication in ACP after addressing the

following comments.

(1) The dependence of SOA yields on pre-existing aerosol surface area in the chamber makes it is clear that vapor wall loss must be accounted in the interpretation of laboratory chamber data. However, it is not clear how the exercise of accounting for vapor wall loss yields a unique set of fitted values for k_wall, gas-phase yields of species with different volatilities (C*), etc.

(2) Were the model fittings done at the end of each chamber experiment or as a function of time in a given experiment?

(3) It is stated that mass accommodation coefficient (alpha_particle) was assumed equal to 1. This indeed seems too conservative, especially if the SOA particles are semisolid and the gas-particle partitioning timescale is longer than currently assumed. If the chamber experiments were conducted under low RH then it is likely that the SOA particles were viscous semisolids. Please state the RH at which the fits were done and comment on how might the results change if alpha_particles < 0.1.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 30081, 2015.