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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.

K. Pérot (Referee)

kristell.perot@chalmers.se

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The manuscript presents a new version of MIPAS temperatures (vM21) which covers the lower stratosphere to the lower thermosphere from 2005 to 2012. The main upgrades with respect to the previous version are described and their impacts on MIPAS temperature fields are discussed. A well-conducted inter-comparison with the temperature measurements from five satellite instruments and two lidars is then presented, showing that the comparisons have improved compared to the previous version.

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This paper is well written and contains many details. It will be useful for the scientific community to understand and evaluate this dataset. I think it is acceptable for publication in AMT after consideration of the following minor issues. The main comment is that the description of the inter-comparison seems to be a bit too optimistic in my opinion (the differences shown in the figures are quite often beyond the ranges given in the text). That should be reconsidered.

Specific comments:

p.6656, l.14: Is there any reference (an ESA technical note for example), describing the version 5.02/5.06 of MIPAS L1b spectra? If so, it would be useful to add this information.

p.6657, l.10-12: “In the summer high latitudes, WACCM-SD atomic oxygen is 2-3 times larger than NRLMSISE-00 at the mesopause (87 km), leading to 5-6 K larger temperatures.” Could you please briefly explain why larger atomic oxygen abundances lead to larger temperatures at the summer high latitude mesopause, while it leads to lower temperatures anywhere else (other altitudes and seasons)?

p.6663: By looking at Fig.3 to 5, it seems that the temperature increases (up to about 6 K) above 100 km in the winter hemisphere, when upgrading from vM11 to vM21. Could you please comment this difference?

p.6664, l.8-12: SMR aboard Odin also provides temperature in the MLT on a regular basis from 2001 and it is still in operation (although it doesn't cover the whole altitude range considered here). The study by Orsolini et al. (JGR, 2010) has been done using this data set for example. Consequently, I think that it is not correct to affirm that the satellite instruments included in your study are the only ones providing this kind of measurements.

p.6665, l.14: “from 316 to 0.001 hPa”: Please indicate an estimate of the corresponding altitude range, in order to make this vertical range comparable to that given for the

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other instruments.

p.6668,l.20: “for each hemisphere”: Do you mean “for each season and latitude box” instead?

p.6670,l.19-20: “and, to a lesser extent, in autumn”: I would say to a lesser extent in spring as well (around 70 km).

p.6672,l.21-23: “MLS and OSIRIS [. . .] differences of up to 10K” I would say 15K rather than 10K (summer, [30-50]°).

p.6672,l.28: “3-5K warmer than MLS”: in winter, MIPAS mesopauses are 7K warmer than MLS at [50-70]° and 9K warmer at latitudes greater than 70°. The 3-5K difference range is clearly underestimated.

p.6674,l.10-13: By looking at the figures, I would remove the word “slightly” (l12): these differences are significantly larger in the NLC mode comparisons than in the other modes (especially with ACE-FTS around the stratopause in the winter at high latitudes).

p.6676,l.26-27: The difference between MIPAS and SOFIE stratopause altitude NH-SH asymmetries is not within the given range at latitudes greater than 70°.

p.6677,l.15-16: Please specify that you are talking about the [50-70]° latitude box.

p.6679,l.8-11: The exception mentioned here is not the only one. Here are some examples: - Spring: MIPAS 4K colder than MLO lidar around 70km. - Autumn: MIPAS 3 to 4K warmer than TMF above 65km and 5K colder than MLO around 70km. - Summer: the difference between MIPAS and TMF lidar temperature measurements is beyond the 2K difference range already from 75km. - Winter: MIPAS 3K colder than TMF at 45 and 75km, and 3K colder the MLO around 55-60km. - And the comparisons with both lidars are significantly out of the 2K difference range in the NLC mode (except for MLO in the summer). As a result, I think that these exceptions are too numerous for this statement to be true. Please reconsider it.

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p.6690-6695 (Fig.6-11): Why is the difference in the stratopause temperature not represented for the two lidars?

Technical comments:

p.6654, l.3: Typo “Environmental Satellite”

p.6655, l.19: Please specify more clearly the period considered in your study: it is January 2005 to March 2012, according to the abstract and summary, while it stops in April 2012, when communication with EnviSat was lost, according to what you say on pages 6654, 6661 and 6664.

p.6656, l.20: Isn't it more correct to say “the temperature increases BY 4K”?

p.6657, l.1: Please change “VM21” to “vM21”.

p.6659,l.27: Please add a “s” to “field”.

p.6660, l.22: Please change “VM11” to “vM11”, and add a “s” to “contribution”.

p. 6661, l.17: I guess you mean “July” instead of “June” for the NLC mode, don't you? I would be more logical as it corresponds to the peak of the NLC season. Moreover, “June” is in contradiction with the captions of the figures 5, 10 and 11. If July is the right month, please correct it on p.6662(l.20) as well.

p.6663,l.11: “arctic” should be written with a capital A.

p.6666,l.3: Typo “Earths's”

p.6666,l.6: Please add “km” after “45 to 72”.

p.6666,l.23: Please correct the reference Remsberg (2008), there is a mistake. The paper you are citing here has nothing to do with SABER. I guess you wanted to refer to another paper by Remsberg et al., written in 2008 as well: “Assessment of the quality of the version 1.07 temperature-versus-pressure profiles of the middle atmosphere from TIMED/SABER, JGR”.

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p.6673,l.24-25: You should not skip a line here, otherwise it is not clear that you are still talking about the summer high latitudes in this last paragraph.

p.6678,l.24: Repeated word “horizontal”.

p.6679,l.18: I would suggest to change “smaller” to “lower”.

p.6685-6689: I think the labels for the figures 1 to 5 should be slightly bigger.

p.6686 (Fig.2): Typo “tproduced”

p.6687-6689 (Fig.3 to 5): Adding the seasons (DJF, MAM, JJA, SON or January/July) at the beginning of each “line” of plots would make the figures clearer.

p.6697 (Fig.13): You mention only the [70;90][°] latitude band in the caption. Please add [50;70][°].

p.6697 (Fig.13): “northern” should be written with a capital N.

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