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Atmospheric Measurement Techniques Discussions

Interactive comment on "Global and long-term comparison of SCIAMACHY limb ozone profiles with correlative satellite data (2002–2008)" *by* S. Mieruch et al.

Anonymous Referee #4

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Review of Global and long-term comparisons of SCIAMACHY limb ozone profiles with correlative satellite data (2002-2008) by S. Mieruch et al.

This manuscript describes an intercomparison of SCIAMACHY limb ozone profiles with several independent ozone profile measurements taken from space-born instruments. The authors include a fairly thorough description of the functionality and quality of each instrument data set, with related references. This work is appropriate to publication in AMT and is useful for those in the community wanting to use SCIAMACHY data, particularly as part of a combined ozone profile data set. In addition, these results can

be used to improve the quality of future versions of SCIAMACHY retrievals.

The intercomparisons are done first by comparing mean offsets (using zonal means and means of co-located pairs of measurements), and then by comparing trends computed from the individual data sets over matching time periods. The authors take care in both analyses to document statistical significance of the results. I have only a couple of minor comments, and believe the manuscript should be published with minor revisions.

Minor Comments:

Data from each type of instrument has a different inherent vertical resolution. The comparisons between instruments are done on a 1-km vertical grid, but is any attempt made to account for differences in the vertical resolution. Are the data from the occultation profiles smoothed in the vertical to match the resolution of the SCIAMACHY profiles? A discussion of this point would be useful.

Also concerning the vertical data dimension, the authors use the temperature profiles provided by SABER and HALOE to convert from mixing ratio on pressure surfaces to number density on altitude. A statement about the source of those temperature records would be useful. Do they use internal measurements or an ancillary data set such as NCEP temperatures?

The discussion of Figure 4 concerning the common feature of a high bias for SCIAMACHY below 20km does not appear to be consistent in the southern mid-latitudes. I suggest refining the description of the offset (see specific note below).

Concerning the trend analysis, I am a little surprised that the trends in the difference time series show no statistical significance given the difference in the trends from the individual instruments as discussed. My inclination is to use the difference time series as the base for the trend computation when investigating drifts in instruments. By subtracting the two time series, interannual variability - including the QBO - is canceled

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out (to the extend that both time series measure the QBO accurately), lowering the noise and increasing the significance of the derived trend. One could also subtract the seasonal cycle from each data record individually as differences in seasonal cycle should not change the long-term drift signal. In any case, I would like to see a little more discussion as to why the trends in the difference time series seem to contradict the other results, particularly in the regions with large negative trends in SCIAMACHY.

Finally, I note that the small differences between zonal mean averages and using co-located profiles is interesting and useful for statistical purposes, I don't believe time or computer constraints are really a problem these days. It is useful to confirm that occultation instruments can provide a usable zonal mean.

Technical Comments: page 4870, Line 12: change used averages to averages used

page 4872, Line 1 and 18: You have already defined the SCIAMACHY acronym.

page 4872, line 20-21: I was confused by this sentence and thought Envisat had ended. How about "Envisat was launched into a sun-synchronous orbit at a height of about 800km, but was lowered 17 km starting in 2011."

page 4874, Line 1: Is there any information on SAGE quality of V6.2 data available?

page 4876, Line 14-15: This sentence is confusing. Try "MLS has a precision of about 5% throughout most of the stratosphere, with 10% precision in the lowermost stratosphere."

page 4878, Line 14: The top panel... page 4878, Line 16: "one of the few months where data from all satellite instruments used in the study were available"

page 4879, Line 7: Remove "For most part of the stratosphere"

page 4880, Line 4 and page 4888, Line 9: consider "... is the high bias below 20 km in the northern hemisphere and particularly in the tropics, where differences can exceed 100%."

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page 4880, Line 9: remove "upon"

page 4880, Line 11: reword to "Rodgers and Conner (2003) suggest preforming profile intercomparisons using ..."

page 4882, Line 20: remove "up to"

page 4884, Line 21-22: replace "additionally to" with "in addition to"

page 4888, Line 14: "several tens of thousands of profiles"

page 4889, Line 22: reword as "Extending the comparisons ... is also planned"

page 4890, Line 1: "the 27-day solar rotation"

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 4867, 2011.