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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Oligomer formation within secondary organic aerosol: equilibrium and dynamic considerations" *by* E. R. Trump and N. M. Donahue

Anonymous Referee #1

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SOA yield often shows a strong increase with aerosol mass indicating that it is composed of low volatility and semi-volatile compounds partitioning between gas and particle phase. On the other hand oligomers have been observed in the particle phase up to 50% in mass. If these oligomers were formed irreversibly, the low aerosol yields at low low mass concentrations could not be explained. The paper deals with the question under what conditions these observations can be brought together. The authors developed a simple dynamic model based on the "volatility basis set" (VBS) approach and a few physico-chemical parameters on SOA constrained to literature data. Two experimental cases are simulated and parameters were constrained using experimental data

from literature. Case A) treats the evaporation of SOA into a new equilibration after dilution while case B) simulates the equilibration profile of SOA after a stepwise increase of temperature. The simulations show that oligomer formation which is reversible on a timescale of few hours is able to reproduce the experimental data and reproduces a reasonable distribution of product volatilities. Oligomer formation in SOA is still not well understood and this paper adds a simple tool to plan experiments and investigate this topic in more detail. The paper is well written and I recommend its publication with some minor corrections given below.

24612, eq (5):C* should have index “m”

24621, line 20: Where do I see the fast SOA formation process in Figure 3? It is formed from the beginning. I do not see an increase.

Table 1: put C* in first column

Figure 2: The legend is too small. Could you make one large legend outside the graphs. Use also larger font size for axes labels and titels

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 24605, 2013.