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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biogenic SOA formation through gas-phase oxidation and gas-to-particle partitioning – comparison between process models of varying complexity" *by* E. Hermansson et al.

Anonymous Referee #2

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Biogenic SOA formation by E.Hermansson et al. 1. Although this is a very useful study, it's not clear why the authors choose unrealistic parameters for the 1D VBS: e.g. very low OH reaction rate, and a small T dependence of enthalpy of vaporization(delH). They could have had delH varying with T as in the 2DVBS.Finally Shrivastava et al. [2011] demonstrated that using 7.5% increase of oxygen per aging step leads to large underpredictions of O:C ratio compared to field measurements during MILAGRO 2006. Why not use 15% oxygen added in the 1D VBS? I would think this would result in a more consistent comparison. 2. Page 11015 Lines 13:15: The authors mention that

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2DVBS simulations show a strong diurnal trend in O:C ratio compared to 1D VBS. But there is no figure supporting this observation. Am I missing something? 3. Page 11016 Lines 5-10: The authors assume that most first generation oxidation products do not include fragmentation. But Figure A1 shows that even for O:C ratio=0.2, 70% of the products in the 2D VBS are fragmenting. This seems contrary to their description. Note that first generation oxidation products of a-pinene have O:C between 0.2-0.4. They also need to better explain why O:C ratio of first gen products in the 2D-1D VBS will be larger than the 2DVBS. It would be helpful to demonstrate with a figure how the O:C of the first generation oxidation products is a function of Equation A1 for the 2D-1DVBS vs the 2DVBS. 4. Page 11017: Line 5-13: The authors mention that the 2DVBS-MCM particle growth is much lower than the 2DVBS. Their Figure 7a shows that the 2DVBS-MCM is closer to observations than 2DVBS. Can the authors comment on whether the aging approximation in the 2DVBS about fragmentation equal to OtoC raised to power of 1 by six is reasonable based on this exercise? 5. Table 4 and page 11018 line 5: The authors note that neglecting fragmentation causes models to use unrealistically low aging or neglect aging. Yet in their Table 4 they say fragmentation is potentially important. I would recommend classifying fragmentation as “Important”

Shrivastava, M., J. Fast, R. Easter, W. I. Gustafson Jr., R. A. Zaveri, J. L. Jimenez, P. Saide, and A. Hodzic (2011), Modeling organic aerosols in a megacity: comparison of simple and complex representations of the volatility basis set approach, Atmos. Chem. Phys., 11(13), 6639-6662.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11001, 2014.