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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Secondary organic aerosol formation in cloud droplets and aqueous particles (aqSOA): a review of laboratory, field and model studies" *by* B. Ervens et al.

Anonymous Referee #2

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Review of Ervens et al. "Secondary organic aerosol formation in cloud droplets and aqueous particles (aqSOA): a review of laboratory, field and model studies."

In this paper the authors review the literature on aqueous phase organic reactions. In addition to secondary organic aerosol (SOA) formed from the gas/particle partitioning of semi volatile organic compounds (gasSOA), the authors point out the potential importance of SOA formation in cloud droplets and aqueous aerosol particle(aqSOA) in the atmosphere. The paper is well written and provides excellent basis for future works on this important topic. This paper should be published in Atmospheric Chemistry and Physics. I only have a few minor comments.

Comments:

Page 22318, line 25, “In East Asia, SOA predictions were low by 50% for the boundary layer but low by a factor 10–100 in the free troposphere (Heald et al., 2005), suggesting a role for aqSOA formation through cloud processing.” Can the authors elaborate this point?

Page 22325, line 14, “In Atlanta, the fraction of total WSOC (gas+particulate) that is present in particles (Fp) increases sharply at high RH, suggesting a positive correlation with aerosol water (Fig. 2a, b)”. Do the authors refer to Fig. 2a, c?

Page 22325, line 16, “No relationship was readily observed between Fp and particle organic mass (Fig. 2c), which would be expected from the gasSOA formation route. . .” Do the authors refer to Fig. 2b?

Page 22325, line 20, “This peak in Fp coincides with particulate nitrate and thus the formation of both particulate components might be initiated by HONO.” Can the authors elaborate this point?

3.4.2 Correlations of WSOC with RH (page 22325). The authors discussed that the increase in particle-phase water-soluble organic carbon (WSOCp) at high RH may point to aqSOA formation. Fig. 2a shows the averaged diurnal evolution of temperature, RH and Fp in Atlanta. In this figure, the Fp had a peak in the afternoon when the RH was low. The time evolution data of Fp and RH do not agree with the positive correlation between Fp and RH (Fig. 2c). I assume Fig. 2a shows the representative data. Can the authors explain this?

Page 22326, line 26, “The increase of the O/C ratio with RH (Fig. 2e) suggests that not only oxygen is added to preexisting molecules. . .” The data look scattered in Fig. 2e. A positive correlation between the O/C ratio and RH is not clear.

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