

Characterization of WSOC/N in Aerosols During CalNex

Alexander Laskin (PNNL), Julia Laskin (PNNL), Sergey Nizkorodov (UCI)

Objective

perform detailed characterization of the chemical composition of WSOC/N in aerosol samples collected during the CalNex 2010 field campaign.

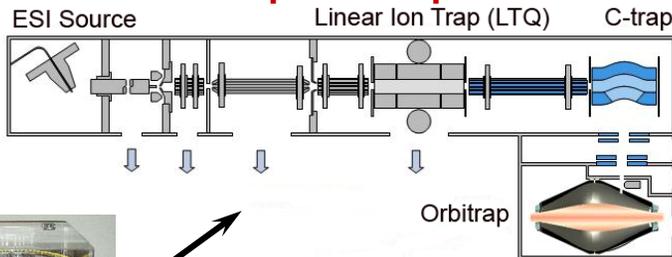
Specific Aims

- Detailed chemical analysis of low- and high molecular weight WSOC/N species in particulate matter
- Identification of WSON resulting from nocturnal VOC oxidation by NO_3
- Direct comparison of AMS and HR-ESI-MS data

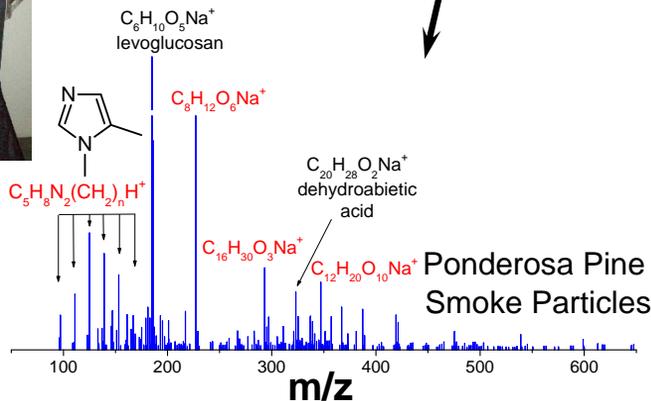
Methods

- Time-resolved sampling with PILS (particle into liquid sampler)
- Size-selected sampling with MOUDI (multi-orifice uniform deposition impactor)
- High-resolution ESI-MS analysis of organic PM
- $m/\Delta m \sim 100,000$, sufficient to identify exact atomic composition of detected ions
- UV/Vis absorption, photodegradation, and FTIR spectra of collected particles

LTQ/ Orbitrap Mass Spectrometer



PILS



- Hundreds of previously unidentified compounds
- Highly toxic alkaloid compounds found in smoke particles

Problem

- WSOC/N are ubiquitous in atmospheric aerosol
- WSOC/N affect particle hygroscopicity and cloud nucleation \Rightarrow alter climate and visibility related impacts of aerosols.
- Impact on carbon and nitrogen biogeochemical cycling.
- WSON compounds \Rightarrow adverse health effects because of their toxicity.

Lack of detailed observational data has limited thus far the ability to evaluate environmental impacts of aerosol WSOC/N.

Our Contribution

Provide important input for closure studies focused on (a) aerosol emission inventories and source apportionment of aerosols, (b) chemical transformation and aging of aerosols, (c) linked composition-hygroscopic/CCN properties of WSOC/N containing aerosols.

Relevant Publications

Nizkorodov et al. *PCCP*, **10**, 1009 (2008);
EST **42**, 7341 (2008)

Laskin et al. *Anal. Chem.*, ASAP article, 2009