Ground Measurements of HNO3 and VOCs Using ID-CIMS and PTR-MS at the T0 Urban IMP Site during MCMA 2006 Campaign

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An ion-drift chemical ionization mass spectrometer (ID-CIMS) developed at Texas A&M University and a commercial proton-transfer-reaction mass spectrometer (PTR-MS, Ionicon Analytik) were deployed at the Instituto Mexiao Del Petroleo (T0 urban site) during the Mexico City Metropolitan Area - 2006 field campaign (MCMA 2006). The ID-CIMS used a chemical scheme based on SiF5- + HNO3 reaction to measure gas-phase nitric acid (HNO3). HNO3 daytime profile generally featured a fast growth starting around 9 to 10 am Central Standard Time (CST), reaching peak value (0.5 to 3 ppbv) in the early afternoon, and then declining sharply to less than half the peak value near 5 pm CST. During this campaign, the PTR-MS was continuously monitoring up to thirty eight masses including propene, butene, isoprene, methanol, acetaldehyde, acetone, toluene, C2 benzenes, and C3 benzenes. Diurnal profiles of weekday and weekend/holiday aromatic VOC concentrations clearly show the influence of rush hour traffic. Overall, anthropogenic sources dominated the VOC emissions and biogenic VOCs were found insignificant in terms of the contribution to the VOC reactivities. On average, toluene, C2 benzenes and C3 benzenes mixing ratios were 26, 18, and 11 ppbv, respectively, during the morning rush hour.