BNL-69421-AB

AEROSOL CHEMICAL COMPOSITION CHARACTERIZATION DURING THE 2000 TEXAS AIR QUALITY STUDY

Y.–N. Lee, Z. Song, R. Weber[1], D. Orsini[1], L. Kleinman, S. Springston, L. Nunnermacker, J. Hubbe[2], V. Morris[2], N. Laulainen[2], Y. Liu, P. Daum, and J. Rudolf[3]
Atmospheric Sciences Division
Environmental Sciences Department
Brookhaven National Laboratory
Upton, NY 11973-5000

October 2002

For presentation at the
American Geophysical Union 2002 Annual Meeting
San Francisco, CA
Dec. 6-10, 2002

ABSTRACT

During the DOE G-1 aircraft flights in TexAQS 2000, the inorganic ionic component of fine aerosol particles (diameter <2.5 μm) was determined using a particle-into-liquid-sampler coupled to ion chromatography analysis, yielding concentrations of nitrate, sulfate, ammonium, sodium, calcium and potassium at a 3-min time resolution and a limit of detection of ~0.1 μg m^{-3}. Black carbon was determined using a particle soot absorption photometer. The total aerosol mass was estimated from the particle size/number distribution determined using a passive cavity aerosol spectrometer probe and an assumed density. The aerosol organic fraction was taken as the difference between the total aerosol mass and the sum of the ionic species and black carbon. The median concentrations of the total aerosol mass and total ionic species measured for the 17 flights varied between 3 and 30 and 2 and 10 μg m^{-3}, respectively. The interquartile range of the organic fraction for the entire study was between 20 and 60 percent. Although the organic component exhibited a strong correlation with black carbon, it only showed a weak correlation with photochemical products such as ozone and formaldehyde. Relationships between organic aerosol mass loading and photochemistry will be investigated to examine the contributions of photochemistry and different VOC source categories, namely, traffic, industrial and biogenic, to the formation of organic aerosols.

[1] Georgia Institute of Technology, School of Earth and Atmospheric Sciences, Atlanta, GA 30332.
[2] Pacific Northwest National Labortory, Department of Atmospheric Sciences, Richland, WA 99352.
[3] York University, Department of Chemistry and Center for Atmospheric Research, Toronto, ONT M3J 1P3, Canada.

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