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Tropospheric ozone sources and wave activity over Mexico City and Houston during MILAGRO/Intercontinental Transport Experiment (INTEX-B) Ozonesonde Network Study, 2006 (IONS-06)

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Abstract. 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 O_3 sources: local pollution; O_3 associated with convection and lightning; stratosphere-troposphere exchange. The variability of tropospheric O_3 over the Mexico City Basin (MCB; 19° N, 99° W) and Houston (30° N, 95° W) is reported here. MCB and Houston profiles displayed a double tropopause in most soundings and a subtropical tropopause layer with frequent wave disturbances, identified through O_3 laminae as gravity-wave induced. Ozonesondes launched 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; nearly all of the increase was in the free troposphere. 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. This may reflect a sampling contrast, August to mid-September 2006 instead of July-mid August 2004.

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