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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Relating CCN activity, volatility, and droplet growth kinetics of β-caryophyllene secondary organic aerosol" *by* A. Asa-Awuku et al.

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We thank Dr. Pöschl for his positive feedback and comments. Our responses to the comments are given below.

"Relating CCN activity, volatility, and droplet growth kinetics of beta-caryophyllene secondary organic aerosol" by Asa-Awuku et al. (AA2008) is a very interesting study, and I would like to compliment the authors on their achievements. The paper presents a wealth of information that can, should, and will certainly be used as a reference and input for further investigations of cloud droplet formation and growth in the atmosphere (lab, field, and model studies). In order to facilitate further exchange and comparison, and to enhance the useful-

ness of the presented results, I would like to contribute the following comments and suggestions:

1) Water vapor supersaturation is the primary variable ... Thus, I would like to ask the authors to include more information about the determination and uncertainty of water vapor supersaturation in their study, and to refer to related studies addressing these issues such as Rose et al. (2008).

As mentioned in the paper, characterization of supersaturation in the instrument was done with $(NH_4)_2SO_4$ calibration aerosol (and not with the CFD model of Lance et al., 2006). The manuscript originally referred to the Englehart et al. (2008) study for more details on the calibration procedure (who use an identical set-up to study the CCN activity of SOA from monoterpene precursors). We have now included a detailed description of the calibration procedure in this manuscript as well.

Moreover, the indication of uncertainty for the water vapor supersaturation in the static diffusion (SD) CCN counter appears very optimistic: plus/minus 0.02% (accuracy or precision?, full range or standard deviation?).

The uncertainty cited is in absolute supersaturation (1 standard deviation). In relative terms, this is about 5%. Both SD and CFSTGC CCN counters are in close agreement for activation diameters at $\sim$0.6% (as shown in the activation curve of Engelhart et al., 2008) and suggests the temperature and flow controls used in each instrument model produce similar results; differences in reported s_c are < 10% (relative error, 1 standard deviation). This agreement, given the drastically different technologies embodied in the two CCN counters, further enhances the high degree of confidence we have on the instrument performance and supersaturation values.

2) The mechanistic understanding, kinetic description, and predictability of aerosol and cloud properties, interactions, transformations, and effects are limited not only because of the limited availability of measurement data, but also because of the limited applicability and compatibility of model formalisms used for

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the analysis, interpretation, and description of heterogeneous and multiphase processes... I would like to ask the authors to consider revising the terms and symbols used in the manuscript for consistency with the existing body of literature on related topics...

We have taken care to precise our droplet growth kinetic terminology; now, the term "effective uptake coefficient" is consistently used throughout the text, and, carefully state that the symbol "α" is treated as a fitting factor for the growth kinetics. We also refer to the Pöschl et al. (2007) study for a comprehensive description of uptake mechanisms.

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