BNL-68902-AB

REAL-TIME MEASUREMENTS OF AEROSOL HYGROSCOPICITY AND INDIVIDUAL PARTICLE SIZE AND CHEMICAL COMPOSITION AT CHEJU ISLAND DURING ACE-ASIA

A. Zelenyuk, D. Imre, G. Buzorius, and F. Brechtel
Atmospheric Sciences Division
Brookhaven National Laboratory
Upton, NY 11973-5000

December 2001

For presentation at
American Geophysical Union Fall Meeting
San Francisco, CA
December 10-14, 2001

Abstract

Real-time in-situ measurements of aerosol physical and chemical properties were performed by the BNL Aerosol Group during the month of April on Cheju Island, Korea. Size and chemical composition of individual particles were measured by the BNL Single Particle Laser Ablation Time-of-flight Mass Spectrometer (SPLAT-MS). The instrument is currently capable of detecting and sizing particles over the 50nm to 3.5 micrometer at a rate of 20 particles per-second.

Over 5 millions particles were detected, sized and their composition characterized during the yellow dust and non-dust events. High sampling rate of approximately 2 particles per second and visualization and analysis tools allow for an exploration of the data with high resolution in time, size and class. Preliminary results of data analysis and visualization based on multivariate binary classification will be presented in the context of the overall ACE-Asia field campaign.

We will also present the results of the first deployment of Humidified Tandem Differential Mobility Analyzer (HTDMA) coupled with the single particle mass spectrometer to simultaneously measure the water uptake and individual particle composition. Dry monodisperse particles were selected, humidified and sampled into the SPLAT-MS, where chemical composition of aerosols with different growth factors was determined. Measurements of single particle composition can now be placed into context with respect to size-rezolved physical and thermodynamic properties through the combined use of HTDMA and the ambient number size distribution.

Research by BNL investigators was performed under the auspices of the U.S. Department of Energy under Contract No. DE-AC02-98CH10886.