

Overview of Some MAOS Chemical Measurements during Aerosol Life Cycle IOP

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- Aerosol Chemical Speciation Monitor (ACSM)
 - Fan Mei
- Particle-into-Liquid Sampler (PILS) with
 - Ion Chromatography (IC)
 - Total Organic Carbon (TOC)
- Proton-Transfer-Reaction Time-of-Flight Mass Spectrometry (PTR-ToF-MS)

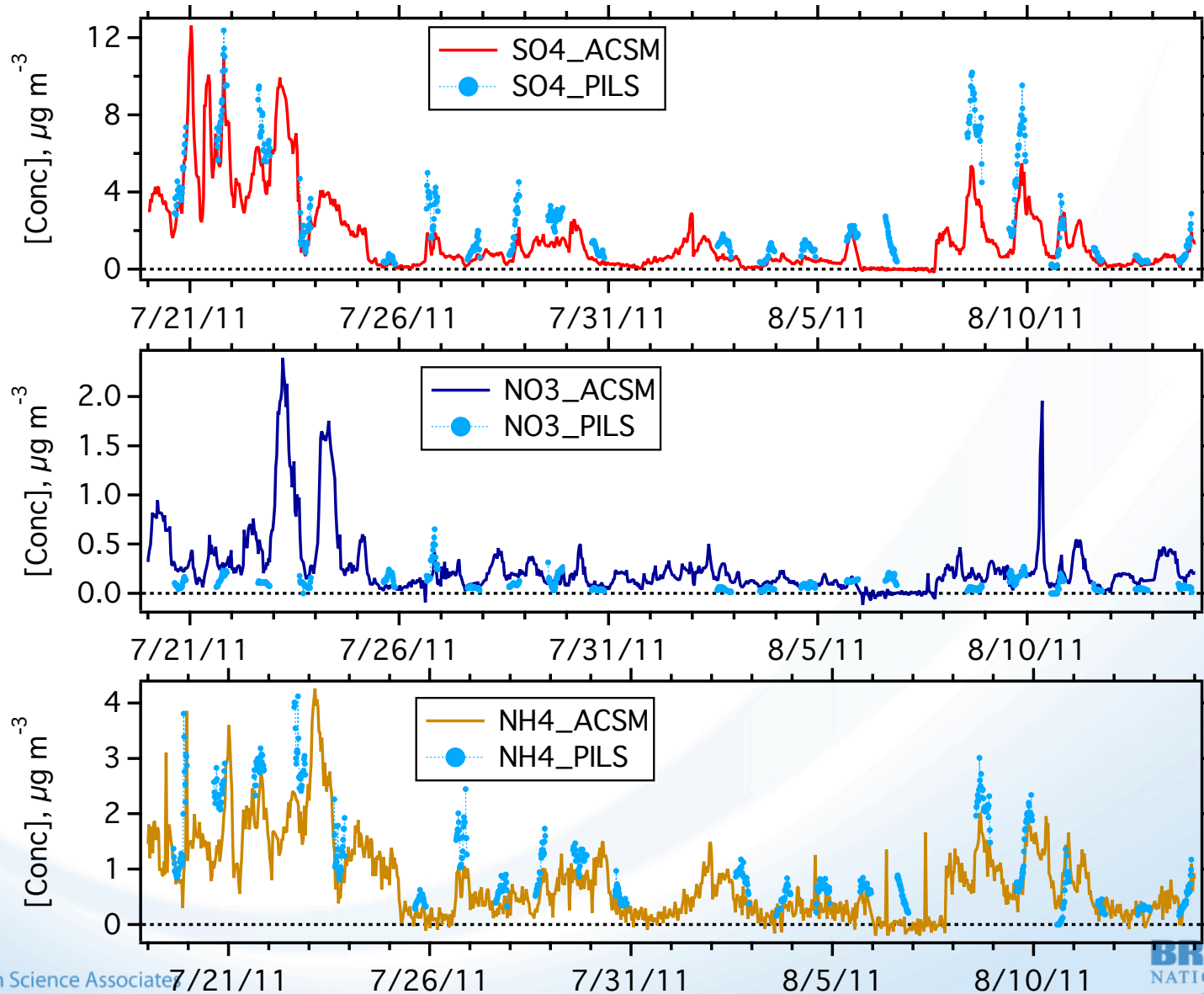
PILS-TOC

- TOC data unavailable because of contamination from
 - Carbon impregnated silicone conductive tubing
- No simultaneous TOC and IC data due to
 - Contamination from denuders used for IC analysis

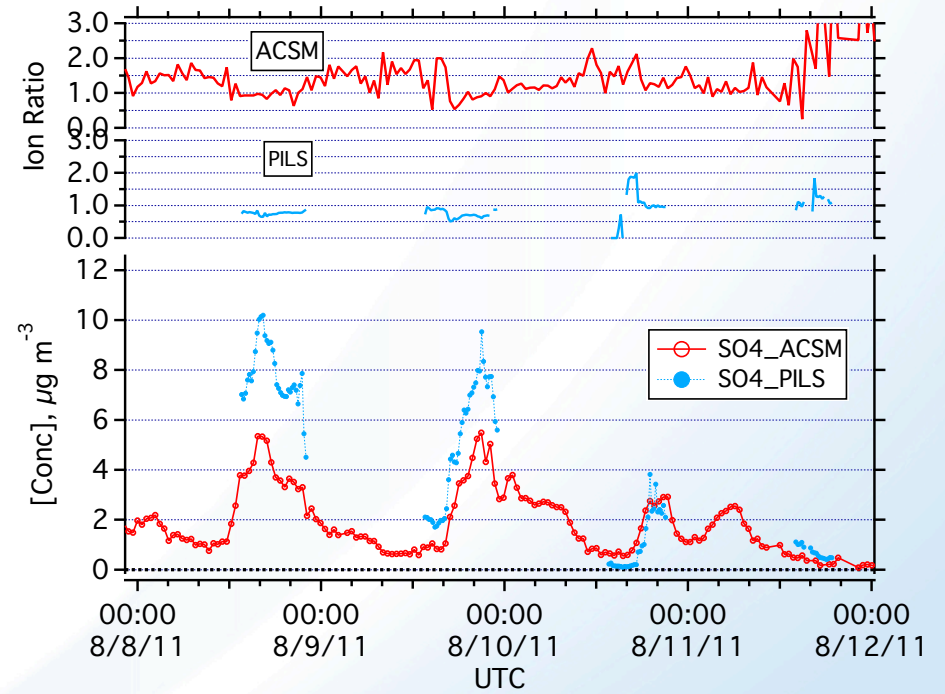
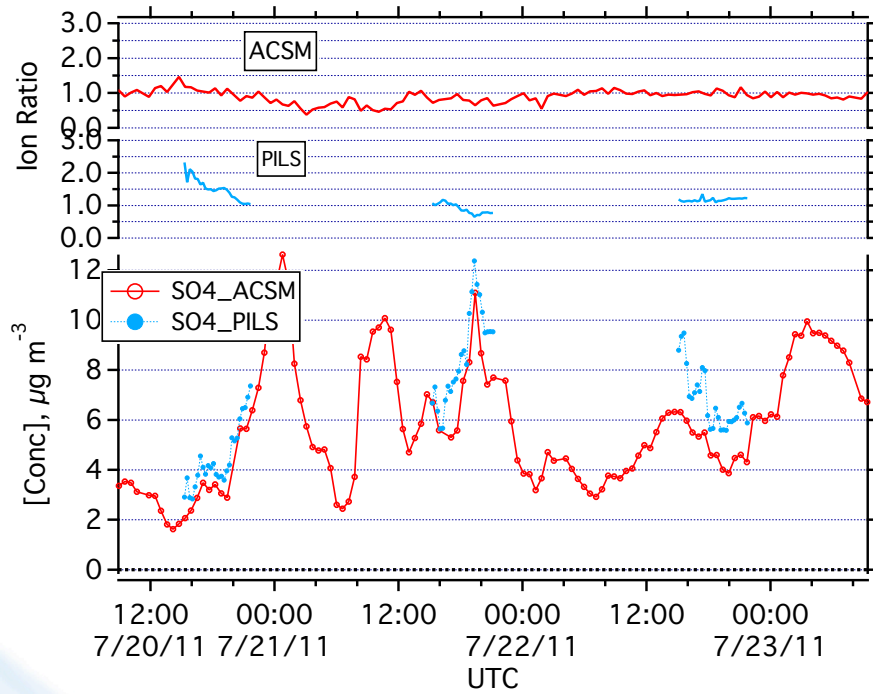
PILC-IC

- Day time measurements performed between 7/18 and 8/13, 2011 (except Sundays)
- Species reported:
 - Anions: Cl^- , NO_3^- , SO_4^{2-} , $\text{C}_2\text{O}_4^{2-}$ (Oxt)
 - Cations: Na^+ , NH_4^+ , K^+ , Ca^{2+}
- Time resolution:
 - 14.5 min averaged sample every 15 min
- Limits of detection:
 - Anions: $0.02 \mu\text{g m}^{-3}$
 - Cations: $0.04 \mu\text{g m}^{-3}$
- Uncertainty ~15 - 30%

ACSM vs PILS



Ion Balance of NH₄, NO₃ and SO₄

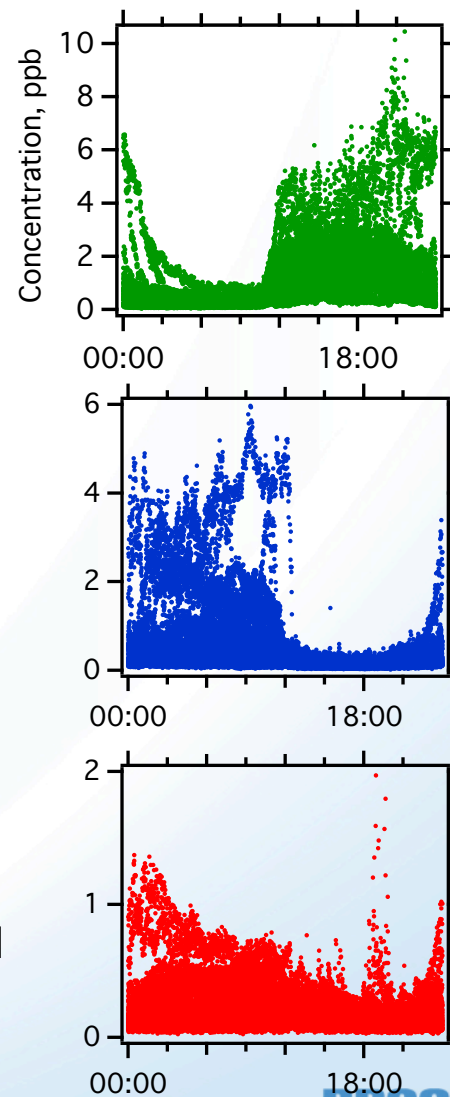
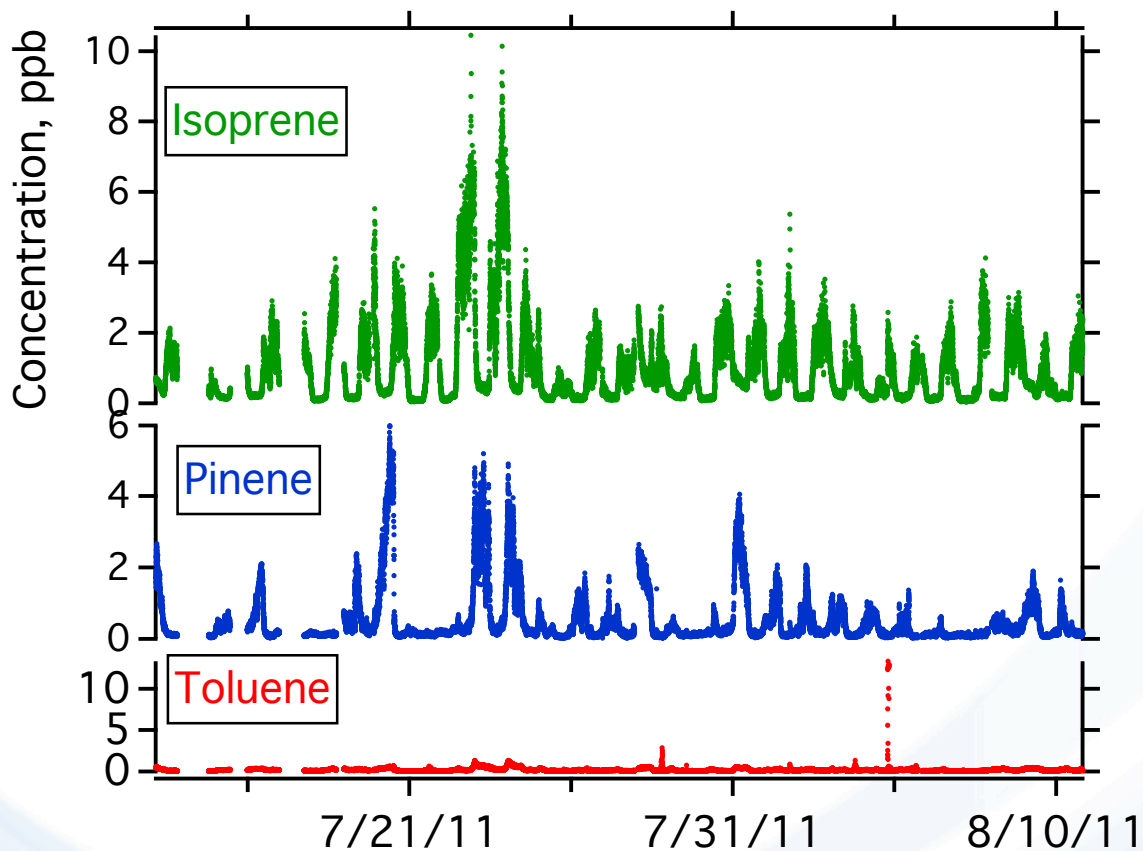


PTR-ToF-MS

- 24-hour data collected daily between 7/13 and 8/10, 2011 (except 7/14 and 7/17)
- Concentrations of 13 VOC species reported (averaged over 1 min, in parts-per-billion, ppb)
- Time resolution = 1 min
- Limit of detection ~ 0.02 ppb
- Uncertainty ~30 to 60 %

mass 33, methanol
mass 42, acetonitrile,
mass 45, acetaldehyde
mass 47, formic acid
mass 59, acetone
mass 61, acetic acid
mass 69, isoprene
mass 71, methyl vinyl ketone
mass 71, methacrolien
mass 79, benzene
mass 93, toluene
mass 107, xylenes
mass 137, pinene
mass 205, sesquiterpenes

Time Series and Diurnal Variations of Isoprene, Pinene, and Toluene



Mass Spectra of Air with Fresh Gas Engine Emission (upper) and with High Isoprene Concentration (lower)

