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Interactive comment on “On the quality of MIPAS kinetic temperature in the middle atmosphere” by M. García-Comas et al.

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We thank Dr. Young Ming Cho for reviewing our manuscript and for his useful comments. We think we addressed all issues he raised. The answers (AA) to his comments (RC) are given below.

RC: Page 24234, line 19-20 : The explanation about large differences over poles in high altitudes is weak. Systematic error, uncertainty, or co-location mismatch would be better to interpret the large differences. I would suggest to remove or rephrase this sentence.

AA: The magnitude of the kinetic temperature differences over the poles is generally within the biases reported for other instruments. Those are not necessarily the same

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(not even smaller) than the estimated systematic errors or uncertainties of MIPAS or the other instruments. Also, the co-location mismatch is not expected to produce differences of the order of the ones found over the poles (in fact, we chose our co-location criteria to avoid large differences due to co-location mismatch). Therefore, we think it is more precise to refer to the biases of the other instruments, better than estimated errors (systematic or random) or differences due to co-location mismatch.

RC: Page 24234, line 26 : change to "Also, the kinetic temperature is ..."

AA: Done.

RC: Page 24235, line 23 : "one day each mode every 10 days" should be rephrased

AA: We now write "each mode is used one day every 10 days" instead.

RC: Page 24236, line 13 : change to "and lower atmosphere ..."

AA: Non-LTE effects generally affect the emissions in the mesosphere and lower thermosphere but not the lower atmosphere. No change done.

RC: Page 24237, line 14 : missing a word, N. "74S-74N"

AA: Done.

RC: Page 24237, line 20 & 21 : typo errors, HIDRLS -> HIRDLS

AA: Done.

RC: Page 24249, line 20 & 21 : Selections in space and time of coincident measurements (1000 km - 2 h for space-borne measurements, 1500 km - 4 h for ground-based measurements) are too large to avoid atmospheric perturbations such as a gravity wave. There are numerous publications about short period oscillations in temperature and density. Especially, 4, 6, and 8 hour oscillations have been reported in the polar MLT region. The amplitude of these short period oscillations, a half of peak-to-peak variation, is more than 5 K in temperature. It means the atmospheric perturbation is

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seriously an additional noise source in the comparison of different measurements. It is important to increase the number of co-located measurements, but the reasonable selection criteria are also required.

AA: In fact, we use selection of '2-h apart' measurements for satellite measurements to avoid such oscillations. Regarding the selection criterion used for ground-based measurements, we agree that the selection rule used may include some effect from oscillations but we have checked the impact of reducing the time difference and the change in the temperature differences is smaller than 0.5K. That suggests that the effect of the oscillations has been completely averaged out when estimating the mean differences. We now write in the 2nd paragraph of Section 3: "We have examined the impact on the comparisons of restricting the spatio-temporal criteria (to 500 km and 1h) and have found that it is not important, which shows that effects from co-locations mismatch are averaged out."

RC: Page 24249, line 23 & 24 : What is the meaningful statistical significance?

AA: We agree that this sentence is vague. We now write: "to have larger statistical significance".

RC: Page 24253, line 26 & 27 : missing comma? "...January, and February..." and "...July, and August..."

AA: We do not think so.

RC: Page 24255, line 29 : needs to expand acronym of vmr, "...volume mixing ratio (vmr)..."

AA: We now define the acronym vmr the first time it is used (Introduction of section 2).

RC: Page 24257, line 18 : "...per a calendar day."

AA: We think it is better to write "per calendar day".

RC: Page 24262, line 3 : "... from 1 to 0.316 hPa, and 14 km at 0.1 hPa."

AA: Done.

RC: Page 24262, line 16 & 17 : "For each year" is not a complete sentence. Please, rephrase it.

AA: We write now: "The average number of coincidences per year..."

RC: Page 24264, line 5 : "That average of negative difference..."

AA: We write now: "That negative average difference..."

RC: Page 24264, line 24 : What is the pressure/altitude conversion formula used?

AA: We think we do not completely understand this question. We mean that the large differences found in the lower thermosphere would be smaller if MIPAS altitude were shifted up in several kilometers, which produces the same effect of shifting MIPAS pressure down by several hPa. The pressure/altitude conversion formula used assumes hydrostatical equilibrium (see Clarmann et al., 2003). No action was taken.

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