Submitted for Milagro Meeting April 4, 2007

Title: G-1 Trace gas and fine particle correlations and particle chemistry

Affiliation #1
John T. Jayne,
Manjula Canagaratna,
Tim Onasch,
Achim Trimborn,
Doug Worsnop.

Aerodyne Research, Inc. 45 Manning Road, Billerica, MA 01821

Affiliation #2
Joel Kimmel
Ingrid Ulbrich
Jose Jimenez

Dept. of Chemistry & Biochemistry; and CIRES, University of Colorado; Boulder, CO 80309

Affliation #3
Larry Kleinman,
Stephen Springston,
Jian Wang
Yin-Nan Lee,
Peter Daum,

Brookhaven National Laboratory, Atmospheric Sciences Division, Upton, NY 11973

Affliation #4
Liz Alexander,
John Ortega,
John Hubbe
Pacific NW National Laboratory, Environmental Molecular Sciences Laboratory, Richland, WA 99352

Results of measurements from a compact time of flight aerosol mass spectrometer (C-TOF-AMS) operated on board the DoE G1 research aircraft are reported. The C-TOF-AMS successfully operated on 14 out of 16 research flights providing particle chemistry data with near 10 second data intervals. The C-TOF-AMS provides chemically resolved particle mass concentrations with size resolved data at a somewhat slower rate. Flight tracks through the Mexico City area show elevated concentrations and large variations in particle pollutant levels.

Regional air quality is significantly perturbed by local anthropogenic emissions and from biomass burning emissions. Pollutant levels were observed to rise significantly within the MC basin region. The relative ratio of particle nitrate to sulfate inverted from inside the city basin area (>1) to outside the basin area (<1). The concentrations of particle organic mass were also lager inside the city than outside the city. Many biomass burning events were visually observed from aloft. The AMS organic mass correlated strongly with volatile organic carbon concentrations measured by a proton transfer mass spectrometer (PTRMS) and with CO concentrations. In particular, AMS organic mass showed good correlations with PTRMS acetonitrile suggesting that a significant fraction of the organic PM may be from biomass burning. This observation contrasts what was observed on the ground by the ARI mobile laboratory. Correlations between particle sulfate and SO_2 concentrations were also observed. These observations will be discussed.