

**Review of “Molecular composition of biogenic secondary aerosols using ultrahigh resolution mass spectrometry: comparing laboratory and field studies” by Kourtchev et al.**

In this paper, the authors present a comparison of the molecular composition identified in laboratory SOA samples and ambient samples using high resolution mass spectrometry. The presented results from two different laboratory generated SOA experiments and two different ambient samples are very interesting. First of all, the SOA from the BVOC mixture containing  $\alpha$ -pinene,  $\beta$ -pinene, d3-carene and isoprene is not remarkably different than the SOA from individual  $\alpha$ -pinene. Thus, the two laboratory generated SOA samples were both very similar to the ambient OA collected in an SOA influenced region, but dissimilar to the urban sample. This may be expected, however some of the markers of monoterpene SOA may exist in the ambient urban sample since SOA is a large source of ambient OA. Interestingly, the authors did not observe ambient SOA dimers in this work. The authors ruled out the possibility for analytical artifacts, but did not discuss ambient OA processes/implications related to this. Overall, this is a very good paper with a careful analytical approach that addresses a topic of substantial interest to the community.

1. Authors may be interested in reviewing the findings of Muller et al., *Rapid Communications in Mass Spectrometry*, 2009; Kristensen et al., *Atmospheric Chemistry and Physics*, 2013; and Zhao et al., *Atmospheric Chemistry and Physics*, 2013 for observations of monoterpene SOA “dimers”. Perhaps the lack of observation is significant with respect to condensed phase OA processes or aerosol aging.
2. Authors interchange the terms BVOC mixture and VOC mixture, which I believe refer to the same experiment. For clarification, one consistent term is preferred.
3. Please add a legend to figures 3 and 4.
4. Despite the significant similarity between the  $\alpha$ -pinene ozonolysis SOA and the BVOC mixture ozonolysis SOA, the mass spectra in figure 1 appear to be different. Could the comparison of the compositions be made clearer in the discussion? This might provide hints regarding the significance of the lack of observation of the ambient SOA dimers in this work.
5. In the abstract, do you refer to 70% of the laboratory generated SOA compounds or the ambient compounds?
6. Please correct the reference, Hatfield and Hartz, 2011. I believe the last name is Huff Hartz. Also note, the name is misspelled on page 29597.
7. The authors place a strong emphasis on this work being the first time SOA from BVOC mixtures is compared to the ambient OA, but didn’t emphasize the differences in the composition between the SOA from the mixture and the individual  $\alpha$ -pinene. As stated above, the differences in the composition from HRMS do not appear to be significant.