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Atmospheric Measurement Techniques Discussions

Interactive comment on "MIPAS temperature from the stratosphere to the lower thermosphere: comparison of version vM21 with ACE-FTS, MLS, OSIRIS, SABER, SOFIE and lidar measurements" *by* M. García-Comas et al.

Anonymous Referee #1

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The manuscript by Garcia-Comas et al. deals with the new version vM21 of MIPAS temperatures covering the middle atmosphere, and the extensive comparison with other observational data sets – mainly from satellites. The authors describe the main improvements of the retrieval compared to the previous version vM11. Some effects like the line-of-sight temperature gradient are shown in more detail. Overall, the improvements have largest effects in the mesopause region and above, resulting in differences by up to 20 K. The new data set is compared to 'co-located' profiles of five satellite instruments and two lidars. The manuscript provides much useful information for users

of the different data sets, not only for MIPAS data. Due to the massive amount of information not all details about the differences can be explained, but some general aspects are well explained or referred back to previous comparisons. The agreements but also the partly huge differences between the six space-based data sets become obvious. As long as the "true" temperature is unknown, it is hard to say which data set is the best. Nevertheless, the authors provide a nice summary about the potentials and limitations of the MIPAS temperature data. The paper is well written and suitable for publications in AMT if some minor comments are acknowledged.

Comments:

p. 6656, l. 16: I do not understand "and temperature decreases above" in this context. Similarly in l. 21. Maybe the authors mix the temperature changes between the two versions (temperatures increase or decrease from vM11 to vM21) with the resulting difference and its altitude dependence. I suggest rephrasing this section.

p. 6657: Is there any possibility to estimate the accuracy of the WACCM-SD O-concentrations? Maybe by comparison with the (indirect) observations or by comparison with temperature data sets being less dependent on [O]?

p. 6664, section 3.1: Uncertainties and systematic errors of Rayleigh lidars are large around 80 km. I suggest (for upcoming studies) using additionally resonance lidars that provide temperatures between 80 and ∼100 km, i.e. in the region with largest differences between satellite data sets. The differences between MIPAS and lidars partially increase drastically at and above 80 km. Is this an effect of seeding temperatures or seeding altitude for the Rayleigh retrieval? Below 60 km partly large differences occur, mostly if the number of profiles is small. Are these systematic differences or an effect of large spatio-temporal distances between lidar and MIPAS data?

p. 6667, l. 23: Spatial differences of 1000 km can induce large systematic differences, e.g. due to the meridional temperature gradient or longitudinal temperature differences ("standing" planetary and tidal waves). What are the reasons for choosing these crite-

ria?

p. 6671, ll. 17-21: Please comment on these oscillations. Are they presumably realistic? What can be the cause for these oscillations and what are the implications for the MIPAS data?

p. 6674, l. 12: The differences are not "slightly" larger, but by $\sim$10 K, i.e., quite significantly. Please provide some explanation why differences increase so strong with the NLC dataset.

p. 6674, Section 4.2.1: Please comment on the very large differences between SABER and MIPAS near 35 km in Fig. 11, 50°-70° and 30°-50°.

p. 6677, Section 5: Please provide a conclusion for the observation of hemispheric differences from MIPAS data (or satellite data in general). Which differences can be found, where are no differences between hemispheres and where is the data set inconclusive (because data sets disagree)?

Technical comments:

p. 6653, l. 20: replace "with" by "between MIPAS and"

p. 6657, l. 12 and elsewhere: "larger temperatures" should read "higher temperatures", "smaller temperatures" should read "lower temperatures"; similarly with "latitudes". Also "warmer" and "colder temperatures" should be avoided.

p. 6661, l. 7: "in (Funke et al., 2012)" should read "in Funke et al. (2012)."

p. 6670, l. 17: "partial" should read "partially"

p. 6670, l. 26: "differences present ..." should read "differences are slightly more negative (3-5 K)"

p. 6673, l. 15: "value" should read "values"

p. 6676, ll. 14-15: "axies" should read "axes", "difference" should read "differences"

Fig. 1-3: The labels are extremely small. A larger font should be used. In Fig. 2: Typo "tproduced".

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 6651, 2014.