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
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”


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