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Ozone profiles over Mexico City and Houston during MILAGRO/ Intercontinental Transport Experiment (INTEX-B) Ozonesonde Network Study, 2006 (IONS-06): Stratospheric, lightning and pollution signals in the troposphere

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During the INTEX-B (Intercontinental Chemical Transport Experiment)/ MILAGRO (Megacities Initiative: Local and Global Research Observations) experiments in March 2006 and the associated IONS-06 (INTEX Ozonesonde Network Study; <<http://croc.gsfc.nasa.gov/intexb/ions06.html>>), regular ozonesonde launches were made over 15 North American sites. The soundings were strategically positioned to study inter-regional flows and meteorological interactions with a mixture of tropospheric O₃ sources: local pollution; O₃ associated with convection and lightning; stratosphere-troposphere exchange. The variability of tropospheric O₃ over the Mexico City Basin (MCB; 19N, 99W) and Houston (30N, 95W) is described. General features were: (1) soundings displayed a double tropopause and a subtropical tropopause layer with frequent wave disturbances, identified through O₃ laminae as gravity-wave induced; (2) expected linkages between MCB and Houston pollution were infrequent

in March 2006, and even less so in August-September 2006; (3) profiles over both cities in August and September 2006 (IONS-06, Phase 3) displayed a thicker tropospheric column O_3 (~ 7 DU or 15-20%) than in March 2006. In spring and summer, O_3 laminar structure manifested mixed influences from the stratosphere, convective redistribution of O_3 and precursors, and O_3 from lightning NO. Stratospheric O_3 origins were present in 39% (MCB) and 60% (Houston) of the summer sondes. Comparison of summer 2006 O_3 structure with summer 2004 sondes (IONS-04) over Houston showed 7% less tropospheric O_3 in 2006.