

4.073 Gas and particle phase characterization of limonene ozonolysis products and their role in SOA formation.

Early Career Scientist

Presenting Author:

Julia Hammes, Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden, julia.hammes@chem.gu.se

Co-Authors:

Cameron Faxon, Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden

Anna Lutz, Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden

Ravi Kant Pathak, Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden

Thomas Mentel, Institute of Energy and Climate Research, IEK-8: Troposphere, Forschungszentrum Jülich GmbH, Jülich, Germany

Mattias Hallquist, Department of Chemistry and Molecular Biology, University of Gothenburg, Gothenburg, Sweden

Abstract:

Limonene is a volatile organic compound (VOC) emitted by vegetation and can be found as a common ingredient in many household products. It exhibits an interesting chemistry owing to its two very different double bonds: a trisubstituted endocyclic and a terminal exocyclic double bond. Both double bonds can be oxidised by ozone with little or no carbon loss. The resulting products will be polar, of lower volatility and subsequently form secondary organic aerosol (SOA). SOA influences the climate and poses a risk on human health. The ozonolysis of limonene produces significant amounts of carboxylic acids which contribute to SOA formation owing to their low vapor pressures. Detailed gas phase mechanisms and information on limonene oxidation products are available through the master chemical mechanism (MCM) and form a framework against which observed product distributions can be compared.

I will present recent lab measurements of limonene ozonolysis products generated in our G-FROST facility and comparisons that have been made with numerical model calculations containing a detailed chemical mechanism (MCM). The measurement of the oxidation products in gas and particle phase was performed with an acetate High-Resolution Time-of-Flight Chemical Ionization Mass Spectrometer (HR-ToF-CIMS) coupled to a Filter Inlet for Gases and AEROsols (FIGAERO).