

## ***Interactive comment on “Hygroscopicity of secondary organic aerosols formed by oxidation of cycloalkenes, monoterpenes, sesquiterpenes, and related compounds” by V. Varutbangkul et al.***

**Anonymous Referee #3**

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The paper describes a carefully performed study on the growth factors for different classes of SOA. In addition, it provides a good review of laboratory studies that have been done to date on the subject. The paper should be accepted into ACP after the minor issues below have been addressed.

p. 1126, first paragraph: It is stated that “SOA coatings on inorganic aerosol are found to allow water uptake at lower RHs than the pure inorganic portion alone.” This is followed by the statement that “In fact, field measurements have shown that there is a substantial decrease in RH dependence of light scattering with increasing organic

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mass fraction.” The first sentence refers to water uptake as a function of RH, while the second refers to water uptake as a function of organic mass fraction. The paragraph needs to be constructed more carefully.

Figure 4: There tends to be some repetition between the text and figure captions. For example, for Figure 4, the caption could simply state what it is plotted and omit the description of what is happening that is also given on p. 1133.

p. 1142, line 4: clarify what is meant by “the corresponding DMA volume distributions AT THE RISING EDGE.” How do the collection and transmission efficiencies compare for the Cal Tech AMS and DMA in this size range?

p. 1143, last paragraph: Provide reference(s) for the statement that the volume-weighting approach to describe water uptake of an organic-inorganic mixture works with relatively dilute solutions.

p. 1143, last paragraph: Given the very low mass fractions of AS (< 4% at 300 nm) how large is the effect of not taking into account thermodynamic interactions between the AS and the organics? Given the uncertainty of this discussion (the low mass fractions of inorganics and the treatment of the system only with volume-weighting mixing of components) it is overstepping to say that the water uptake of the inorganic portion is being enhanced or suppressed.

p. 1143 and throughout: Assessing small differences between growth factors (0.04) at different particle sizes or composition requires that the uncertainty in the growth factor measurements is well defined. It is stated in the methods section that the HTDMA is found to be able to reproduce the hygroscopic growth curve to within 1.5% of theoretical values. This accuracy appears to apply to a different set up than that at Cal Tech. What is the accuracy of the instrumentation used in these experiments?

p. 1144, line 13: Presumably the particles are internally mixed so it is not clear how the AMS would be overestimating the organic fraction of the larger particles. If particles

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are lost due to bounce or lens transmission, it would apply to all components and not just the organics.

p. 1144, line 2: where does the uncertainty of +/- 0.01 come from? Is that based on an uncertainty analysis with the instrumentation used here?

p. 1146: The result that the discrepancy between the GForg is a result of non-ideal interactions in the mixture is based on ruling out other causes rather than an investigation of how significant this effect is for a mass fraction of inorganics of less than 4%.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1121, 2006.

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