

***CHARACTERIZATION OF SUBMICRON PARTICLES AT LONG ISLAND
NEW YORK USING A HIGH-RESOLUTION AEROSOL MASS
SPECTROMETER***

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ABSTRACT

The Department of Energy (DOE) sponsored Aerosol Life Cycle Intensive Operational Period (ALC-IOP) field campaign took place at Brookhaven National Laboratory (BNL) on Long Island, New York, from July 1st to August 15th, 2011. An Aerodyne High-Resolution Time-of-flight Aerosol Mass Spectrometer (AMS) was deployed after a temperature-stepping thermodenuder during this study to acquire highly time resolved, quantitative data on the mass-based size distribution, chemical composition, and volatility profile of the non-refractory fraction of submicron particles (NR-PM₁). The average mass concentration of NR-PM₁ was 13.3 (± 7.7) $\mu\text{g}/\text{m}^3$, comprising 24.3% sulfate, 7.3% ammonium, 3.8% nitrate, 0.2% chloride and 64.4% organic species. It was observed that particles were originated from different air masses, including urban plumes from New York City, regional pollution enriched of ammonium sulfate, forest fire plumes transported from Canada, and oceanic emissions showing elevated methanesulfonic acid concentrations. In addition, relatively high concentrations of metal species such as Na, Mg, K, Fe, Mn, Cu, Zn, Sb, Sn and their adduct ions were observed from the night of July 4th to the early morning of July 5th, indicating the detection of firework smokes from the Independence Day celebration. Due to the influences of different sources, organic aerosol composition and oxidation degree varied substantially during the campaign. In addition, nitrogen-containing organic compounds, likely amines, were found to be an important contributor to secondary organic aerosol (SOA). Positive matrix Factorization of the high-resolution mass spectra of organics will be reported to discuss the sources and processes of OA observed in this study.