

Interactive comment on “Level 1b error budget for MIPAS on ENVISAT” by Anne Kleinert et al.

Anonymous Referee #2

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The article "Level 1b error budget for MIPAS on ENVISAT" by Anne Kleinert et al. gives a comprehensive overview on the error budget of the level 1b data in the upcoming and probably last version 8. The level 1b data are the calibrated and geo-located spectra that serve as the basis for the retrievals of the atmospheric state and constituents. The error budget presented here is of great value, especially to all who are retrieving any species from MIPAS data and all who are using derived MIPAS products. The paper is well written and structured. I recommend it for publication in AMT after some minor and technical corrections.

Minor comments

page(p)1 line(l)18: The examples for clouds comprise only PSCs and PMCs. I'd suggest to also add an example for upper troposphere/ lower stratosphere cirrus clouds e.g. Spang et al., ACP, 2012 or Sembhi et al., ACP, 2012

C1

p2 l17–18: Please consider adding a sentence for explanation here. It takes some time studying Fig. 1 to understand how 4 detectors can cover 5 spectral bands even if one detector fails.

p4 l5: Please add some description of the parameters given in Table 1. E.g., what does coadditions per gain measurement mean?

p4 l14: What does simple mean here? Is the correction algorithm cutting the spikes?

p6 l8: Please state what low means. 10 km, 20 km or 50 km? Is this factor linear from top to bottom?

p6 l8–10: Does this have any practical implications? Does this mean that when investigating measurements at e.g 10 km all data points with radiance $\leq \text{NESR} \times 1.5$ should be discarded / are not significant? Please clarify.

p7 l14: Please add to which value the requirement of the scaling accuracy was relaxed.

p12 l4–8 & Figure 9: There are 3 spectral bands shown in Figure 9 for band A (best visible at 180° Latitude), but the label and text indicate only 2 bands. Further, what does Latitude <0, >90, <180, <270 mean? Where is the Equator? Is each data point representing a single sweep or a scan measurement? In the text it says that in FR mode the variation between two subsequent measurements is below $2 \text{ nWcm}^{-2}\text{sr}^{-1}\text{cm}$ in band A, but in Figure 9 it goes down to $-4 \text{ nWcm}^{-2}\text{sr}^{-1}\text{cm}$. Please clarify.

p13 l26–28: Did you assume 91% modulation efficiency for all bands? Or did you derive it using the DC-zero method for all detectors but B1 and B2? Please clarify.

p13 l31: And what about bands AB, C, D?

p18 Figure 12: Is my assumption correct that altitude level 1 is low (about 10 km) and altitude level 26 is high (about 65 km) altitude? Please provide a description in the caption. Please consider a change of the color scale to blue/green for excellent agreement (ratio close to 1) and orange/red for slightly reduced agreement (ratio smaller than 1).

C2

p20 l1 – 3, l6-15: Do you have any idea what is causing the day-night difference, latitudinal and seasonal variation of the offset?

p22 l6: Please explain why the spectral accuracy is given like a mixing ratio in ppm. I'd rather expected values in cm^{-1} as you provide in line 7.

p23 l12: Which standard atmosphere did you use (the U.S. Standard Atmosphere or any other)? Is this atmosphere anywhere available?

Technical comments

Please revise all places where you are using "allow to".

p1 l9: please write "... allows atmospheric parameters to be retrieved ..."

Text font and unit font seem to be different throughout the manuscript e.g p1 l13.

p1 l15-16: please write "...measurements allow for retrievals of..."

p1 l23: it should be SF_6 and CF_4

p2 l13: See first technical comment. Please write e.g.: "It allows two-sided ... up to ± 20 cm to be measured."

p2 l15: cooled "to" 70 K

p2 l18: Please write "bands".

p4 l20: "... consist of scaling ..."

p5 l8: Please write: "The level 1b processor reports the geolocation with each measured spectrum..."

p7 l11: Please consider adding the channel names in brackets here to facilitate reading. E.g. "... the non-linear channels (A, AB, B)..." and "linear channels (B,C)..."

p11 l6: See first technical comment. Please write e.g. "This allows us to conclude..."

C3

p13 l2: Please check comma placement between "constant" and "between"

p17 l6: Please add "Section" before "5.2" and "5.6".

p17 l11: See first technical comment. Please write e.g. "This allowed for calculating a mean..."

p18 l1: Please replace "like" with "such as"

p19 Figure 13: Please fix the caption. The picture label says that the FR curve is black and the OR curve is red.

p20 l2: Please consider writing "The offset is decreasing with increasing altitude and wavenumber." for better comprehensibility.

p22 l5: "... used as an estimate for..."

p22 l10: Did you mean "one per day"?

p24 l6: Please add comma after "lengths".

p25 l5: See first technical comment. Please write e.g. "... allows retrieving atmospheric..."

p25 l8: "...has shown that a thorough..."

p25 l12: Please add comma before "which".

References

Spang, R., Arndt, K., Dudhia, A., Höpfner, M., Hoffmann, L., Hurley, J., Grainger, R. G., Griessbach, S., Poulsen, C., Remedios, J. J., Riese, M., Sembhi, H., Siddans, R., Waterfall, A., and Zehner, C.: Fast cloud parameter retrievals of MIPAS/Envisat, *Atmos. Chem. Phys.*, 12, 7135-7164, <https://doi.org/10.5194/acp-12-7135-2012>, 2012.

Sembhi, H., Remedios, J., Trent, T., Moore, D. P., Spang, R., Massie, S., and Vernier, J.-P.: MIPAS detection of cloud and aerosol particle occurrence in the UTLS

C4

with comparison to HIRDLS and CALIOP, *Atmos. Meas. Tech.*, 5, 2537-2553,
<https://doi.org/10.5194/amt-5-2537-2012>, 2012.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2018-185, 2018.