Isoprene-Derived Secondary Organic Aerosol in an Urban Region Downwind of the Ozark Mountains

B. WILLIAMS[1]*, D. MITROO[1], R. MARTINEZ[1], Y. ZHANG[1], M. WALKER[1], C. OXFORD[1], D. HAGAN[1], X. ZUO[1], L. DU[1], J. TURNER[1], L. HU[2], M. BAASANDORJ[2] AND D. MILLET[2]

[1]Washington University, St. Louis, MO 63130, USA (*correspondence: brentw@seas.wustl.edu)
[2]University of Minnesota, St. Paul, MN 55108, USA

The St. Louis Air Quality Regional Study (SLAQRS) took place between Aug-Oct 2013 at the previous home of the U.S. EPA Midwest Supersite in East St. Louis. The site is located in a large urban area near the edge of the Missouri Ozarks, which is a global hotspot for isoprene emissions – the so-called 'isoprene volcano' [1]. During southerly summer winds, the site experiences extremely high isoprene levels from the Ozarks; measured concentrations during summer 2013 sometimes exceeded 8 ppb. With northerly summer winds, isoprene concentrations are very low, while concentrations of anthropogenic pollutants remain high during both periods. This site is thus uniquely positioned for studying the influence of biogenic and anthropogenic VOCs on atmospheric chemistry.

In recent years several new approaches have been introduced to improve the chemical characterization of atmospheric organic aerosol (OA). During SLAQRS, in addition to VOC and OVOC measurements from a proton transfer reaction mass spectrometer (PTRMS), we employed the thermal desorption aerosol gas chromatograph (TAG) for automated in-situ molecular level OA speciation [2], a high resolution time-of-flight aerosol mass spectrometer (AMS) for inorganic aerosol speciation, total fine OA mass concentrations, and O/C, H/C, and N/C elemental ratios [3], and a novel volatility and polarity separator (VAPS) for OA functional groups with improved throughput of highly oxygenated OA.

An initial analysis of field measurements and subsequent laboratory studies will be presented here. Positive matrix factorization (PMF) has been used to deconvolve timeseries of AMS mass spectra [4] and timeseries of VAPS and TAG source-marking compounds [5] into major components contributing to atmospheric OA concentrations. In addition to ambient gas and particle chemical composition, we employed a potential aerosol mass (PAM) oxidation chamber to achieve perturbed oxidation states in both field and lab studies. Initial PAM results of isoprene-SOA production under high/low anthropogenic influence will also be presented.

[1] Wiedinmyer *et al* (2005), *J. Geophys. Res.*, ***110*,** D18307. [2] Williams *et al* (2006) *Aerosol Sci Technol* **40**, 627-638. [3] DeCarlo *et al* (2006) *Anal Chem* **78**, 8281-8289. [4] Ulbrich *et al* (2009) *Atmos Chem Phys* **9**, 2891-2981. [5] Williams *et al* (2010) *Atmos Chem Phys* **10**, 11577-11603.