

***Interactive comment on “In-cloud processes of methacrolein under simulated conditions – Part 3: Hygroscopic and volatility properties of the formed Secondary Organic Aerosol” by V. Michaud et al.***

**Anonymous Referee #2**

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The manuscript describes the measurement of hygroscopicity and volatility of aerosol generated from the nebulization of the products of the aqueous-phase reaction of methacrolein with hydroxyl radical. The authors find that the hygroscopicity and the volatility of the SOA decreases as the reaction time of the SOA increases, and also that SOA formed under aqueous reaction conditions has differs from SOA formed from gas-phase reaction conditions.

The study of the properties of the SOA formed under aqueous conditions and aging of aerosol are important to advance the field. My concern with this article is the residence

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time of the particles used to make the volatility and hygroscopicity measurements. The authors state that the residence time was sufficient for their experiments because of only a few percent between 40 nm and 50 nm. However this does not necessarily demonstrate that the residence time of these experiments is sufficient. Neither these authors nor An et al. have measured the RVF as a function of residence time. A difference of a few percent could be within the error of the measurement particularly if there induction period in volatilization kinetics. While this does not detract from the authors' findings, this issue should be carefully considered in the final publication.

Specific comments: p. 6453 Lines 11-12. This sentence is awkward as written: "The average particle's composition varies with size, time, and location, reflecting the particles' diverse origins and atmospheric processing." A single particle is considered in the first part of the sentence, while particles, the plural form, are considered in the second part. p. 6461 line 15: "ozonolysis of arachidonic acid particles." Text is missing "acid." p. 6467 lines 25-26: correct the hyphenation and spelling of dihydroxymethacrylic acid p. 6471 line 4: incorrect abbreviation for journal.

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