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Aerosol Mass Spectrometric features of biogenic SOA: observations from a plant chamber and in rural atmospheric environments

1. Kiendler-Scharr (1), Q. Zhang (4) and the JPAC06 -Team

1. Institut für Chemie und Dynamik der Geosphäre ICG, Forschungszentrum Jülich, Jülich, Germany
2. Center for Atmospheric Science, Cambridge University, Cambridge, UK
3. Department of Environmental Science & Energy Research, The Weizmann Institute of Science, Rehovot, Israel
4. Atmospheric Science Research Center, State University of New York, Albany, NY, USA

Atmospheric oxidation of volatile organic compounds (VOCs) emitted by plants is one source of secondary organic aerosols (SOA) in the troposphere. We investigated SOA formation from the mixture of VOC emitted from plants and compared these results to those obtained using α-pinene as single VOC.

The experiments were performed in the Jülich plant chamber in order to provide well defined conditions for plants. A fraction of the air carrying plant emissions was transferred from the plant chamber to a reaction chamber. SOA formation from the VOCs introduced into the reaction chamber was initiated by UV-photolysis of ozone. The resulting SOA was analysed with an Aerodyne aerosol mass spectrometer (Q-AMS) to determine the mass spectral patterns from the SOA.

Spruce, pine and birch were used as model plants. The resulting mass spectra show some common features such as a relatively high contribution of m/z 91 which is also observed for SOA formed from single monoterpenes. The overall spectral patterns of the plant chamber SOA compare well with that of one oxygenated organic aerosol (OOA) component extracted from rural/remote atmospheric datasets using a custom

multiple component mass spectral analysis technique. The OOA component is dominated with ions that are mainly associated with carbonyls and alcohols and appears to be less oxidized than another OOA component that is more prevalent in various rural/remote atmospheres.