Atmos. Chem. Phys. Discuss., 8, S8278–S8281, 2008
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the extraction of wind information from the assimilation of ozone profiles in Météo–France 4D-Var operational NWP suite" *by* N. Semane et al.

Anonymous Referee #2

Received and published: 15 October 2008

While several studies have examined the theoretical basis for extracting wind information from ozone observations, the novel aspects of this paper are the three-month long experiments within an NWP system, and the use of good quality vertically-resolved data from MLS. This is an interesting study and it should be published in ACP. However, before that I would like to see some more investigation of the following areas:

1) Page 16482 mentions the use of "traditional OSE" experiments in evaluating the impact of new observations in NWP. In these, forecast scores are calculated by comparison to reference analyses, such as those from the full operational system. These OSE studies are done quite routinely (since the RMS error statistics versus analysis are

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very easy to calculate) and NWP people would expect to see them. Why have these not been done in the present study? Whether the results are positive or negative, it would be useful to see them.

2) Section 3.3 covers OMF wind statistics. This is a very interesting part of the study. However, one question that needs to be answered is which region of the atmosphere the results apply to. Would it be possible to resolve these results by region, such as tropics versus high latitudes? Perhaps the location of the sondes is dominated by NH high latitude locations anyway?

3) One of the hopes for ozone assimilation has been that it might help improve winds in the upper troposphere and at the tropopause. This study shows useful improvements in the lower stratosphere, generally at levels higher than 80hPa, but not below. Could the authors comment on the prospects for improving winds in the UTLS? It would be useful to address this in the conclusions and perhaps highlight any reasons that have prevented this study from showing any real impact at these levels.

Specific points:

1) p16475, line 2-3: these are useful references but I am not sure how they link to the sentence they are attached to. Please provide some extra linkage or explanation.

2) p16479, line 2: "generalised interpolator". Since this is part of a general description of the NWP system used, it should be mentioned that as well as including an atmospheric model and interpolation, the H() operator may also include a modelling of the observed quantity, such as a radiative transfer code.

3) p16481 / Figure 3: This is a useful figure but stage (c), the 6hr forecast, runs vertically downwards, whereas the rest of the time-dependent processes, and a time-axis, run horizontally. So stage (c) may be confusing to understand - please could you try to revise this diagram so that the 6hr forecast also runs horizontally.

4) p16481, line 14: "averaged in time from 23 January..." Please state what allowance

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has been made for spin-up in these experiments. Ozone in the lower stratopshere can easily take 7-10 days to spin up in some NWP systems. Figure 4 seems to show that over the course of a 6 hour forecast, the model ozone drifts substantially away from the analysed/observed. Could this also be a spinup effect, or is it present throughout the period?

5) p16482, line 18: Please describe in the text how the observations are peturbed.

6) p16485, line 12-13: "temperature analysis response is dependent on the "drying" or "wetting" analysis effect of these radiances" I don't understand how this might happen. Please could you explain this in a little more detail in the text.

7) section 3.3: (see main point 2) If possible, please break down these statistics by region, or give an indication of which part of the stratosphere they are applicable to (e.g. - mid-latitudes / vortex / tropics?).

8) p16486, line 10-11: "OMF standard deviations, not shown here, are very close". It would still be interesting to see a figure here. Also, perhaps this could be reworded for clarity as "OMF standard deviations are almost unchanged between experiments".

9) p16487, line 4: "No bias correction has been applied". Is it possible that, if bias corrections were applied, that the changes in mean meridional wind shown in Figure 7 would go away? The ozone observations are fighting against a large (20%) model bias, as shown in Fig. 4. This could easily lead to systematic changes in the wind fields in the analyses. Please discuss this possibility.

10) Conclusions: the conclusions should be specific about which part of the wind field has been improved in Fig. 7 - i.e. the mean merdional winds. If point 9 (mean changes due to uncorrected ozone biases) is a realistic possibility, please mention this as well.

Typos

1) p16480, line 7: "errors ARE small" (not IS)

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2) p16485, line 11: "analysis of THE temperature field"

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