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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Molecular composition of biogenic secondary organic aerosols using ultrahigh resolution mass spectrometry: comparing laboratory and field studies" *by* I. Kourtchev et al.

Anonymous Referee #2

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General comments

This is an interesting study reporting the comparison of molecular composition of laboratory generated biogenic SOA and ambient aerosol samples that were collected at a boreal forest site and an urban site. The authors show that the chemical composition of the SOA produced from the ozonolysis of a VOC mixture (alpha-pinene, beta-pinene, delta-3-carene and isoprene) is similar to that of the ambient aerosol sample collected at the boreal site. Contrary, the aerosol sample collected at the urban site

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is dominated by oxidized aromatic compounds, indicating that a strong influence of anthropogenic activities. It is interesting that the laboratory generated BSOA can represent monomeric compounds well in the ambient sample collected at the boreal site but dimeric compounds were hardly observed in the ambient samples. I wonder if this relates to the experimental conditions used to generate SOA in a laboratory or mechanisms that lead to dimer formation are simply not important in the ambient air. Definitely, future studies are warranted to better understand the dimer formation mechanisms. The authors have used Ultra High Resolution Mass Spectrometry (UHRMS) to accurately assign chemical formulas to m/z values observed in the aerosol samples. Overall, the manuscript delivers the message clearly and I recommend the manuscript be published after addressing a few minor comments that are given below.

Specific comments

P29605 L1-15: Have the authors thought potential importance of OH reactions in BVOC ozonolysis? In addition to lower SOA yields of beta-pinene and isoprene ozonolysis, both the VOC might act as OH radical scavengers that influence the final SOA yields. Perhaps the authors can add a sentence or two about the importance of OH radical formation in ozonolysis and its potential impact on the SOA yields here.

P29607 L3 and elsewhere: I wonder why the authors present only two decimal places for SOA compounds. I presume the authors have assigned these compounds based on the m/z values with four or more decimal values. Could the authors provide m/z values used for the chemical formulae assignment instead of these 'less accurate' m/z values?

P29608 L4: I believe this dimeric compound is also reported by Müller et al., 2009 as a peroxyhemiacetal compound.

L. Müller, M. C. Reinnig, H. Hayen, T. Hoffmann, Characterization of oligomeric compounds in secondary organic aerosol using liquid chromatography coupled to electrospray ionization Fourier transform ion cyclotron resonance mass spectrometry, Rapid

ACPD
13, C10673–C10675, 2014

Communications in Mass Spectrometry, Vol. 23, Issue 7, 971-979, 2009

P29610 L20-29611 L10: Such highly oxidized compounds are observed in both the laboratory generated SOA and ambient aerosols at Hyytiälä. The authors may want to add the following reference here.

M. Ehn, E. Kleist, H. Junninen, T. Petäjä, G. Lönn, S. Schobesberger, M. Dal Maso, A. Trimborn, M. Kulmala, D. R. Worsnop, A. Wahner, J. Wildt, and Th. F. Mentel, Gas phase formation of extremely oxidized pinene reaction products in chamber and ambient air, Atmos. Chem. Phys., 12, 5113-5127, 2012

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 29593, 2013.