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Interactive Comment

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

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General comments: We will extend the abstract as suggested. This paper gives an overview of the MIPAS Level 1B (L1B) processor whose main objective is to calibrate atmospheric measurements radiometrically, spectrally and geo-located. It presents also the results of instrument characterization done on ground and during the first years in-flight. An accurate calibration is mandatory for high quality atmospheric retrievals. MIPAS has shown very good performance and stability. The noise equivalent spectral radiance ranges from 3 to 50 nW/(cm2 sr cm-1) and is well within the requirements over nearly the whole spectral range. The systematic radiometric error is estimated to be within 1 or 2 % in most situations.

A reference (Revercomb et al., 1988) describing the basic calibration technique will be added and referred to on page 10676. p. 10676 #9: The radiometric calibration uses

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the approach described by Revercomb et al. (1988).

Reference: Revercomb, H. E., Buijs, H., Howell, H. B., LaPorte, D. D., Smith, W. L., Sromovsky, L., "Radiometric calibration of IR Fourier transform spectrometers: solution to a problem with the High-Resolution Interferometer Sounder," Appl. Opt., 27, 3210-3218 (1988).

Specific comments: 1. reason for filtering and decimation OK, a reason will be added. (for modification in the text, see the second point of referee 2)

2. NESR estimation The NESR estimation will be described in detail in section 4.2 p. 10687 #21: The NESR (noise equivalent spectral radiance) quantifies the noise level of the data. The NESR0 is the NESR in absence of signal radiation. For characterization purposes, the NESR0 is determined by calculating the standard deviation of consecutive high resolution deep space spectra. Furthermore an NESR is calculated for each calibrated spectrum. This NESR is derived from the imaginary part of the calibrated spectrum, by taking the standard deviation of all data points within a spectral interval of 10 cm-1. This NESR is reported on a spectral grid of 10 cm-1.

The NESR0 ranges from 3 nW/(cm2 sr cm-1) to 50 nW/(cm2 sr cm-1), depending on the spectral range and channel. The NESR is well within the requirements (Figure 1), and no systematic evolution of the NESR over time could be observed. The most important effect on the NESR is ice accumulation on the detector system, which may temporarily degrade the NESR by up to 20 % with respect to an ice free detector.

3. FCE Measurements are used after detection/correction for fringe losses, because it is assumed that fringe losses occur only at turnaround, not in the middle of the interferogram. This will be made clear in the text. p10679 #19: ... for this aspect. It is assumed that fringe count errors occur only at turnaround and not within an interferogram, therefore the interferograms are used after the fringe count error correction.

4. Min/max values The ADC min/max values before filtering and decimation are part of

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the data stream, and the total flux is computed for each interferogram. p 10680, #11: ... and decimation. These values are contained in the data stream. The scaling factor is applied ...

5. Electronic responsivity scaling The detector responsivity will be replaced in the text by preamplifier gain settings. p 10680, #16: ... to account for the current preamplifier gain settings at the time of measurement. The only scaling applied to the measurements takes into account the commanded gain setting that optimizes the detector signal at the ADC level. During commissionning phase, the best commanded gain settings was calculated by measuring the variations of the maximum and minimum ADC values over several orbits for different type of scenes from high altitude to low altitude, for deep space measurements and blackbody measurements.

6. ILS OK p 10681 #1: ...convolved with the theoretical line and iteratively fit to the experimental data. Two parameters of the full ILS model are adjusted. The selected parameters are part of the characterisation of the interferometer's alignment status, one parameter is the amount of linear shear across the scan direction and the other parameter is the misalignment between the optical axis and the center of the field-of-view.

7. Type of laser We will describe the type of laser in the text and a reference will be added for diode laser aging (TBD). p. 10690 #21: The auxiliary data file MIP_CS1_AX contains the spectral correction factor (SCF) that compensates for variations in the instrument metrology (e.g.: aging of the laser (ref Ě)). The laser is a single-mode 1.3 um-diode laser, which does not have an absolute frequency stabilisation but is designed to have a good short term frequency stability (less than 50 MHz drift over 75s). The initial spectral factor is applied to the first scans scene measurement data.

Reference: ĚTBDĚ

8. N2O and CH4 N2O and CH4 have been used to look for scan direction dependence initially, due to an improper Non-Linearity characterization input to the level-1b

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processing causing some strong oscillations in the N2O and CH4 profiles. Within the analysis of the affected data, it has been shown, that the oscillations disappeared when the correct inputs to the level-1b processing had been applied.

9. Microvibrations Only one offset is retrieved for the whole limb sequence. Since the effect of microvibrations changes from one interferogram to the next, the retrieved offset cannot compensate for the microvibration errors. A scale parameter is not fitted at all, because a scaling error cannot be separated unambiguously from trace gas concentrations.

Technical corrections: OK, the corrections will be done as suggested.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 10673, 2006.