Atmos. Chem. Phys. Discuss., 14, C5077–C5079, 2014
www.atmos-chem-phys-discuss.net/14/C5077/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Climate-relevant physical properties of molecular constituents relevant for isoprene-derived secondary organic aerosol material" *by* M. A. Upshur et al.

Y. Rudich (Referee)

yinon.rudich@weizmann.ac.il

Received and published: 18 July 2014

In this study, Upshur et. al. synthesized isoprene oxidation products that may partition into secondary organic aerosol phase. It is hypothesized that under atmospherically relevant concentrations some of these compounds (trans-alpha-IEPOX (1) for example) could lead to substantial reduction in the surface tension which would translate into activation of cloud droplets at lower relative humidities than super-saturation conditions that would otherwise lead to cloud droplet activation.

The authors measured also the octanol-water partition coefficient and showed that

some of the products will tend to be dissolved in the organic phase rather than the water phase. However the results of this section of the study are not very well connected to the main focus of the paper and perhaps should be omitted, unless specifically discussed. Overall this is a good laboratory study, which should be published as such. The synthesis of these compounds opens a nice avenue for interesting research and this is important by itself. I am questioning how robust and relevant are the conclusions about the atmospheric implications though. First, we do not really know if these products will indeed be in significant concentrations in the aerosol/droplet phase. There is no supporting evidence from the GAMMA runs, and no validation or comparison of the GAMMA conclusions with measurements. Adding such validation is essential for strengthening the paper. More information about the modeling should be provided. Also, if the uptake of these compounds is governed by reactive uptake, wouldn't these compounds be transformed to a different species that may not be surface active? Since these compounds would partition to the organic phase, how do you envision that they will partition from the aerosol phase to the aqueous phase? Some discussion about these issues is warranted. These issues need to be discussed in order to put the results in the atmospheric context. Finally, these references deserve to be included in the introduction and in the discussion:

1. Djikaev, YS et al, Effect of adsorption on the uptake of organic trace gas by cloud droplets, JGR 2003

2. Aumann, E and Tabazadeh, A, Rate of organic film formation and oxidation on aqueous drops, JGR 2008

3. Tabazadeh, A, rganic aggregate formation in aerosols and its impact on the physicochemical properties of atmospheric particles, Atmos Env, 2005

4. Taraniuk et al, Surfactant properties of atmospheric and model humic-like substances, GRL, 2007

5. Tarniuk at al, Enrichment of surface-active compounds in coalescing cloud drops

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 17197, 2014.