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Atmospheric Measurement Techniques Discussions

Interactive comment on "MIPAS reduced spectral resolution UTLS-1 mode measurements of temperature, O_3, HNO_3, N_2O, H_2O and relative humidity over ice: retrievals and comparison to MLS" *by* S. Chauhan et al.

Anonymous Referee #2

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General Comments

This paper presents a concise and well-written description of comparisons between MIPAS (reduced resolution IMK/IAA retrievals) and Aura/MLS measurements of temperature, H2O, O3, HNO3, N2O, and relative humidity, with a focus on the upper troposphere/lower stratosphere during November and December 2005. Some comparisons with ECMWF temperature analyses are also presented and suggest possible errors in the ECMWF dataset. The vertical resolution and measurement noise obtained for each species using the MIPAS reduced resolution spectra are characterized and compared

with corresponding results for the full resolution mode. Mean differences between MIPAS and MLS are shown as functions of latitude and altitude, and vertical profiles of the global mean biases and their uncertainties are calculated. These results are relevant to anyone interested in using the MIPAS reduced resolution UTLS-1 mode data, either independently, or in combination with the MLS data, as suggested in the paper.

Specific Comments

Page 443, last paragraph - A brief explanation of why the tangent altitude grid is latitude dependent in the UTLS-1 mode, but not in the FR mode would be instructive, given the significant impact of this latitude dependence in causing the wavelike behaviour in vertical resolution and measurement noise seen in Figures 1 to 5.

Page 444, first paragraph - Although the reader can look up details of the retrievals in the papers cited, it would be helpful to have a short description of the MIPAS IMK/IAA retrieval approach, providing some introduction for the discussion of the Tikhonov-type formalism mentioned on page 447, paragraph 2.

Page 444, second paragraph - Clarify what is different between the UTLS-1 mode and the FR mode for each of these five points, and give the reason for each difference (as is done for point 5).

Page 445, line 2 - Explain briefly how the vertical resolution and measurement noise were calculated.

Page 445, line 26 - Add some discussion of the results reported in Table 2, e.g., comment on the differences in the horizontal resolution with respect to species and altitude, and the reasons for them.

Page 445, line 27 - Are the horizontal resolution results for this reference geolocation over the south polar region typical or are there any significant differences for other orbits and locations?

Page 446, line 3 - Same as the previous question - are the error analysis results for this

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reference limb scan over mid-latitudes typical or are there any significant differences for other orbits and locations?

Page 446, section 3 - This section describing MLS is very brief. It would be helpful to add a short discussion of the retrieval approach, typical errors and vertical resolution for temperature and the four species of interest, and to cite the relevant validation papers. Some of this information is given later in the paper, but would be appropriate here.

Page 447, second paragraph - The discussion of the impact of the a priori here seems strange if the a priori profiles were set to zero as implied on page 444, line 17 - clarify. It would also be helpful to know what retrieval approach is used by MLS (see previous point) when considering the impact of the a priori on MLS retrievals.

Page 448, line 6 - This states that the mean differences were calculated for 5 degree latitude bins. However, the plots on altitude-latitude grids in Figures 6 to 19 do not appear to be binned. If the binned results have been smoothed for the contour plots, state this. Perhaps it would be better to show the results in the bins?

Page 449, line 21 - For Figures 8, 11, 16, 18, and 20, add a panel showing the SEM on a different scale. It would also be informative to include the MIPAS and MLS measurement errors on such plots, particularly given that some attention has been given to calculating the UTLS-1 mode measurement noise shown in Figures 1 to 5.

Page 461, Table 1 - This table should be more clearly explained in the caption and/or in the text. What is the significance of A, B, and C? Are bands (column 2) the same as microwindows (column 3)? Why were different microwindows used for the UTLS-1 and FR modes? Delete brackets on wavenumber ranges. Add units for column 2.

Technical Corrections

Page 445, line 1 - Section 2.1.1 might be better named Section 2.2.

Page 446, line 2 - Tables 3a to 3e (or just Table 3?)

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Page 447, line 5 - delete "to" after "gave"

Page 447, line 20 - does "worse than 50%" mean "greater than 50%" ? If so, the latter is clearer.

Page 447, line 28 - delete "quasi"

Page 447, line 29 - change "amount" to "number"

Page 451, lines 3,4 - change to "... showed large differences that were similar to those in the original comparison (Fig. 12). These large differences ..."

Page 453, line 12 - delete comma after "121 hPa"

Page 453, line 24 - "C2H6, and PAN, which ..."

Page 480, Figure 13 caption, line 2 - "In the case of ..."

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 439, 2009.