Organic Ambient Aerosol Analysis with the Aerodyne High Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS) in Mexico City during MILAGRO / MCMA-2006

Allison C. Aiken, University of Colorado; Dara Salcedo, Universidad AutÃ3noma del Estado de Morelos; Michael Cubison, University of Colorado; Donna Sueper, University of Colorado; Peter F. DeCarlo, University of Colorado; J. Alex Huffman, University of Colorado; Ken Docherty, University of Colorado; Ingrid Ulbrich, University of Colorado; Douglas R. Worsnop, Aerodyne Research, Inc.; Jose L. Jimenez, University of Colorado

Allison C. Aiken, University of Colorado, allison.aiken@colorado.edu

Ambient data was collected at the T0 supersite in Mexico City with the new version of the Aerodyne Aerosol Mass Spectrometer, the High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS) [DeCarlo et al., 2006]. The main advantage of the HR-ToF-AMS is its ability to resolve the elemental composition of most mass fragments, especially for the low m/z where the majority of the signal in the AMS occurs when using electron impact ionization (EI). Although Mexico City's ambient aerosol has been studied previously with a Q-AMS during MCMA-2003 [Salcedo et al., 2006; Volkamer et al;, 2006; Dzepina et al., 2006], the further level of ion separation allows a characterization of ambient aerosol distributions in more detail than was previously possible. Time series of mass concentrations and specific fragments are shown from Mexico City. Mass spectra are also analyzed and categorized in detail using time series analysis. The time trends and size distributions for the main aerosol species are similar to those observed in 2003. The importance of oxygenated organic species is confirmed by the HR-ToF-AMS data. Nitrogen-containing fragments represent a small fraction of the total organic signal, with amines being clearly present during some mornings.

P.F. DeCarlo, J.R. Kimmel, A. Trimborn, J.T. Jayne, A.C. Aiken, M. Gonin, K. Fuhrer, T. Horvath, K. Docherty, D.R. Worsnop, and J.L. Jimenez. A Field-Deployable High-Resolution Time-of-Flight Aerosol Mass Spectrometer. Analytical Chemistry, in press, Sep. 2006.

K. Dzepina, J. Arey, L.C. Marr, D.R. Worsnop, D. Salcedo, Q. Zhang, L.T. Molina, M.J. Molina, and J.L. Jimenez. Detection of Particle-Phase Polycyclic Aromatic Hydrocarbons in Mexico City using an Aerosol Mass Spectrometer. International Journal of Mass Spectrometry, submitted, 2006.

D. Salcedo et al., Characterization of ambient aerosols in Mexico City during the MCMA-2003 campaign with Aerosol Mass Spectrometry: results from the CENICA Supersite. Atmospheric Chemistry and Physics, 6, 925-946, 2006. http://www.atmos-chem-phys.net/6/925/2006/acp-6-925-2006.pdf

R. Volkamer, J.L. Jimenez, F. San Martini, K. Dzepina, Q. Zhang, D. Salcedo, L.T. Molina, D.R. Worsnop, and M.J. Molina. Secondary Organic Aerosol Formation from Anthropogenic Air Pollution: Rapid and Higher than Expected. Geophysical Research Letters, 33(17), L17811, 2006.