

Comparison of ground-based, and total-column DOAS measurements of HONO with C-130 aircraft overflights aloft T0: implications for vertical gradients

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During MILAGRO an extensive set of measurements was collected at T0 (MCMA-2006) to quantify time resolved RO_x (sum of OH, HO₂, RO₂) radical production from the photolysis of nitrous acid (HONO), formaldehyde (HCHO), glyoxal (CHOCHO), ozone (O₃), and selected oxygenated volatile organic compounds (OVOCs). Respective photolysis-frequencies (J-values) were measured by spectroradiometry at ground-level.

Quasi-simultaneous observations of HONO, HCHO and CHOCHO concentrations at ground-level (by open-path DOAS) are used in combination with total vertical column measurements (by MAX-DOAS) to assess the vertical structure of radical production within the MCMA. Strong vertical gradients are observed for the concentrations of HONO during mid morning, indicating the existence of ground-level sources during the day. These direct (DOAS) measurements are compared with HONO concentration measurements by a Chemical Ionization Mass Spectrometry (CIMS) instrument onboard the C-130 aircraft, which intercepted the airmass aloft T0 in various occasions.

Integrating radical production rates over the height of the planetary boundary layer presents an extension of previous analysis of radical sources at ground-level (MCMA-2003, see Volkamer et al., 2007 Atmos. Chem. Phys. Disc. accepted). Since the radical production in Mexico City is radical limited, our analysis aims to identify the drivers of such processing to ultimately reduce peak concentrations of secondary pollutants like O₃ and secondary organic aerosol (SOA).