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Comment

Interactive comment on “Tropospheric ozone sources and wave activity over Mexico City and Houston during MILAGRO/Intercontinental Transport Experiment (INTEX-B) Ozonesonde Network Study, 2006 (IONS-06)” by et al.

Anonymous Referee #2

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

General: This is an interesting study of the tropospheric ozone budgets over two urban areas as determined from ozone and meteorological soundings and assimilation model results. The analysis techniques have been presented in a previous publication (Thompson et al., JGR, doi:10:1029/2006JD007441) and I do not believe that any new methods are developed in this paper. The data from IONS-06, however, are new and

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the conclusions drawn in this analysis are noteworthy. The text is generally well-written and the figures are clear. The abstract accurately conveys the content of the paper along with the important conclusions. In my judgement, this manuscript is acceptable for publication with consideration of the specific comments below.

Specific: The first two issues in this list are particularly important and should be addressed. The remainder are of lesser importance but the authors may still find some of the points useful.

1. Most of the primary results of this study are summarized in Table 2 and in Figure 6, which breakdown the mean and daily O₃ budgets in terms of the four contributions from BL, ST, RCL, and AD. While I recognize that a precise and objective uncertainty analysis may be difficult (or perhaps not possible in this case), there ought to be *some* measures that can be used to gauge the uncertainty, or at least to estimate the magnitude of the uncertainty for these contributions. For example, is the ~1 DU increase in BL O₃ from spring-to-summer (p. 5991, l. 5) really significant above the uncertainty? One could also get a better picture of whether the day-to-day differences between ST and RCL in Fig 6 are truly significant, provided there is an error estimate placed on these contributions.

2. It appeared that a secondary objective to the O₃ budget analysis was to explore the hypothesis that MCB and Houston O₃ pollution are linked (p. 5987, l. 4), but it was not fully explained what this linkage actually meant. Two paragraphs on p. 5987 refer to back- and forward trajectory calculations, and the discussion implies a search for cases where MCB O₃ may be advected over Houston, but it was not clear to me that this was the source of the linkage. On the other hand, on p. 5993 there is a conclusion that pollution transport between Houston and Mexico City during IONS-06 phase 1 was somewhat limited, with even less coupling during the summer phase 3. If this refers to the linkage hypothesis stated above, then I did not find that these conclusions were adequately demonstrated.

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3. p. 5985, l. 4: Most launches took place in early afternoon. What was the spread in local times – are morning or nighttime launches included? What effect would any diurnal O₃ changes have on assessing the day-to-day variability?

4. Fig 2: Tropopause in white should be in caption. How is the tropopause defined here?

5. p. 5986, l. 14: Locally moist layers above 9 km can also result from continental convection, not just marine origins.

6. p. 5986, l. 21: Double ozonopause is not defined. Why does this not appear in the average plots Figs 2c and 2d (or does it)?

7. Fig 3a and 3b: These are really interesting figures, but there is not much discussion other than a sentence or two at the bottom of p. 5986. There could be more discussion and motivation for why these figures need to be presented; if they are examples, then how they fit into the overall analysis would be a useful addition.

8. p. 5988, l. 26: The two maxima at 3.5 and 5 km in the MCB profile are not apparent to me in Fig 2c. It looks like a single broad max at the top of the BL.

Technical Corrections: Title to section 2: Experimental IONS-06 observations (and?) methods of analysis

Fig 5d: I did see temperature data plotted in Fig 5d.

Fig 6: I suggest that the legend use the terms "AD", "ST", "RCL", and "BL" to be consistent with the text and with Table 2.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 5979, 2008.

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