Aerosol Chemical Composition Determined on the DOE G1 Aircraft during MAX-Mex in March 2006

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Aerosol chemical composition was determined on board the DOE G1 during the 2006 MAX-Mex/MILAGRO campaign using two different techniques. The Aerodyne Time-of-Flight Mass Spectrometer (ToF-AMS) measured sulfate, nitrate, ammonium, chloride, and total organics at a time resolution of 12 s, and the PILS-IC techniques measured sulfate, nitrate, ammonium, chloride, sodium, magnesium, potassium and calcium at a 3 min time resolution. Preliminary data analysis resulted in the following observations: (1) ToF-AMS and PILS-IC showed a general agreement with the former using a collection efficiency (CE) of 0.5, (2) the aerosol particles were not appreciably acidic as sulfate and nitrate were completely neutralized by ammonium, which is also consistent with the CE used, (3) aerosol sulfate concentration was significantly less variable than nitrate, indicating a slower sulfate formation rate, giving rise to a regional character, (4) aerosol nitrate peaked in urban plumes, reaching upward of 40% of the aerosol mass and 20% of total NOz (=NOy-NOx), consistent with a VOC-limited photochemical production and the presence of sufficient ammonia from vehicular emissions, (5) organics comprised an important fraction of the total aerosol mass, upward of 80%, which increased with photochemical age with concomitant increase in oxidized organic fraction, and (7) although both biomass burning and dust events appeared to be common in Mexico City basin, neither potassium nor calcium were observed, suggesting that they might not be the suitable tracers for these aerosol sources in this region.