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Atmospheric Chemistry and Physics Discussions

Interactive comment on "SOA formation from the photooxidation of α-pinene: systematic exploration of the simulation of chamber data" *by* R. C. McVay et al.

Anonymous Referee #2

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The McVay et al. manuscript reports on the alpha-pinene+OH oxidation mechanism and resultant SOA, investigated using comparative measurements and modeling. Smog chamber experiments were conducted under low NO (< 2 ppb) and low and high OH (2x105 and 2x106 molecules/cm3, respectively) conditions; modeling was performed using the GECKO-A model. The GECKO-A model was updated to include gas-phase chemistry based on Vereecken et al. (2007) and dynamic gas/particle partitioning based on La et al. (2015). The significant finding was that OH levels did not influence SOA growth in the chamber studies but did influence growth in the modeling studies. Explanations for the need of a higher vapor wall loss rate in GECKO-A to match the high UV/OH experiments were explored. It was concluded that GECKO-A

overestimates the contribution of later-generation (2nd and higher) species to SOA formation. The manuscript provides good insight into variability of vapor wall loss rates (e.g., in different chambers and in different chemical systems) and the potential for over contribution of later-generation oxidation products in GECKO-A. The manuscript is very well written and easy to follow. It is recommended that following attention to the minor comments provided, the manuscript be accepted for publication in ACP.

Minor comments: p. 33164, line 10: It is suggested that the authors consider adding "near" before explicit. It is my understanding that GECKO-A follows the Master Chemical Mechanism to the point at which the SARs are invoked, including as regards to the assumption that all understudied compounds and chemical reactions can be represented by a subset of studied reactions and similar compounds.

p. 33176, line 8: spelling "preferentially"

Fig. 3: It is recommended to increase text size, particularly the high/low UV/OH and the explanation headers.

Supplement, Fig. S3 discussion: The authors note that the remaining number concentration in the low UV/OH experiment is $\sim$ 3x less than that of the high UV/OH experiment. Do the authors attribute this to size-dependent or compositionally-dependent wall losses of the particles?

I agree with the first reviewer's comment that underestimation of vapor pressures for multi-functional (later-generation) oxidation compounds should not be ruled out.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 33161, 2015.