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Aerosol composition and water content during NEAQS 2004

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The spatial and temporal variations of the ambient aerosol composition in the outflow from the Northeastern United States was characterized during the summer of 2004 as part of the New England Air Quality Study (NEAQS) using an aerosol laboratory instrumented and deployed by PMEL onboard the NOAA Research Vessel Ronald H. Brown. Size-resolved aerosol mass and chemical composition was measured with an aerosol mass spectrometer (AMS) and an extensive suite of aerosol instrumentation including a particle-into-liquid sampler (PILS), an organic and elemental carbon analyzer (OC/EC, Sunset Laboratory), a differential mobility particle sizer, an optical particle counter, and three wavelength nephelometers.

The non-refractory PM1.0 aerosol composition was dominated by periods of high sulfate, high organics, and mixtures of sulfates and organics with lesser amounts of ammonium and nitrate. The mass loading and chemical composition of the aerosol was influenced by local and regional air pollution sources. The organic component was composed of hydrocarbon and oxygenated organic compounds. The AMS was operated with an inlet capable of varying the sampling relative humidity (RH). During the six week cruise, the sampling RH was varied from 40 – 90%. The mass spectra obtained from ambient aerosol in the AMS provide a measure of the condensed phase water content of the particles at a given sampling RH. The condensed phase water was highly correlated with the inorganic fraction of the aerosol composition. An analysis of the condensed phase water content will be presented with the goal of predicting water uptake as a function of particle composition and RH. In addition, the effect of water uptake on light scattering intensity will be discussed.