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Measurements of Volatile Organic Compounds Using Proton Transfer Reaction – Mass Spectrometry during the MILAGRO 2006 Campaign

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Abstract. Volatile organic compounds (VOCs) were measured by proton transfer reaction – mass spectrometry (PTR-MS) on a rooftop in the urban mixed residential and industrial area North Northeast of downtown Mexico City as part of the Megacity Initiative – Local and Global Research Observations (MILAGRO) 2006 field campaign. Thirty eight individual masses were monitored during the campaign and many species were quantified including methanol, acetaldehyde, toluene, the sum of C_2 benzenes, the sum of C_3 benzenes, acetone, isoprene, benzene, and ethyl acetate. The VOC measurements were analyzed to gain a better understanding of the type of VOCs present in the MCMA, their diurnal patterns, and their origins. Diurnal profiles of weekday and weekend/holiday aromatic VOC concentrations showed the influence of vehicular traffic during the morning rush hours and during the afternoon hours. Plumes including elevated toluene as high as 216 parts per billion (ppb) and ethyl acetate as high as 183 ppb were frequently observed during the late night and early morning hours, indicating the possibility of significant industrial sources of the two compounds in the region. Wind fields during those peak episodes revealed no specific direction for the majority of the toluene plumes but the ethyl acetate plumes arrived at the site when winds were from the Southwest or West. The PTR-MS measurements combined with other VOC measuring techniques at the field site as well as VOC measurements conducted in other areas of the Mexico City Metropolitan Area (MCMA) will help to develop a better understanding of the spatial pattern of VOCs and its variability in the MCMA.

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