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Online IC-MS measurements of organic acids in aerosols and gas phase in Mexico City

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During the month of March 2006 the MILAGRO (Megacity Initiative: Local and Global Research Observations) intensive field campaign to study the chemical and physical transformations of gaseous and aerosol pollutants within the city and in the outflow of the world's second largest metropolitan area, Mexico City (MC) took place.

We deployed our wet effluent diffusion denuder – aerosol collector (WEDD/AC), a home-built instrument for sampling water-soluble gas-phase and aerosol compounds at the site T0 in the north of the city of Mexico. The samples were analyzed using ion chromatography mass spectrometry (ICMS) in a quasi-continuous fashion. The MS (MSQ from Dionex) has a single quadrupole mass detector and uses the atmospheric pressure ionization (API) technique, which offers soft ionization resulting in little or no fragmentation. The API source operates using electrospray ionization (ESI). With this system, we measured inorganic anions and organic acids in the gas and particle phase.

Distinct diurnal cycles were found for many acids. NO_2^- and NO_3^- in the aerosol phase show peak concentrations of several μg/m3 and an opposite diurnal cycle, with high HONO levels at night time due to heterogeneous reaction from NO_x under dark conditions. We will present diurnal cycles of the organic acids in the gas and aerosol phase. This yields information on primary and secondary sources of these acids. For example an acid with m/z 87, a fragment mass of a dicarboxylic acid, shows a very distinct peak between 6 and 12 in the morning and can be associated with the car exhaust of the morning rush hour. We were able to measure many dicarboxylic acids in

the aerosol phase, with high mass over charge ratios like 193, 181, 178, 155, 197, 225, 192 and 161, stated here with increasing retention time. This data will be compared to measurements done by other instruments like CIMS and DOAS of other research groups.