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Atmospheric Chemistry and Physics Discussions

Interactive comment on "MIPAS Level 1B algorithms overview: operational processing and characterization" *by* A. Kleinert et al.

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We feel that the description of the level-1b processing is important for the understanding of how the level-1b data is generated and for the understanding of the different calibration tasks and the results. Furthermore this paper should be seen in the frame of the MIPAS special issue, where "data processing" is explicitely named in the title. Therefore we wish not to reduce the paper to the results of the characterization. Two more general references will be added, and the figures will be improved following the specific comments (see below).

p. 10674 # 10 ... spectral range from 4.15 to 14.6 μm (685 - 2410 cm-1)(Fischer et al., 20061, Fischer et al., 20002, Endemann, 19993).

Reference 3: Endemann, M., MIPAS Instrument Concept and

Performance, Proceedings of European symposium on atmospheric measurements from space, Noordwijk, 18-22 Jan. 1999 http://envisat.esa.int/services/sample_products/mipas/documentation/MIPAS/MIPAS_performance_ESAMS_99.pdf

Specific comments: 1. reference to a published paper: A reference will be added. Reference 2: Fischer, H., Blom, C., Oelhaf, H., Carli, B., Carlotti, M., Delbouille, L., Ehhalt, D., Flaud, J.-M., Isaksen, I., Lopez-Puertas, M., McElroy, C. T., Zander, R., Envisat - MIPAS, the Michelson Interferometer for Passive Atmospheric Sounding; An instrument for atmospheric chemistry and climate research, ESA SP-1229, Readings, C. and Harris, R. A. (Eds.), European Space Agency, Noordwijk, The Netherlands (2000).

The cold target will be described in the paper: p. 10674 # 20 to minimize its contribution to the signal. The cold target is a cold plate of high emissivity cooled at 70 K

2. Merging of Table 1 and 2 The tables will be merged and the decimation factor will be explained in the text. Detector Optical Range [cm-1] Band Optical Range [cm-1] Decimation Factor A1 685 - 995 A 685 - 970 21 A2 685 - 1193 B1 995 - 1540 AB 1020 - 1170 36 B2 1193 - 1540 B 1215 - 1500 22 C1 & C2 1540 - 1780 C 1570 - 1750 30 D1 & D2 1780 - 2410 D 1820 - 2410 11 p. 10674 #21: Each output port is equipped with four detectors covering different spectral bands. The signals detected at both output ports are similar and they are combined in some frequency bands to improve signal-to-noise ratio. The eight detectors are split into five bands, each band being covered by one or two specific detectors. Due to the limited data rate, the measured interferograms are filtered and decimated. The filtering before decimation prevents noise from out-of-band spectral regions to be aliased into the spectrum. The spectral coverage of the eight detectors and the five bands, together with the decimation factor, is given in Tab. 1.

3. Acronym LOS and calibration sources: The acronym LOS (Line of Sight) will be explained p. 10676 #3 Line of sight (LOS) calibration

We will use "hot source" and "could source" in table 3 and in the text. p. 10676 #10 The radiometric calibration is performed using two known radiation sources (a hot source and a cold source). The hot source is an internal calibration blackbody, while the deep space serves as cold source. Two sets of measurement scenarios are required:

p. 10676 #18 Using the notation given in Table 3, the radiometric gain G is defined as:

Table 3: Spectrum Cold source Hot source Scene Units Radiance 0 Lbb Lx nW / (cm2 sr cm-1) Observed Sds, Sc Sbb Sx Arbitrary

4. forward/reverse separately It is explained on page 10676, that forward and reverse sweeps are treated separately (#22-24).

5. Table 4 and ADFs Table 4 will be mentioned when the auxiliary data files are introduced (p 10681 #20), and a reference will be given on p 10682 #15. p 10681 #20: The L1B processor requires 2 input types: the Level 0 product containing the measurement data, and a set of auxiliary data files (see Table 4) to calibrate ... and p 10682 #15 The calibration and characterization data is stored in auxiliary data files (Aubertin et al., 2002). These files are listed in Table 4.

Reference: Aubertin G., Leroux, J., and Perron, G.: MIPAS L1B Processing Input/Output Data Definition. Technical ESA report, PO-TN-BOM-GS-0010 4E, 2002

6. Calculate spectral calibration In "calculate scene calibration", a spectral calibration factor is applied, which has been determined before. Then, in the step "calculate spectral calibration", a new spectral calibration factor is determined, which will be applied to the following spectra. This will be clarified in the text by writing: "this function determines the spectral calibration factor for the following elevation scans" (p. 10685 # 16). p. 10685 # 16 this function determines the spectral calibration factor for the following elevation scans. It is applied at every 4 elevation scans.

7. NESR0 NESR will be explained before NESR_T and NESR_0 are defined p 10686 #17 The noise is quantified by the noise equivalent spectral radiance (NESR). The

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NESRt is defined as ...

8. NESR0 and NESR NESR will be replaced by NESR0 in the text. p 10687 #20 The NESR0 ranges from ...

9. s0 s0 will be replaced by sigma0 p 10691 #7 ... at position 0 ...

10. "and" instead of & OK

11. deg vs. rad OK, the text will be changed into mrad or the Figure 6 will be changed in mdeg.

12. periodic behaviour The magnitude of the deviation shows a periodic behaviour in time. In figure 10 only the examples with the largest deviations are shown. The text will be modified.

p 10695 #3 In the absence of any gain variation in time its real part should be 1 and its imaginary part should be 0. However, in the measurements deviations of these values are observed. The magnitude of the deviations shows a periodic behaviour in time within the sequence. Figure 10 shows the maximum deviations found in the spectra. The variations can be attributed to microvibrations leading to a modulation of the sampling positions within the interferogram.

13. + 2 -> and two OK (p 10691 #25)

14. Table 3 The text will be changed to replace "Theoretical" by "radiance" and to replace W/... by nW/... to be consistent with the NESR values given. The difference between Sds and Sc is explained below the table.

15. Table 4 We will mention Table 4 in the text (see above).

16. radiometric unit The radiance units will be changed to nW/... on page 10675

17. Figure 1 In order to avoid confusion, the caption will be shortened to: NESR0 of MIPAS on ground an in flight. The NESR0 will be explained in the text. Figure caption:

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NESR0 of MIPAS on ground an in flight.

18. Figure 4 IGM will be replaced by "interferogram", and the explanation of the y-axis will be changed as follows: y-axis: relative spectral intensity. The spectral intensity of the calibration blackbody is scaled to 1, the spectral intensity of the deep space view is around 0.2. Furthermore the legend of the first figure is missing and should be added.

19. Figure 7 OK p 10675 #7 ... descending to 3 km. The observation geometry is displayed in Figure 1. (The figures need to be renamed then.) Figure caption: Observation geometry of MIPAS.

20. Figure 8 Is it possible to add the appropriate numbers and units?

21. Figure 9 The amplitude is in km as is indicated on the y-axis.

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