**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Evaluation of tropospheric ozone columns derived from assimilated GOME ozone profile observations" *by* A. T. J. de Laat et al.

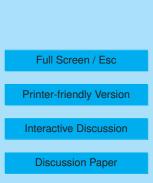**Anonymous Referee #1**

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The topic of estimating the tropospheric ozone column is suitable for ACP, but the authors need to address a few points before it is acceptable for publication in ACP. These points general, specific are described below.

General points:

The paper makes several statements that need to be clarified and/or quantified. These are detailed in the specific issues below. Furthermore, I think it would be useful to readers if the authors could provide some discussion on whether the data assimilation procedure "adds value" or not: viz., discuss the differences between using/not using assimilation. My reading of the paper is that it is not generally the case that assimilation

improves on the model. I think this is worthy of discussion.

Specific points:

P. 11812, Abstract: Mention the issue of "added value".

L. 21: "improvements" in what?

P. 11813, L. 20: I think the statement about "spatially dense" data is misleading. Satellite observations can have quasi-global coverage, but may not be spatially dense, in particular if the horizontal spatial resolution is coarse. Perhaps the authors could clarify what they mean.

P. 11814, L. 11: define level-2.

Line 19-20: Where is this "relevant"? The UTLS? Does the dominance of dynamical processes in the UTLS mean that the use of the Cariolle scheme is justified?

Line 23-24: How do the weather analyses provide the best information about the separation between the stratosphere and the troposphere?

P. 11815, L. 1: Provide references describing the TORA method.

P. 11817, L. 13: Quantify "good agreement".

Line 14: Give latitude range for the "tropics".

P. 11818, L. 4: This comment about the analysis is in principle true, but shortcomings in the data assimilation methodology generally mean that the solution is sub-optimal. Perhaps the statement could be qualified?

P. 11820, L. 14: Quantify "good agreement".

Line 16: Identify the individual days where these "considerable differences" occur. If the list is long, perhaps provide a few examples to aid the reader.

Line 20-24: Please quantify statements or, at least, refer to (I think) Table 1.

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P. 11821, L. 3: Quantify the "positive model bias".

Line 12: By "near perfect" do you mean near 1?

P. 11822, L. 24: Quantify "a bit worse".

Sections 4.3/4.4 would be a good place to discuss the issue of whether the assimilation "adds value" to the model.

P. 11824, L. 25-26: Note that the assimilation does not actually correct the bias in the model, as this bias still remains.

P. 11825, L. 8: Quantify "very well".

P. 11826, L. 3-6: I think it would help the reader if the authors commented on the results when using the assimilated products (does the assimilation "add value"?).

P. 11829, L. 7: Can you comment on the implications of Schoeberl's results on the results of your paper?

Line 15-20: Is the number of observations to be assimilated really for a problem for what is a CTM-based assimilation? Can you quantify your statements, e.g., provide CPU time, wall-clock time for, e.g., 1 month assimilation?

P. 11838, Fig. 2: Difficult to see text inside the figures. The caption needs rewording to identify clearly which panels refer to the monthly means and which ones do not. Do the panels not describing monthly means describe daily means/values at 1200UTC?

P. 11839, Fig. 3: It would be helpful to mention in the caption what do the positive/negative differences indicate.

P. 11840, Fig. 4: Indicate in the caption which panels correspond to Payerne (left?) and which correspond to Ascension (right?).

P. 11841, Fig. 5: It would be helpful to mention in the caption what do the positive/negative differences indicate.

Technical points:

P. 11815, L.16-17: Should be: "Medium-Range"

P. 11826, L. 27: "According" is superfluous.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 11811, 2009.