

MERTIS-FM

Spectrometer Radiometric Calibration Report

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1 Introduction

1.1 Purpose

This document is a description of the measurement campaign focusing on the radiometric calibration of the spectrometer part of the MERTIS flight model (FM). The campaign includes a series of preliminary investigations and the final radiometric system response measurements under space-like thermal-vacuum conditions (TV).

The validity of the radiometric measurements base strongly on the preliminary measurements. These include the spectral assignment for each spatial/spectral channel, determinations of the dynamic range limits of the image signal in order to keep a linear system response, the definition of different sets of detector settings in order to ensure the system's ability to deliver high quality images for the whole temperature interval the instrument will face in orbit around Mercury.

Each of those steps is described together with a brief theoretical background description and models used. Finally the measurement results are shown and evaluated.

1.2 Abbreviations

BG	Background Signal Portion
DLR	German Aerospace Center, Germany
DM	Development Model (sometimes called Lab-Model)
EM	Engineering Model
FEE	Front End Electronics
FM	Flight Model
FOV	Field of View
ICU	Intelligent Control Unit / Instrument Control Unit
IfP	Institut für Planetologie
MERTIS	ME rcury R adiometer and T hermal I nfrared S pectrometer
OGSE	Optical Ground Support Equipment
PI	Principal Investigator
PIX2PIXBGR	Pixel-to-Pixel Background Removal
SSD	Spectral Sampling Distance
TBC	To be confirmed
TBD	To be determined
TBW	To be written
TIS	Thermal Infrared Spectrometer

1.3 Applicable Documents

N/A

1.4 Reference Documents

RD1 Measurement data, AST

2 Radiometric Calibration Campaign Overview

The radiometric calibration concept for the MERTIS-FM TIS is divided into these four parts:

1. Spectral assignment measurements
2. Determination of KRS5 window transmittance and external calibration of reference BB
3. Adjustment of the image signal's dynamic window for a maximized almost linear response
4. Determination of thermal dynamic ranges
5. Radiometric response measurements in vacuum covering the whole thermal range 0°C..40°C of the instrument temperature

The preliminary measurements 1-2 were done at air under room temperature conditions. The determination of the digital and thermal dynamic ranges and the final radiometric calibration in the steps 3 to 5 were done under thermal vacuum conditions. It is sufficient if the certified calibration of the reference BB used for step 2 is done in the near future after all calibration measurements have been completed.

1. Spectral calibration using narrow-band spectral features at multiple angular positions within the FOV

In this step a set of narrow band-pass filters (BP) covering the spectral range between 7 μm and 14 μm is measured for three different positions within the FOV. The resulting datasets are the base for determination of the spectral calibration coefficients. The procedure's primary outputs are the calibration coefficients, the spectral sampling distance (SSD) and the BP central positions within each image. The BP positions are chosen relative to the edges of the FOV. The edges are clearly visible in the difference image data. Additionally the relation of the BP – positions in the images to the angular scale is the subject of the geometric calibration.

2. Determination of KRS5-Window transmittance and external calibration of reference BB

The MERTIS radiometric calibration goal is to make possible an absolute spectral quantification of the radiation coming from the mercury surface. It is therefore necessary to know the amount and spectral distribution of the radiation arriving from the reference radiators during the radiometric calibration measurements. Using the TVC setup measurements were done with the goal to get the knowledge about the actual amount of the radiation passing through the KRS5 window which is integrated into the TVC. Knowing the spatial distribution of the spectral transmittance of that window and the spectral emittance of the reference blackbody radiator used to generate the scenes an absolute radiometric calibration becomes possible. While the KRS5-window transmittance can be measured in the DLR IR-Lab the blackbody device needs to be calibrated externally, i.e. at the PTB / Berlin / Germany.

3. Adjustment of the image signal's dynamic window for a maximized linear response

The sensitivity of the system's response against incident radiation could be configured in a limited range by the adjustment of the detector gain voltage V_{FID} . As the very first step the gain was maximized so that the system response is kept almost linear and no signal degradation was detectable. For that investigation a gain of the image SNR was regarded for different detector gain settings. In order to avoid strange detector behaviour – i.e. keeping system response linear - the maximization finalized where the SNR gain stopped "growing" and no further degradations of the image signal could be seen.

Furthermore it was observed that at the bottom and top of the digital dynamic range the system response to an incident radiation signal lost the linear behaviour rapidly. In order to avoid this effect, the digital dynamic range was limited keeping the already maximized detector gain value fixed. That investigation was done by driving the detectors offset controlling voltage V_{SKIM} through the whole dynamic range. The upper and lower range limits are now set at those points where the system's response to a constant difference scene signal is shortly before degradation. Residual non-linearities of the radiometric system response are regarded in the radiometric calibration approach.

4. Determination of thermal dynamic ranges

Due to the strong thermal drift during operation in orbit at Mercury and due to the lack of a cold shielding for the detector the image signals will show a strong drift. Regarding the image offsets, the images will “slide” out of the dynamic window defined in the previous step. Therefore it was necessary to adjust the detector settings in a way that keeps the image offsets in the desired dynamic ranges. Furthermore the temperature of the bolometer detector chip was kept adapted to the instrument temperature, i.e. that a difference temperature of $<10\text{K}$ was ensured. The investigation's result are sets of detector settings with a fixed detector gain, variable signal offset controlling voltages and a variable bolometer chip temperature. Each of those sets are valid only for a corresponding instrument temperature range. To make an automated switching between these ranges possible and to cover the whole temperature range in which MERTIS will be, each one of the thermal operating ranges was set to overlap with their neighbouring ranges.

5. Radiometric response measurements under vacuum covering whole thermal range

In that procedure the linear spectro-radiometric response function of the system was evaluated from a series of measurements of reference scenes with 6 different temperatures. The reference scenes cover the scene temperature interval of 300K to 700K which is expected to be the Mercury interval relevant for the spectrometer. Depending on the instrument temperature and the image offset respectively the system response raises within each thermal operating interval. That effect was to be compensated by a repetition of the radiometric calibration measurements at the lower and the upper bounds of each interval. Numerically that issue is now solved using a floating sensitivity per thermal operating interval. That method has already been introduced during the development of the QM calibration method and was applied to the MERTIS FM as well.

3 Data gathering and evaluation approach

Here the physical setups for the radiometric calibration measurements and the mathematical background and definitions to model and evaluate the measurement data are described.

3.1 Measurement Facilities

The measurement setups used for the radiometric calibration campaign bases on the opportunities the DLR-IR-Laboratory facilities offer.

For a scheme of the experimental setup for measurements under vacuum conditions see Fig 1. A radiometric reference scene is generated using a large area OPTRIS-blackbody radiator which is placed in front of an TIR-transparent KRS5 window integrated in a vacuum chamber in which MERTIS is mounted. Using an external flow-through-chiller the instrument can be set at different temperatures ranging between -2°C and 50°C. The temperatures for the different chamber parts can be monitored during the instrument operation. The same applies to the sensors placed inside the MERTIS instrument. They make an observation of the temperatures of the different spectrometer parts, the TMA, baffle and POI unit possible and enable the investigators to detect the instruments thermal status practically in real-time. For the investigations the instrument's planet view is used to couple-in the externally generated radiometric reference scenes. For the purpose of capturing images representing the radiometric background an external shutter or chopper can be installed between the KRS5-Window and the scene generating external BB. This offers the opportunity to create high SNR-images without changing the system's state. Alternatively the instrument-internal BB300 can be used as background reference radiator with an assumed emissivity of 1 and a known temperature.

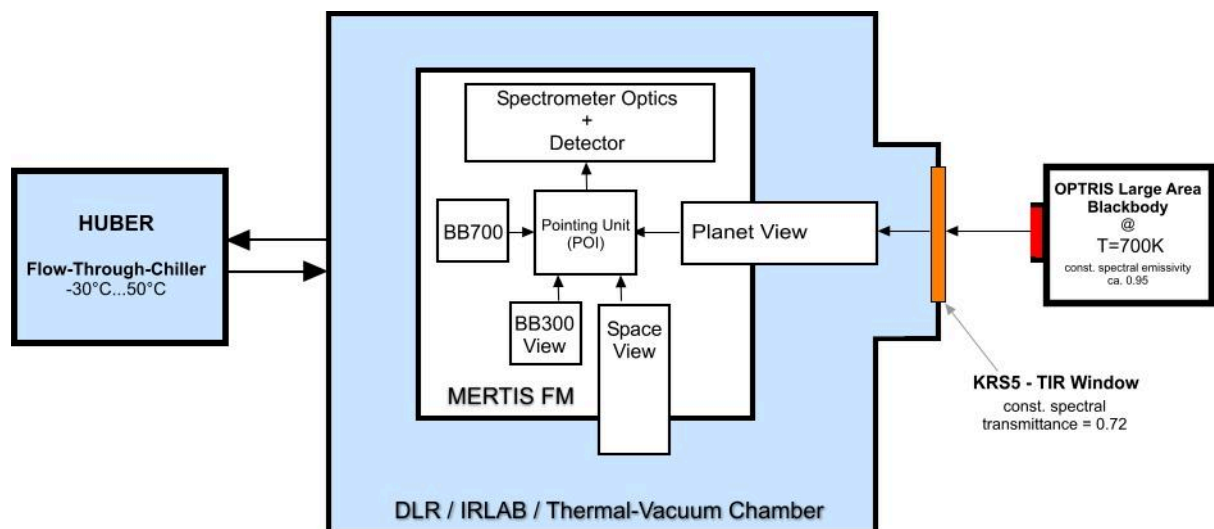


Fig 1: Scheme of the experimental setup for the FM radiometric calibration under thermal/vacuum conditions. The setup consists of a vacuum chamber facility with the MERTIS instrument inside. The instrument can be driven to temperatures -1°C up to 50°C. Through a KRS5 window a radiometric reference scene can be seen by MERTIS. The planet baffle is oriented towards the chamber-external OPTRIS large area blackbody which can be set to a temperature up to 700K and filling the whole TIS and TIR FOV.

The chamber-external large area OPTRIS blackbody radiator can be set to temperatures between 300K and 700K. In order to evaluate the radiometric performance of MERTIS-TIS correctly the spectral transmittance function and its spatial distribution of the KRS5-window has been determined (spectral trans. around 0.72). The emissivity of the OPTRIS BB has a value of ca. 0.95 and will be calibrated externally after the radiometric calibration measurements in the DLR IR-Laboratory. For the purpose of measurements of the spectral assignment of the MERTIS-TIS image channels a setup as presented in Fig. 2 has been used. There MERTIS was placed in front of a high temperature

SR20-blackbody which is equipped with a wheel holding a set of IR-narrow band pass filters. The spectral transmittance of the filters and their central wavelengths have been measured in the DLR / PEL before.

For the SNR optimization and dynamic range determination measurements a chopper was placed between the TVC and a high temperature SR20-BB positioned in front of the chamber.

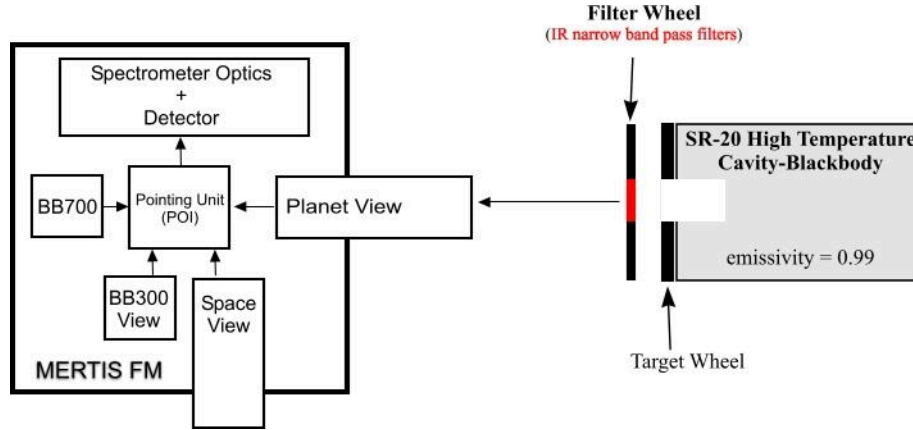


Fig. 2: Scheme of the experimental setup for the FM under air conditions. Here MERTIS is placed in front of a high temperature SR20-Blackbody which has a filter wheel that hold a set of IR-narrow band pass filters. One wheel position is without filter. With that setup the spectral assignment have been done.

3.2 Mathematical Background

In the following a theoretical background is given with the focus on the measurements and evaluations methods applied.

3.2.1 Image area classification

For the calculations all images have been divided into a rectangular scene area (covering the FOV) and a reference area being the rest of the image. Additionally hot and dead pixels were mapped out and can therefore not contribute any disturbing signal portions to the results to be calculated.

If not indicated differently, the rectangular image scene area is defined as:

$$\text{Rect_Scene_FM} := \{ (x,y) \mid x \in [20\dots137] \text{ and } y \in [0\dots100] \} \quad (1)$$

which covers the whole FOV and all visible portions of the. The set of out-mapped pixels is:

$$\text{DeadPixelsSet_FM} := \{ \begin{array}{l} (24,119), (158,110), (158,111), (121,109), (146,37), \\ (133,118), (132\dots134, 119) \end{array} \} \quad (1.1)$$

3.2.2 Scene signal extraction

In order to reduce the background signal portions (housing radiation / thermal housing drifts, electronical offsets and drifts, thermal detector element drifts etc.), a shuttered measurement mode has been chosen. The shutter can be the MERTIS-internal BB300 or an external shutter device.

For getting a high SNR measurements with a periodic change between scene and shutter have been done (chopping). Images taken with the shutter as target ("dark") are subtracted from the scene images measured using the external blackbody. When an external shutter is used it has to be regarded as a radiating scene emitting at a temperature of the laboratory (average of 21.5°C). Therefore it can be compared to a 300K scene. The most basic difference image is modelled as:

$$S_{ijts}^{\Delta} := S_{ijt}^{scene} - S_{ijs}^{shutter} \quad (2)$$

where (i,j) addresses the different elements of the image matrices S_{ijts}^{Δ} , S_{ijt}^{scene} and $S_{ijs}^{shutter}$. The index i gives the spatial index of the scene (e.g. the across-track ground pixel direction, that is along 4° FOV) and the index j points to the spectral channels. t is the time the scene signal was determined and s the time the shutter measurement has been done.

In order to improve the SNR by minimization of noise in the resulting difference image, a strong averaging and subtraction of the averages of each scene- and shutter-subseries is introduced and (1) becomes more the more general case:

$$\bar{S}_{ij}^{\Delta} := \frac{1}{T_{scene}} \sum_{t=1}^{T_{scene}} S_{ijt}^{scene} - \frac{1}{T_{shutter}} \sum_{s=1}^{T_{shutter}} S_{ijs}^{shutter} \quad (3)$$

Practically the series S_{ijt}^{scene} and $S_{ijs}^{shutter}$ were obtained by a periodic placement and removal of the shutter or scene during an image series measurement. Depending on the shutters location and the availability of corresponding HK data (internal with cyclic POI movement, external periodic open/close) specific algorithms have been developed and used to extract the data and calculate a difference image as it is defined in the formula above.

If the shutter is externally mounted this method delivers high SNR values easily since there is no need to change the radiometric state of the instrument itself. If the internal shutter is used, the instrument has been put into the desired cyclic POI movement mode letting it thermally stabilize for a while. That is necessary since as soon as the POI move frequency changes the instrument changes its thermal state, i.e. the intrinsic radiometric regime of the spectrometer. The result would be disturbing and strong signal image offsets.

3.2.3 Determination of the spectral calibration coefficients

For the determination of the instrument's spectral calibration a plane fit calculation through spectral – spatial sampling points has been defined. The base data for that calculation are difference images of IR band pass filters discretely covering the whole spatial and spectral range MERTIS-TIS offers. Having measured the sample points at three different positions within the FOV and for six spectral positions, a plane can be fitted through the set of $3 \times 6 = 18$ points. The following plane equation was used to reflect the relation between pixel coordinates (i,j) and the channel's (pixel's) central

wavelength λ_{ij}^c :

$$\lambda_{ij}^c \equiv \lambda(i, j) := \lambda_0 + s * i + t * j \quad (4)$$

The set (λ_0, s, t) are the spectral calibration coefficients. From these results the image clocking angle ϕ and the spectral sampling distance SSD can be calculated and verified as well. Furthermore a fit-error is given.

3.2.4 Detector Settings and Digital Dynamic Range Definitions

The digital image signal does not only depend on the irradiance a bolometer matrix element receives but also on certain settings the detector system is operated at. A detector operational parameter set D_k relevant for the calibration is defined as follows:

$$D_k := (U^{FID}, U_k^{SKIM}, T_k^{BOL}, \tau^{int}) \quad (5)$$

Here U^{FID}, U_k^{SKIM} are the control voltages for gain and offset of the image signal. T_k^{BOL} is the bolometer chip temperature and τ^{int} is the integration time. A parameter can depend on the set index k which indicates - whether or not the parameter can change when the system switches over to another detector parameter set. For MERTIS the gain parameter U^{FID} is optimized only once by a special measurement and stays fixed over all sets D_k . The integration time stays constant as well -

having a value $\tau^{\text{int}} = 123 \mu\text{s}$.

Regarding the different detector settings D_k the radiometric calibration of MERTIS needs a more general approach to reflect the dependencies the resulting image signals have:

$$S_{ijk} \equiv S_{ijt}(T_t^{BB300}, T_t^{SCENE}, D_k) \in I^S \quad (6)$$

The former image signal S_{ijt} is here replaced by S_{ijk} depending on the additional set index k. Furthermore S_{ijk} depends on the radiant flux arriving from the instrument and scene. Here without further modelling, both fluxes depend on the temperatures T_t^{BB300} and T_t^{SCENE} of the instrument and scene. The possible values a digital raw image signal can have is given by the set I of positive integer values:

$$I := \{0, \dots, 2^{14}\} \subset \mathbb{N} \quad (7)$$

As described in step 3 of the calibration campaign, a digital dynamic window needs to be determined in order to keep the system's response to an incident radiance signal a linear function. Therefore it shall be demanded that a signal S_{ijk} has to stay within a corresponding digital dynamic interval I^S which is a subset taken from the set of possible digital values I :

$$S_{ijk} \in I^S := \{\bar{S}^{low} \dots \bar{S}^{high}\} \subset I \quad (8)$$

$\bar{S}^{low}$ and $\bar{S}^{high}$ are the lower and upper bounds for the values the image signals S_{ijk} are allowed to have - no matter under which operational set D_k they had been recorded with. In other words, a raw image histogram may not include counts >0 for image signal values S which are lower than $\bar{S}^{low}$ and higher than $\bar{S}^{high}$:

$$(S < \bar{S}^{low}) \vee (S > \bar{S}^{high}) \Leftrightarrow \text{hist}(S) = 0 \text{ with } S \in I \quad (8.1)$$

Here $\text{hist}(S)$ refers to an image histogram function delivering the number of occurrences of the signal value S .

3.2.5 Raw Image SNR

For the measurements done for the determination of an optimal detector gain and the dynamic ranges preserving a linear system response the image SNR is the key parameter to be evaluated. Since no non-uniformity pattern correction is applied at that investigation level only the application of spatial mean of a temporal noise value is useful. That measure is defined as the average of each pixel's temporal noise values determined from a series of dark images, i.e. from images with the shutter as scene:

$$\sigma_k := \frac{1}{MN} \sum_{i^*=1}^M \sum_{j^*=1}^N \sigma_{ijk} \text{ with } \sigma_{ijk} := \sqrt{\frac{1}{T-1} \sum_{t^*=1}^T (S_{ijt^*k} - \bar{S}_{ijk})^2} \text{ and } \bar{S}_{ijk} := \frac{1}{T} \sum_{t^*=1}^T S_{ijt^*k} \quad (9)$$

Herein σ_k represents the mean temporal noise value the elements (i,j) of an image have if the image is recorded using the operational set D_k . σ_{ijk} is the temporal noise per pixel and $\bar{S}_{ijk}$ is the temporal average value of the signals of pixel (i,j). The index t corresponds to the time the image was recorded at and T is the number of images recorded and processed respectively. M is the number of pixels per line and N the number of pixels per column. As it can be seen in the formula the noise values are given as standard deviations of the corresponding signals.

A difference image SNR can now be calculated in relation to the highest difference image value:

$$SNR \doteq \frac{\max(\{S_{ijk}^{\Delta}\}_{ij})}{\sigma_k} \quad (9.1)$$

Practically the same definition can be used if a radiance image SNR is regarded. Only the signal S would be exchanged by the spectral radiance L .

3.2.6 Image Offsets

For the determination of the dynamic ranges and later on for the calculation of the floating sensitivities the values of the corresponding image offsets $\bar{S}_i$ are to be regarded. An image offset is defined as the pixels average value:

$$\bar{S}_{kt} := \frac{1}{MN} \sum_{i^*=1}^M \sum_{j^*=1}^N S_{i^*j^*kt} m_{i^*j^*} \quad (10)$$

The time-independent function m_{ij} is a masking image which has for each pixel (i,j) either the value $m_{ij} = 1$ or $m_{ij} = 0$. If not indicated differently all matrix elements m_{ij} have the value 1 with the exception of the dead pixels defined in 3.2.1 – their value is $m_{ij} = 0$. A modified masking matrix m_{ij} can also be defined for the image reference or scene area are. Here the values of the matrix m_{ij} are set corresponding to which image area is in the focus.

3.2.7 Thermal Dynamic Ranges Definitions

During the operation on Mercury the spectrometer inner structure is expected to have temperatures within an interval I^T :

$$I^T := \{T^{BB300_low} \dots T^{BB300_high}\} \subset \square \quad (11)$$

Starting with an instrument temperature of T^{BB300_low} and using a fixed operational set $D_{k=1}$ the corresponding image offset $\bar{S}_{1t}$ would run out of the dynamic window I^S if the instrument temperature would raise above a certain level $T_1^{BB300_high}$. In order to avoid that the instrument needs to switch to the next operational set D_2 . In that set the image offset is returned to a lower level near to $\bar{S}^{low}$ by adjusting the detector control voltage U_k^{SKIM} . If the difference between instrument temperature and the detector chip temperature T_k^{BOL} is greater than 10K T_k^{BOL} is modified as well.

Keeping the image signal for the given operational set D_k within the dynamic window I^S the lower and upper instrument temperatures $T_k^{BB300_low}$ and $T_k^{BB300_high}$ define a temperature range I_k^T :

$$I_k^T := \{T_k^{BB300_low} \dots T_k^{BB300_high}\} \subset I^T \quad (12)$$

For a choice of $T_k^{BB300_low}$ and $T_k^{BB300_high}$ it has to be ensured that all image values S_{ijkt} stay within the digital dynamic bounds given by I^S . One approach is to define the thermal range in a way that keeps the corresponding minimum and maximum image signals within I^S :

$$\begin{aligned} \min(\{S_{ijkt}(T_k^{BB300_low}, T^{scene} = 3K)\}_{ij}) &\geq \bar{S}^{low} \\ \max(\{S_{ijkt}(T_k^{BB300_high}, T^{scene} = 700K)\}_{ij}) &\leq \bar{S}^{high} \end{aligned} \quad (13)$$

Since the image signals also depend on the scene temperature the condition above gives respect to the extreme radiometric cases of the coldest scene (Space-View, $T^{scene} = 3K$) and the hottest scene (Planet-View, $T^{scene} = 700K$). Choosing the thermal dynamic range temperatures $T_k^{BB300-low}$ and $T_k^{BB300-high}$ according to (13) guarantees that the resulting image signals completely remain in the dynamic window I^S . The corresponding lower and upper image offset bounds $(\bar{S}_k^{low}, \bar{S}_k^{high})$ define an image offset interval individual for each operational set D_k :

$$I_k^S := \{\bar{S}_k^{low} \dots \bar{S}_k^{high}\} \subset I^S \quad (14)$$

$(\bar{S}_k^{low}, \bar{S}_k^{high})$ can be used together with $(T_k^{BB300-low}, T_k^{BB300-low})$ to determine the time to switch to the next operational set D_{k+1} or D_{k-1} .

Step 4 of the calibration campaign includes the determination of the following sets representing the thermal dynamic ranges the instrument can be operated in without degradation of image signals:

$$D_k^{thermal} := (D_k, I_k^T, I_k^S) \quad (15)$$

3.2.8 Radiometric Calibration Approach

It has already been verified experimentally on MERTIS that there is a linear dependence between the incoming spectral radiance of a radiometric scene and the corresponding digital signal output of the instrument. Using a blackbody device as reference that dependence could be modelled as follows:

$$S_{ijk} \approx c_{ijk}^0 + c_{ijk}^1(\bar{S}_{tk}) \int_{\lambda_{ij}^c - SSD/2}^{\lambda_{ij}^c + SSD/2} L(\lambda, T^{BB}) d\lambda \quad (16)$$

Here the coefficients c_{ijk}^0 and $c_{ijk}^1(\bar{S}_{tk})$ correspond to an offset and a floating sensitivity (depending on image offset) of an image element (i,j) receiving radiation from a blackbody at a temperature T^{BB} . In this approach the integration of the spectral radiance L is done for a spectral interval of $SSD \sim 90$ nm around λ_{ij}^c which is the central wavelength of the pixel (i,j). The coefficient matrices $(c_{ijk}^0, c_{ijk}^1(\bar{S}_{tk}))$ are the radiometric calibration dataset to be determined for each thermal dynamic range $D_k^{thermal}$.

$c_{ijk}^1(\bar{S}_{tk})$ is determined in two steps, first by a per-pixel linear regression calculation on image datasets recorded at 6 different blackbody temperatures covering the range 300K up to 700K and for the two instrument temperatures $T_k^{BB300-low}$ and $T_k^{BB300-high}$. From both measurements the sensitivities $c_{ijk}^1(\bar{S}_k^{low})$ and $c_{ijk}^1(\bar{S}_k^{high})$ are calculated. In the second step a per-pixel linear regression calculation gives the floating sensitivity coefficient matrices $(c_{ijk}^{10}, c_{ijk}^{11})$:

$$c_{ijk}^1(\bar{S}_{tk}) := c_{ijk}^{10} + c_{ijk}^{11} \bar{S}_{tk} \quad (17)$$

Having the matrices $(c_{ijk}^{10}, c_{ijk}^{11})$, the floating sensitivity $c_{ijk}^1(\bar{S}_{tk})$ is approximated sufficiently.

3.2.9 Determination of KRS5-Transmittance

For the determination of an image matrix holding the spectral and spatially distributed KRS5-window transmittance values two measurements were done giving two difference images $S_{ijk}^{\Delta 1}$ and $S_{ijk}^{\Delta 2}$ recorded using a flat field 700K scene with and without KRS5 window:

$$S_{ijk}^{\Delta 1} = S_{ijkt}^{Planet} (T^{BB} = 700K) - S_{ijkt'}^{BB300} (T \approx 300K)$$

$$S_{ijk}^{\Delta 2} = \tau_{ij}^{KRS5} S_{ijks}^{Planet} (T^{BB} = 700K) - S_{ijks}^{BB300} (T \approx 300K)$$

Since the signal of BB300 is (for example at room temperature) much smaller than the signal of a 700K scene seen through the planet baffle the quotient of both measurements gives approximately the transmittance value matrix τ_{ij}^{KRS5} for each pixel (i,j):

$$\tau_{ij}^{KRS5} \approx \frac{S_{ijk}^{\Delta 2}}{S_{ijk}^{\Delta 1}} \Leftrightarrow S_{ijk}^{Planet} \square S_{ijk}^{BB300} \quad (18)$$

4 Measurement Results

Here the results for the calibration steps 1-5 are presented for the MERTIS-TIS FM.

4.1.1 Spectral Calibration Coefficients

The spectral calibration measurement has been done according to 3.2.3 after the qualification test procedures. The differences of the spectral central positions of the BP sample points in the image and the calculated plane are shown in Table 1. From these a spectral calibration error σ_{fit} is given as a standard deviation. Furthermore the image clocking angle ϕ , the spectral sampling distance SSD and the spectral calibration coefficients (λ_0, s, t) are given in Table 2.

An image showing all bandpass measurements as a sum image is given by Fig. 3.

The measurement data sets used for the spectral calibration / evaluation were taken in the measurement session "FM_18" on 29/January/2013.

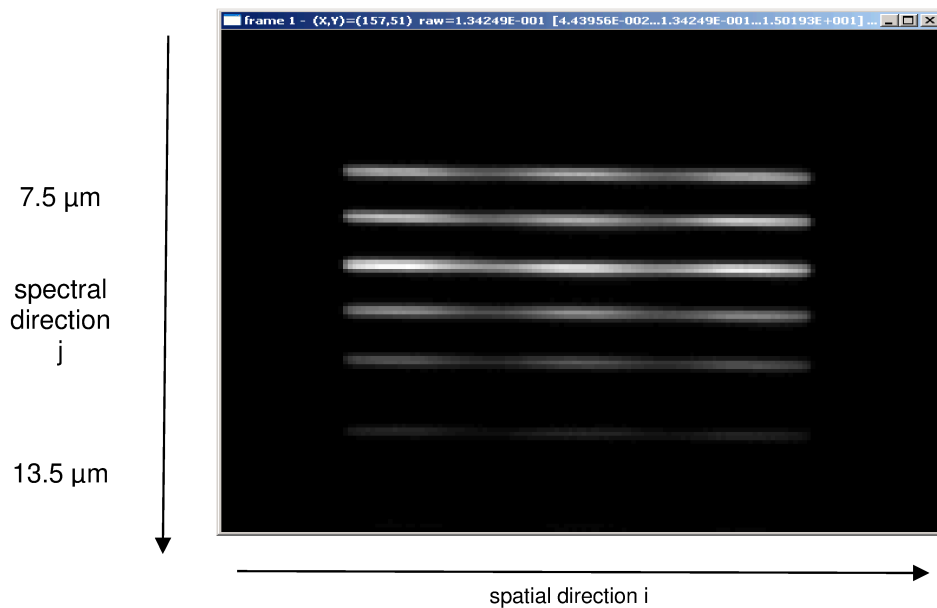


Fig. 3: Sum of all difference images of the IR-narrow band pass filter set measured using the MERTIS-FM after vibrational tests. The set covers the spectral range between 7.5 μm and 13.5μm.

Filter Name	λ_c [m] PEL	λ_{plane_fit} [m] Plane Fit	$\Delta\lambda = \lambda_{plane_fit} - \lambda_c$ [m] (PEL vs. Plane Fit)	σ_{fit} [m]
BP 7.5 μm	7.508189E-06	7.509928E-06 7.500119E-06 7.500752E-06	-1.738542E-09 8.070253E-09 7.436687E-09	
BP 8.5 μm	8.471418E-06	8.494111E-06 8.467947E-06 8.471366E-06	-2.269240E-08 3.471142E-09 5.270368E-11	
BP 9.5 μm	9.497802E-06	9.507104E-06 9.496916E-06 9.499150E-06	-9.302047E-09 8.859198E-10 -1.348062E-09	
BP 10.5 μm	1.047755E-05	1.047302E-05 1.045785E-05 1.048352E-05	4.529269E-09 1.970422E-08 -5.964155E-09	
BP 11.5 μm	1.153172E-05	1.153946E-05 1.151999E-05 1.153749E-05	-7.741103E-09 1.172662E-08 -5.773941E-09	
BP 13.0 μm	1.301154E-05	1.300358E-05 1.303024E-05 1.300212E-05	7.959471E-09 -1.869582E-08 9.419780E-09	
All Filters				1.061719E-08

Table 1: Spectral central positions of the IR BP filter set measured in the DLR/PEL and their deviations from the plane used as base model for the spectral calibration of MERTIS-TIS, central BP position values were calculated using bounding boxes of 12x3 (pre-centering) and 10x7 pixels (final centering) around the BP intensity maximum positions. The shuttering sequence was estimated using an intensity threshold value of 0.6.

SSD [m]	Clocking [°]	f_0 [m]	s [m / index]	t [m / index]
8.904449E-08	7.552717E-01	1.517173E-05	-1.173749E-09	-8.903675E-08

Table 2: Spectral Sampling Distance (SSD), image clocking angle ϕ relative to the (almost spectral) image direction j and the spectral calibration coefficients (λ_0, s, t)

4.1.2 Spectral KRS5-Window Transmittance

In this step a spatially distributed (over the image matrix) spectral transmittance of the KRS5-window mounted in the TVC has been determined. There were two measurements necessary:

1. The first measurement has been done with the MERTIS FM in the TV chamber but without vacuum. The instrument was set in the same position it has during the radiometric calibration measurements. The planet view was directed towards the OPTRIS BB which was set to 427°C. Between blackbody and MERTIS the KRS5 window was in its place. During the measurement the viewport was changed periodically between BB300 and planet view in order to eliminate later on the background signal portion efficiently.
2. The second measurement has been done outside the TVC. Here MERTIS FM was placed in front of the OPTRIS BB without further optical components in between. Analog to the first measurement here the viewport was changed periodically between BB300 and planet view in order to eliminate later on the background signal portion efficiently.

From both measurements a spectral transmittance matrix was calculated according to formula (18). The resulting image can be seen in Fig. 4. The transmittance matrix can be used later on to clean the calibration datasets from the effect the KRS5 window is having on the radiometric calibration data sets ($c_{ijk}^0, c_{ijk}^1(\bar{S}_{tk})$).

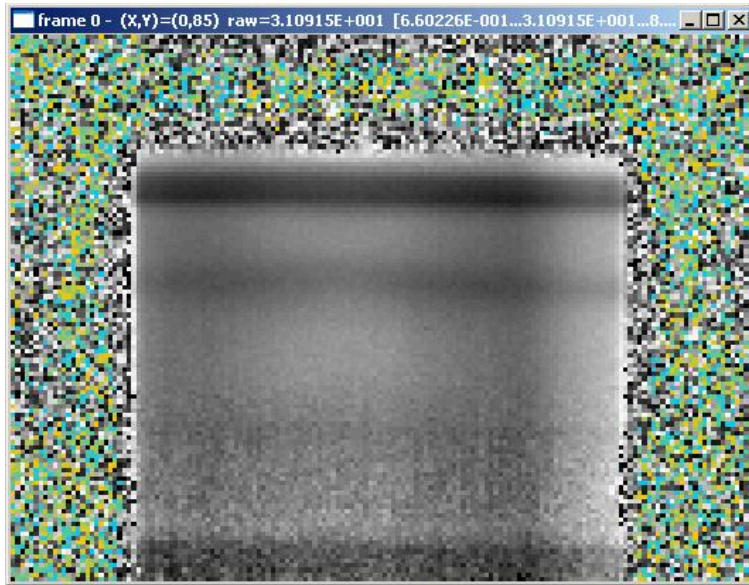


Fig. 4: Transmittance matrix for the KRS5 window mounted in the TVC / DLR IR-Lab. The spatially distributed (over the window) spectral transmittance of the window influences the radiometric calibration coefficients. Knowing the transmittance matrix permits to remove that effect from the radiometric calibration coefficients. It can be seen that there are both a spatial distribution (horizontal direction) and a spectral distribution (vertical). The average transmittance is ca. 0.72. The image reference area appears colored in the image and can be ignored.

4.1.3 Image signal's dynamic window with maximized linear response

This calibration step contained two substeps:

- The detector gain U^{FID} had to be maximized. A measure for the improvement is the difference image SNR for a constant radiometric scene signal. The setup consisted of the MERTIS-FM model mounted in the TVC. In front of the KRS5-chamber window a SR-20 BB radiator was set to a temperature of 800°C. A chopper device was installed at the BB in order to produce a modulated signal for improving the image SNR. Before the measurements started several hours were given to the thermal stabilization process of the instrument and the TVC. The instrument had then a temperature of ca. -1.8°C at the optic's base plate.

The measurements were done for 11 different values of U^{FID} in a range of 2.398 V to 4.647 V. For each U^{FID} the offset voltage U^{SKIM} was adjusted so that the resulting images were centred around approximately 8000 DN. For each measurement the disturbing signal offsets were removed using the image reference areas and the mean temporal noise value σ_k was calculated according to formula (9) out of a series of 550 images. Additionally, from each of the measurements a difference image was calculated from which the highest difference signal value was chosen in order to calculate an image SNR according to formula (9.1). The results can be seen in Fig. 5. For the detector gain a value of $U^{FID} = 3.972$ V has been selected for all subsequent calibration measurements and the future instrument operation.

The measurement session was FM_20 and has been completed on 30th of January 2013.

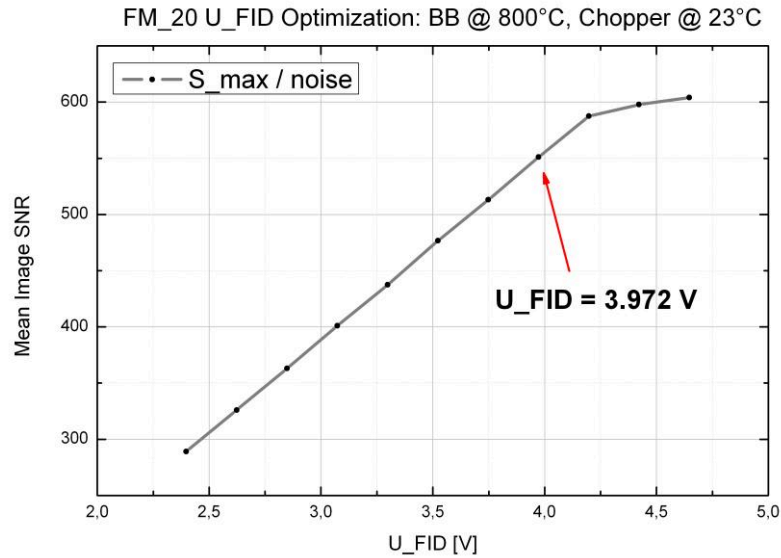


Fig. 5: Difference image SNR for 11 different values of the detector's gain value U^{FID} . In order to avoid non-linear behaviour of the radiometric system response function and for getting a maximized signal SNR, a value of $U^{FID} = 3.972V$ has been chosen for all subsequent calibration and future measurements of the MERTIS-FM model.

- b) In the second step the digital dynamic range I^S as introduced in (8) was determined and giving the digital signal value bounds $\bar{S}^{low}$ and $\bar{S}^{high}$ which were also defined in (8) respectively. The measurements were done with the same setup as in step a). This time the detector gain $U^{FID} = 3.972V$ remained at a fixed value and the value U^{SKIM} was varied in a range between 4.294 V and 4.414 V. For each U^{SKIM} a measurement has been done and the maximum signal within a difference image, image offsets, noise (from 500 samples) and the difference image SNR were calculated. All raw image data had been freed of disturbing offset components using the image reference areas.

The results can be seen in Fig. 6. The accepted digital dynamic range for MERTIS-FM is:

$$I^S = [1450 \text{ DN} \dots 12280 \text{ DN}]$$

regarding image offsets.

The measurement session was FM_21 and has been completed on 30th of January 2013.

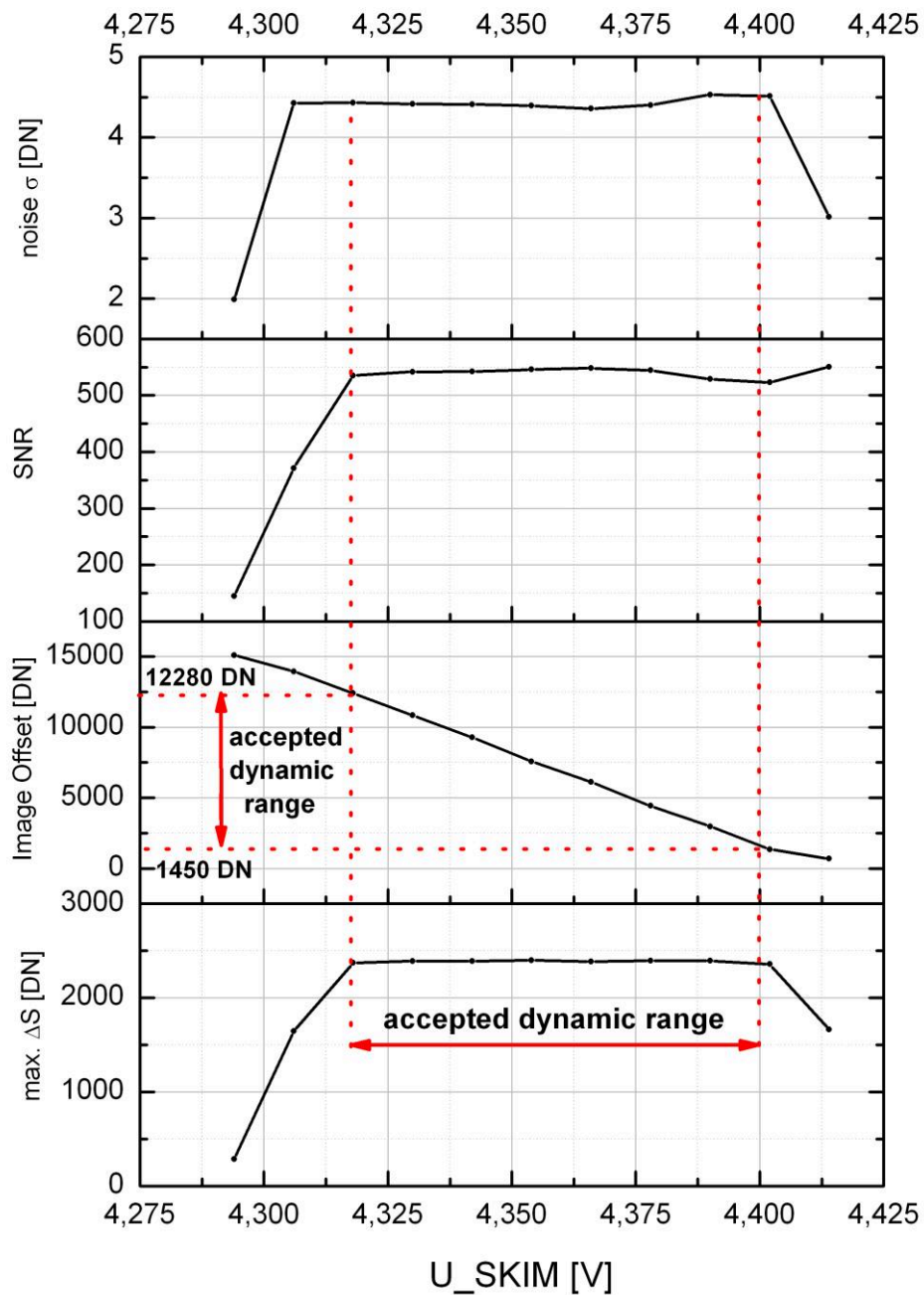


Fig. 6: Determination of an acceptable digital dynamic window avoiding a signal degradation and a non-linear system response. The measurement was taken using 11 different values of the detector's control value U^{SKIM} . In the accepted interval the max. difference signal, noise and image SNR stay nearly constant. The lower and upper bounds given define the accepted dynamic range of $I^S = [1450 \text{ DN} \dots 12280 \text{ DN}]$ related to image offsets. Remark: The absolute value of the SNR is not relevant here, but only the slope.

4.1.4 Configuration of thermal dynamic ranges

With these measurements the system's response to the strong flux coming from the instrument housing and influencing the image offsets is measured and the detector's operational parameters are adjusted in order to keep the image signals within the dynamic range I^S . The result are the definitions

for the thermal ranges $D_k^{thermal}$ covering the full MERTIS relevant instrument temperature range of $I^T = [-1.24^\circ\text{C} \dots 39.92^\circ\text{C}]$ including the detector operational setting sets D_k and the temperature ranges and image offset intervals.

The detector settings to be found compensate the shift of the image offsets outside the dynamic range I^S . This was achieved adapting the control voltage U_k^{SKIM} . Additionally the bolometer chip temperature has been adapted so that the TEC of the detector needs to compensate only temperature differences $< 10\text{K}$.

Furthermore the measurements and definitions have been arranged in such a way that neighbouring thermal dynamic ranges overlap each other with an overlap-width of ca. 1K. This ensures that the instrument can be switched to the next thermal range $D_k^{thermal}$ instantly.

The instrument was integrated into the TVC. For the control of the instrument temperature the flow-through-chiller was used. In order to emulate a cold space-view a plate connected to a Stirling cooler has been used at the chamber in front of the MERTIS space view port.

During the measurement the pointing unit (POI) was driven to all viewports periodically. It was ensured that before a measurement started, the system was in a thermal equilibrium which makes the measurement process very time-consuming. All measurements are part of an iterative process where the following steps have been done:

1. The instrument temperature was initially set to $T_k^{BB300_low} = -1.24^\circ\text{C}$, with $k=1$
2. The bolometer chip temperature was adapted to the spectrometer temperature $T_k^{BOL} = 5^\circ\text{C}$, $k = 1$
3. the control voltage U_k^{SKIM} and the bolometer chip temperature were set to reach a low image offset level
4. The measurement is started and the system is heated up. The measurement could be finished when it was seen that the image offset ran out of the dynamic window I^S
5. From the measurement data it was calculated which are the lower and upper bound $T_k^{BB300_low}$ and $T_k^{BB300_high}$ of the thermal interval k and the corresponding image offsets. Having that information the flow-through chiller was set to reach an instrument temperature:

$$T_{k+1}^{BB300_low} \approx T_k^{BB300_high} - 1\text{K} - 1$$

6. Having reached that temperature the procedure continues with step 3 - adjusting U_{k+1}^{SKIM} and T_{k+1}^{BOL} .

This was repeated until the whole instrument temperature range for MERTIS was covered. The results of that procedure are 10 thermal range sets $D_k^{thermal}$ which can be seen in Fig. 7. as image offsets for planet view and a space view raising with the instrument temperature. The instrument temperature was represented from the temperature sensor "optics_base_plate" which is mounted in an area from which the bolometer detector chip is directly receiving radiation. The overlap of the thermal ranges is approximately 1K +/- 0.2 K since it is difficult and very time consuming to tune the instrument temperature more exactly. The values for the image offsets $\bar{S}_k^{low}$, $\bar{S}_k^{high}$ are referring to the reference area of the images. In table **Fehler! Verweisquelle konnte nicht gefunden werden.** the results for thermal dynamic range sets $D_k^{thermal}$ are summarized.

The measurement sessions were FM_23 to FM_33 and have been performed from 1st of February 2013 to 12th of February 2013.

Set index k	U^{FID} [V]	U_k^{SKIM} [V]	T_k^{BOL} [°C]	τ^{int} [μs]	$T_k^{BB300_low}$ [°C]	$T_k^{BB300_high}$ [°C]	$\bar{S}_k^{low}$ [DN]	$\bar{S}_k^{high}$ [DN]
1	3.971	4.397	5	123.8	-1.24	9.80	2740	10116
2	3.971	4.403	15	123.8	8.88	15.92	3685	9721
3	3.971	4.435	15	123.8	14.74	21.40	3351	9490
4	3.971	4.435	25	123.8	20.54	25.67	3422	9110
5	3.971	4.458	25	123.8	24.80	29.47	3405	8918
6	3.971	4.478	25	123.8	28.41	32.62	3556	8741
7	3.971	4.469	35	123.8	31.52	34.65	3882	8365
8	3.971	4.480	35	123.8	33.64	36.50	4037	8243
9	3.971	4.491	35	123.8	35.46	38.29	3884	8149
10	3.971	4.501	35	123.8	37.35	39.92	4147	8070

Table 3: Summary of the thermal range sets $D_k^{thermal}$ the MERTIS FM needs to be operated in. The sets include the detector's control parameter values together with the corresponding instrument temperatures and image offsets. The image offsets are related to the image reference area.

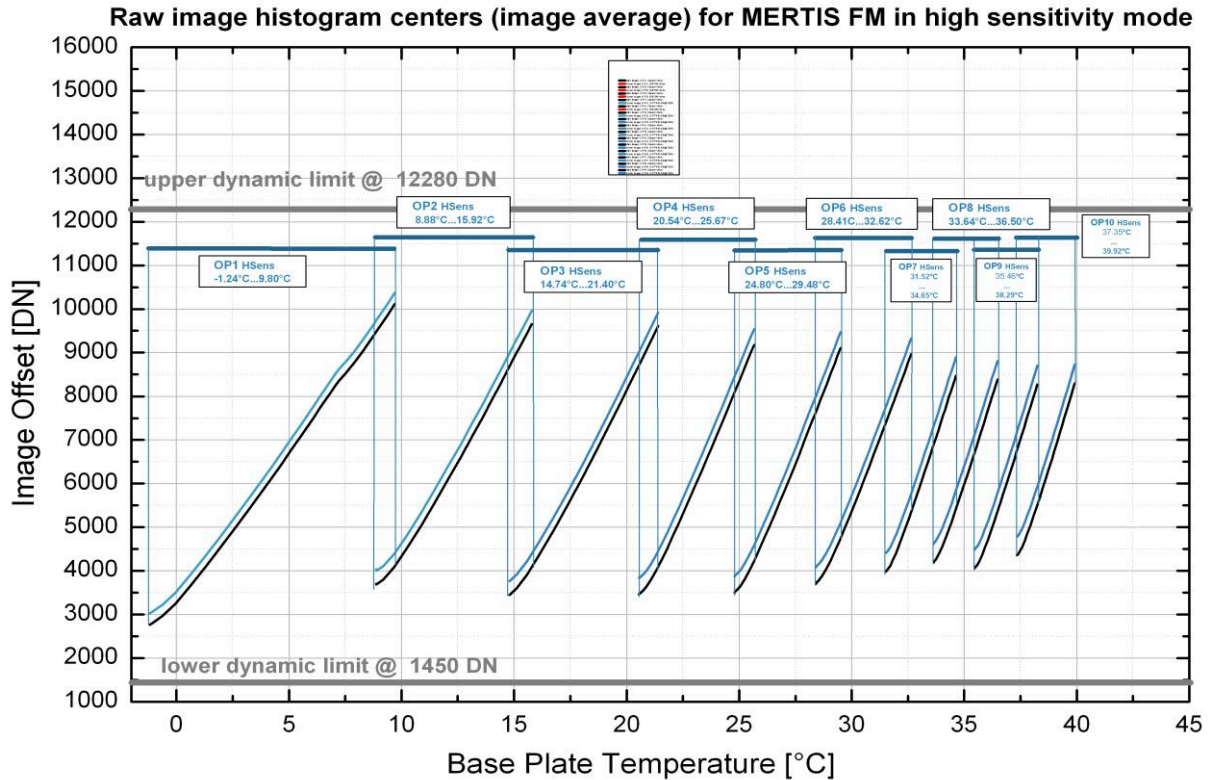


Fig. 7: Image offsets for images recorded in Space-View (black) and Planet View (blue) within the different thermal dynamic ranges. The ranges overlap each other by ca. 1 K. With a growing instrument temperature also the image histogram widths grow. Since the histograms need to be kept strictly within the digital dynamic range I^S the image offsets are getting more distanced from the lower and upper dynamic limits. The thermal interval width is getting smaller with higher instrument temperatures because the radiant flux incident on the detector elements grows nearly with T^4 .

4.1.5 Spectro-Radiometric response function in TVC

In this step the spectro-radiometric calibration datasets $(c_{ijk}^0, c_{ijk}^1(\bar{S}_{tk}))$ of the spectrometer are determined for the upper and lower bounds of each thermal range given by $D_k^{thermal}$. Additionally the floating sensitivities $c_{ijk}^1(\bar{S}_{tk})$ are calculated from both measurements for each $D_k^{thermal}$.

For each calibration measurement the OPTRIS BB - which served as radiometric reference - was driven at the six temperatures 27°C, 156°C, 239°C, 308°C, 369°C and 427°C. The resulting spectral sensitivities are shown in Fig. 8. All measurements were done using in the TVC setup. For the OPTRIS BB an emissivity of 0.95 was assumed. That value has to be redetermined lateron in an external certified calibration (PTB / Berlin / Germany). In the graphics shown the effect of the KRS5 window has not been removed yet, but this can be done any time since the window transmission has been measured already.

The measurement sessions were FM_35 to FM_44 and have been performed from 19th of February 2013 to 15th of March 2013.

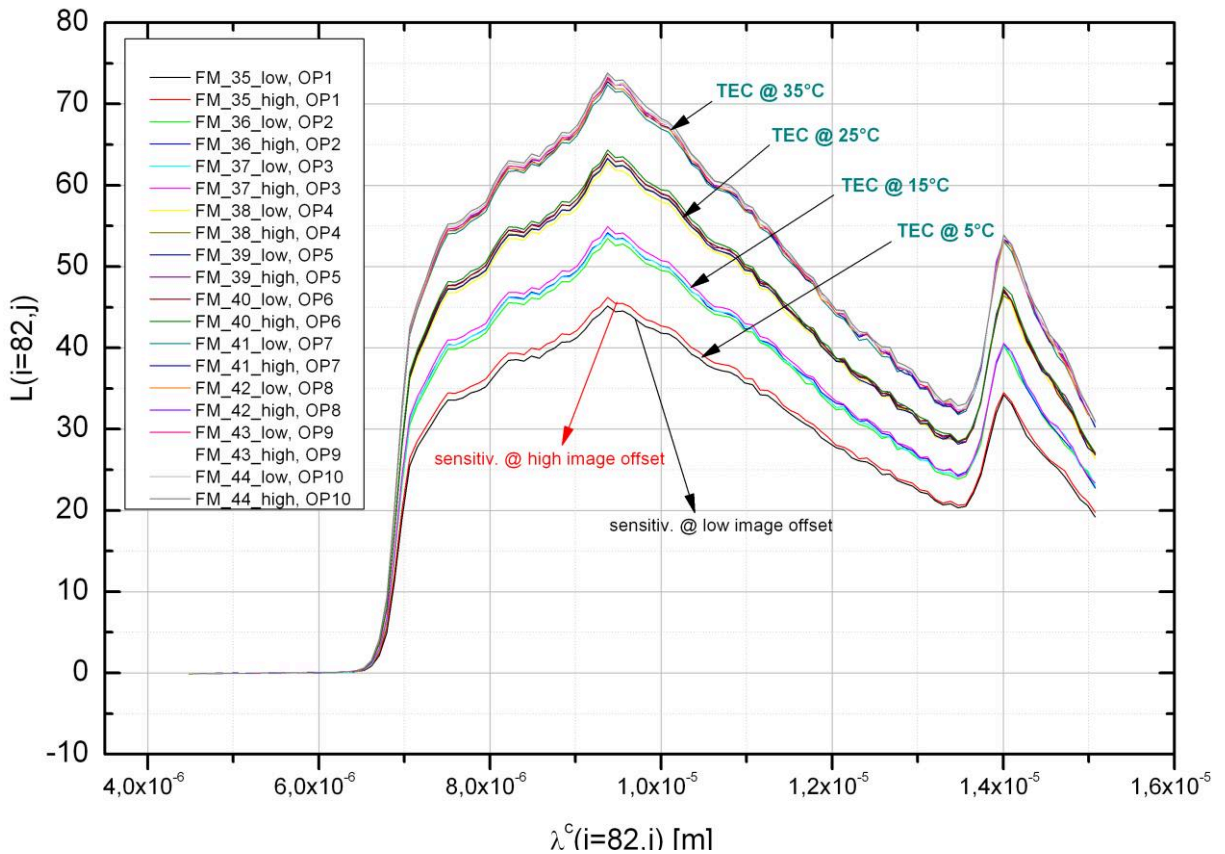


Fig. 8: Spectral sensitivities for all thermal ranges and for image column 82 calculated during the radiometric response determination measurements for MERTIS FM. The sensitivity increases strongly with the bolometer chip temperature and slowly increases with a raising image offset. Both effects are regarded in the MERTIS calibration approach by calculating a floating sensitivity $c_{ijk}^1(\bar{S}_{tk})$ per thermal range k from the measurements.

4.1.6 Verification of spectro-radiometric calibration

In this step the calibration results are verified by doing an independent measurement of a static radiometric scene generated by the OPTRIS BB which was set to 280°C. The instrument was driven two times from 40°C down to 0°C and from 0°C up to 40°C. During the heating and cooling process images of the OPTRIS BB at planet view and BB300 images were taken periodically. From these datasets basic difference images (1 scene – 1 dark) were calculated and converted to radiance images using the radiometric calibration coefficients $(c_{ijk}^0, c_{ijk}^1(\bar{S}_{tk}))$. The thermal cycles can be seen in

Fig. 9 showing the slope of the instrument temperatures for BB300, the optic's base plate and SOP M1 representing a temperature distribution over the spectrometer's inner parts. All show very similar temperatures relative to each other for all measurements made. Since heating and cooling of the spectrometer is a process where the temperature converges in time, different temporal temperature gradients are observed. In the case of these measurements a maximum of 6 mK / s has been determined.

For the measurement session FM_45_4 the radiances were calculated using the radiometric calibration coefficients $(c_{ijk}^0, c_{ijk}^1(\bar{S}_{tk}))$. The results are shown as image profiles along the FOV (line j=64) and along the spectral direction (column i=82) in Fig. 10. For that measurement the maximum temporal instrument temperature gradient was ca. 5 mK/s. All thermal ranges are covered and the calculated radiances correspond very well with to the theoretical results.

Additionally a spectral radiance image SNR from measurement FM_33_1 (independent from calibration measurement) has been determined. This SNR curve can be seen in Fig. 11 and was taken for a 700 K radiator recorded at the thermal interval k=10. The raw data were one scene image and

one BB300 image which were used to calculate and afterwards calibrate a difference image. The resulting radiance image was 96 x spatially binned. The maximum radiance SNR is here located at ca. 7.7 μm . and has a value of ca. 266. Since this measurement was taken using the KRS5 window the SNR value was corrected accordingly (by a factor of 1 / 0.72). Furthermore the blackbody emissivity of ca. 0.95 was assumed and used for the SNR value correction as well.

The measurement session was FM_45 and has been performed from 18th of March 2013 to 28th of March 2013.

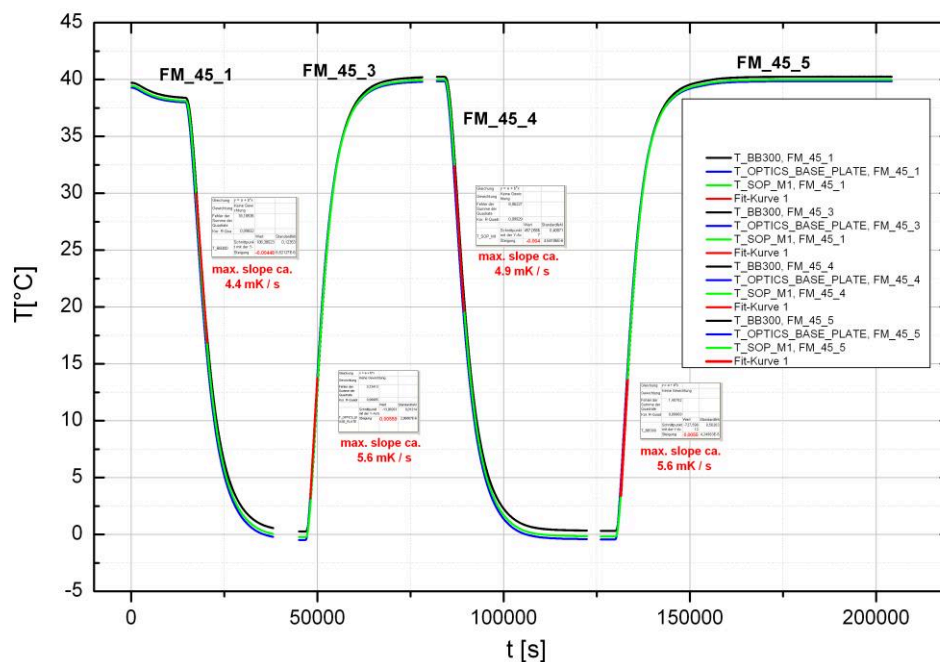


Fig. 9: Instrument temperature cycle for the radiometric calibration verification measurements of MERTIS FM. The instrument was driven through the whole MERTIS-TIS relevant temperature interval of 0°C to 40°C. 2 cycles were driven and the results for the temperatures of sensors in the inner spectrometer are shown. The maximum temporal temperature gradient has a value of about 6 mK / s. During the measurement images for a flat scene with 280°C and the BB300 have been recorded and processed applying the radiometric calibration coefficients.

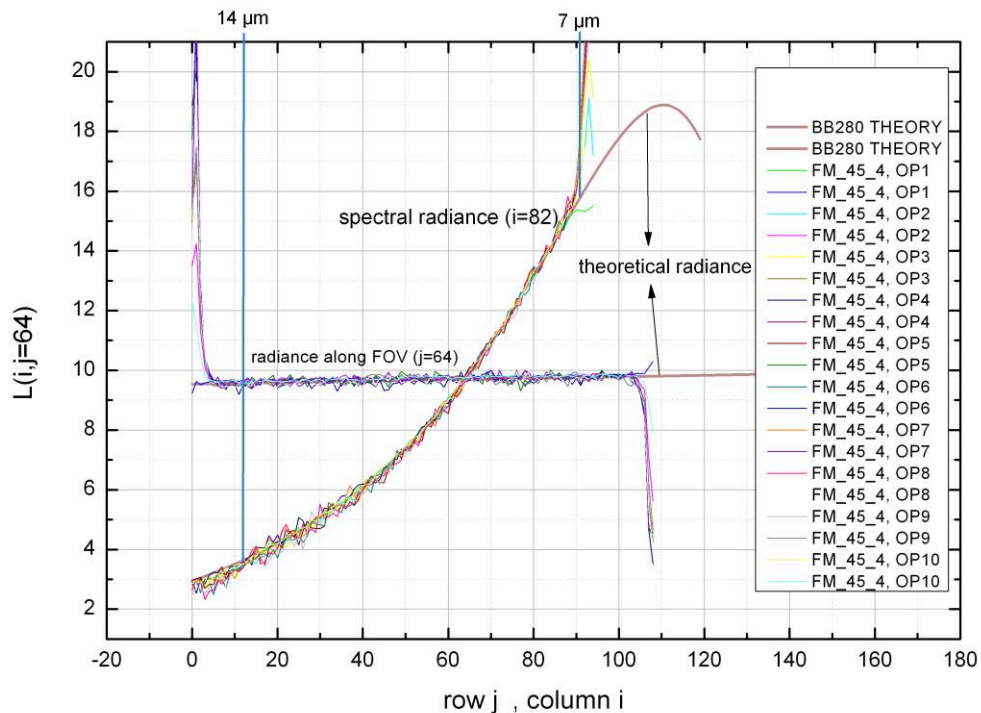


Fig. 10: Radiance image profiles calculated from measurement FM_45_4 (scene at 280°C) shown for the spectral direction (column i=82) and along the FOV (j=64). All thermal ranges are covered and the profiles agree very well with the theoretical results.

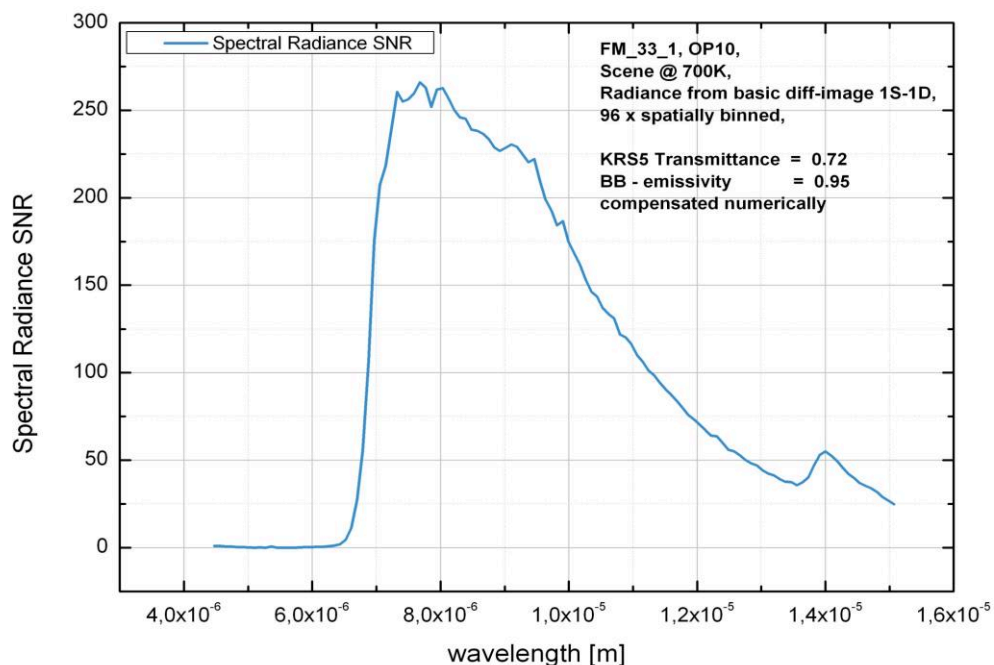


Fig. 11: Spectral radiance image SNR from measurement FM_33_1. This SNR curve was taken for a 700K radiator recorded at the thermal interval $k=10$. The raw data were 1 scene image and 1 bb300 image which were used to calculate and afterwards calibrate the difference image. The resulting radiance image was 96 x spatially binned. The maximum radiance SNR is here located at ca. 7.7 μm . and has a value of ca. 266. Since this measurement was taken using the KRS5 window the SNR value is corrected accordingly as well as the blackbody emissivity assumed to be 0.95 (TBC) (factor of $1 / 0.72 / 0.95$).

5 Conclusion

A radiometric calibration campaign has been performed on the MERTIS FM model using measurement facilities the DLR IR-Lab in Berlin Adlershof offer. In preparation of the determination of the spectro-radiometric calibration coefficients the system was optimized for a maximum signal SNR and linearity of the system response. Additionally it has been ensured that the instrument keeps its radiometric performance for all thermal states it will face during the operation at Mercury with respect to the large spectrometer temperature differences ranging from 0°C to 40°C. The calibration coefficients have been verified through an independent measurement in which a static scene has been recorded and the corresponding imaging data was converted to radiance values. The comparison with the theoretical values gave that there are practically no systematic errors visible. For the most basic measurement case (no averaging) the radiance images resulting from the difference images show a maximum SNR of 280 for a 700K scene. Additional averaging will even improve that result.

In order to complete the radiometric calibration the effect of the KRS5 window needed during the TVC measurements can be compensated since its transmittance has been measured in an additional calibration step. Furthermore the reference radiator (OPTRIS BB) has to be calibrated externally in order to remove its emissivity numerically later on from the calibration coefficient data sets.

Appendix 1: Measurement History / Protocol

29.Januar.2013 - Thomas S  uberlich

* Session# : 18
 * Session-Name: "FM_18_Spectral_Calibration_SR20_Without_AFT"

* BP vor dem AFT-SR20 @ 447  C, keine weitere Optik zwischen BB und MERTIS

* V_skim = 3,819 V
 * V_FID = 2,398 V
 * T_TEC = 35  C

* Filterpositionen:

Wheel-Position	Filter
1	keines
2	BP @ 7.5 ��m *
3	BP @ 9.5 ��m *
4	BP @ 8.5 ��m *
5	BP @ 10.5 ��m *
6	BP @ 11.5 ��m *
7	BP @ 13.0 ��m *
8	LP @ 7.0 ��m *

* T_LAB = 21.2  C

* 1. Messung:

* file = "mer_saeuberl_FM_18_1_NOAFT_SR20_BB444_FOV_MIDDLE_BP13_0.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 13.0   m (Wheel Pos 7)

* 2. Messung:

* file = "mer_saeuberl_FM_18_2_NOAFT_SR20_BB444_FOV_MIDDLE_BP11_5.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 11.5   m (Wheel Pos 6)

* 3. Messung:

* file = "mer_saeuberl_FM_18_3_NOAFT_SR20_BB444_FOV_MIDDLE_BP10_5.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 10.5   m (Wheel Pos 5)
 * Labortemperatur 21.8  C

* 4. Messung:

* file = "mer_saeuberl_FM_18_4_NOAFT_SR20_BB444_FOV_MIDDLE_BP9_5.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 9.5   m (Wheel Pos 3)

* 5. Messung:

* file = "mer_saeuberl_FM_18_5_NOAFT_SR20_BB444_FOV_MIDDLE_BP8_5.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 8.5   m (Wheel Pos 4)

* 6. Messung:

* file = "mer_saeuberl_FM_18_6_NOAFT_SR20_BB444_FOV_MIDDLE_BP7_5.tdms"
 * SR20 @ 444  C
 * Handshuttern
 * Bild - Repetition Rate = 1 Bild / 100 ms
 * IR - Band Pass Filter @ 7.5   m (Wheel Pos 2)

- * 7. Messung:
 - * file = "mer_saeuberl_FM_18_7_NOAFT_SR20_BB444_FOV_LEFT_BP13_0.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 13.0 μm (Wheel Pos 7)
- * 8. Messung:
 - * file = "mer_saeuberl_FM_18_8_NOAFT_SR20_BB444_FOV_LEFT_BP11_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 11.5 μm (Wheel Pos 6)
- * 9. Messung:
 - * file = "mer_saeuberl_FM_18_9_NOAFT_SR20_BB444_FOV_LEFT_BP10_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 10.5 μm (Wheel Pos 5)
- * 10. Messung:
 - * file = "mer_saeuberl_FM_18_10_NOAFT_SR20_BB444_FOV_LEFT_BP9_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 9.5 μm (Wheel Pos 3)
- * 11. Messung:
 - * file = "mer_saeuberl_FM_18_11_NOAFT_SR20_BB444_FOV_LEFT_BP8_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 8.5 μm (Wheel Pos 4)
- * 12. Messung:
 - * file = "mer_saeuberl_FM_18_12_NOAFT_SR20_BB444_FOV_LEFT_BP7_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 7.5 μm (Wheel Pos 2)
- * 13. Messung:
 - * file = "mer_saeuberl_FM_18_13_NOAFT_SR20_BB444_FOV_RIGHT_BP13_0.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 13.0 μm (Wheel Pos 7)
- * 14. Messung:
 - * file = "mer_saeuberl_FM_18_14_NOAFT_SR20_BB444_FOV_RIGHT_BP11_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 11.5 μm (Wheel Pos 6)
- * 15. Messung:
 - * file = "mer_saeuberl_FM_18_15_NOAFT_SR20_BB444_FOV_RIGHT_BP10_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 10.5 μm (Wheel Pos 5)
- * 16. Messung:
 - * file = "mer_saeuberl_FM_18_16_NOAFT_SR20_BB444_FOV_RIGHT_BP9_5.tdms"
 - * SR20 @ 444°C
 - * Handshuttern
 - * Bild - Repetition Rate = 1 Bild / 100 ms
 - * IR - Band Pass Filter @ 9.5 μm (Wheel Pos 3)
- * 17. Messung:
 - * file = "mer_saeuberl_FM_18_17_NOAFT_SR20_BB444_FOV_RIGHT_BP8_5.tdms"
 - * SR20 @ 444°C

- * Handshuttern
- * Bild - Repetition Rate = 1 Bild / 100 ms
- * IR - Band Pass Filter @ 8.5 μm (Wheel Pos 4)

* 18. Messung:

- * file = "mer_saeuberl_FM_18_18_NOAFT_SR20_BB444_FOV_RIGHT_BP7_5.tdms"
- * SR20 @ 444°C
- * Handshuttern
- * Bild - Repetition Rate = 1 Bild / 100 ms
- * IR - Band Pass Filter @ 7.5 μm (Wheel Pos 2)

* T_{LAB} = 22.0°C

30.Januar.2013 - Thomas Säuberlich

* Session-Name: "FM_20_FID_OPTIMIERUNG"

* ZIEL: FID optimieren - herausfinden, wann SNR nicht mehr verbessert wird, wenn man FID erhöht

- * MERTIS FM in TVC
- * AutoOpPoint-Mode "Functional Parameters/Bias volt setting mode" OFF
- * SR-20-2 bei 800°C vor der TVC mit FM drin & Vakuum
- * SR-20-2 chopper auf 0.2 Hz

* Lab-Temp = 21.4°C

* Huber Temperatur: T_{set} = -22°C, T_{intern} = -22.1°C

* Optics Baseplate Temp:

- * 12:17: -0.95°C
- * 13:20: -1.39°C
- * 15:38: -1.79°C

* vorläufige Dynamikbereichsgrenzen (Histogram scharf begrenzt):

- * mit V_{FID} = 4.498 V
- * [666 DN...7889 DN...15112 DN]
- => Dynamikbereichsmittle bei 7889 DN

- * [V_{FID} = 2.398 , V_{SKIM} = 3.774, t_{int} = 123 μs , T_{TEC} = 5°C] => ds = 1100 DN
- * [V_{FID} = 2.648, V_{SKIM} = 3.861, t_{int} = 123 μs , T_{TEC} = 5°C] => ds = 1280 DN
- * [V_{FID} = 4.650, V_{SKIM} = 4.472, t_{int} = 123 μs , T_{TEC} = 5°C] => ds = 2600 DN

* Settings scan interval:

[T_{TEC} = 5°C, V_{SKIM} = 3.774, V_{FID} = 2.398]

.

[T_{TEC} = 5°C, V_{SKIM} = 4.472, V_{FID} = 4.650]

=> dFID = 2.252 V

* x scan Schritte => FID_{step} = 0.250 V

* SKIM wird so nachgeregelt, dass mittlerer Bildoffset bei ca. 8000 liegt

Messungs-Index t	SKIM[mV]	FID[mV]	TEC[°C]	Dunkelbildserie	# Dunkelbilder
1	3774	2398	5	719...1363	644
2	3850	2623	5	580...1231	651
3	3930	2848	5	697...1282	585
4	4008	3073	5	646...1266	620
5	4091	3298	5	710...1324	614
6	4176	3523	5	811...1386	575
7	4254	3748	5	681...1340	659
8	4349	3973	5	702...1321	619
9	4432	4198	5	708...1386	678
10	4459	4422	5	720...1517	797
11	4467	4647	5	673...1645	972

* Bildersequenzen: ca. 10s Dunkel + 50s Moduliert mit chopper + 60s Dunkel

* framerate = 10 /s

* files = "mer_saeuberl_FM_20_(\$t)_SKIM_????_FID_????_TEC_5.tdms"

- * 1. Messung: file = "mer_f_mertis_FM_20_1_SKIM_3774_FID_2398_TEC_5.tdms"
- * 2. Messung: file = "mer_f_mertis_FM_20_2_SKIM_3850_FID_2623_TEC_5.tdms"
- * 3. Messung: file = "mer_f_mertis_FM_20_3_SKIM_3930_FID_2848_TEC_5.tdms"
- * 4. Messung: file = "mer_f_mertis_FM_20_4_SKIM_4008_FID_3073_TEC_5.tdms"
- * 5. Messung: file = "mer_f_mertis_FM_20_5_SKIM_4091_FID_3298_TEC_5.tdms"
- * 6. Messung: file = "mer_f_mertis_FM_20_6_SKIM_4176_FID_3523_TEC_5.tdms"
- * 7. Messung: file = "mer_f_mertis_FM_20_7_SKIM_4254_FID_3748_TEC_5.tdms"
- * 8. Messung: file = "mer_f_mertis_FM_20_8_SKIM_4349_FID_3973_TEC_5.tdms"
- * 9. Messung: file = "mer_f_mertis_FM_20_9_SKIM_4432_FID_4198_TEC_5.tdms"
- * 10. Messung: file = "mer_f_mertis_FM_20_10_SKIM_4459_FID_4422_TEC_5.tdms"
- * 11. Messung: file = "mer_f_mertis_FM_20_11_SKIM_4467_FID_4647_TEC_5.tdms"

- * Auswertung ergab:
 - * => Mittelung über 550 Dunkelbilder für zeitl. Rauschmaß
 - * ab V_FID > 3.972 V tritt nicht lineares Verhalten d. Systems ein
 - * => wähle fix V_FID = 3.972 V für nachfolgende Messungen

 30.Januar.2013 - Thomas Säuberlich

- * Session-Name: "FM_21_SKIM_UND_SIGNALDYNAMIK"
- * ZIEL: * V_SKIM variieren für festes V_FID
 - * herausfinden, wie sich SNR über gesamten Dynamikbereich ändert

- * MERTIS FM in TVC
- * AutoOpPoint-Mode "Functional Parameters/Bias volt setting mode" OFF
- * SR-20-2 bei 800°C vor der TVC mit FM drin & Vakuum
- * SR-20-2 chopper auf 0.2 Hz

- * Lab-Temp = 22.1°C
- * Huber Temperatur: T_set = -22°C, T_intern = -22.1°C

- * Optics Baseplate Temp:
 - * 16:27: -1.81°C

- * Settings scan interval: (Entropie-Änderungen an den Grenzen gehen gegen 0)

[T_TEC = 5°C, V_SKIM = 4.414, V_FID = 3.972]

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·
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[T_TEC = 5°C, V_SKIM = 4.294 V_FID = 3.972]

Messungs-Index t	SKIM[mV](calced)	FID[mV]	TEC[°C]	Dunkelbildserie	# Dunkelbilder
1	4414	3972	5	788...1759	971
2	4402	3972	5	828...1436	608
3	4390	3972	5	682...1265	583
4	4378	3972	5	741...1522	781
5	4366	3972	5	760...1289	529
6	4354	3972	5	854...1580	756
7	4342	3972	5	877...1355	478
8	4330	3972	5	817...1371	554
9	4318	3972	5	726...1296	570
10	4306	3972	5	987...1619	630
11	4294	3972	5	1064...1606	560

- * Bildersequenzen: ca. 10s Dunkel + 50s Moduliert mit chopper + 60s Dunkel
- * framerate = 10 /s

- * files = "mer_saeuberl_FM_31_(\$t)_SKIM_????_FID_4504_TEC_5.tdms"

- * 1. Messung: file = "mer_f_mertis_FM_21_1_SKIM_4414_FID_3972_TEC_5.tdms"
- * 2. Messung: file = "mer_f_mertis_FM_21_2_SKIM_4402_FID_3972_TEC_5.tdms"
- * 3. Messung: file = "mer_f_mertis_FM_21_3_SKIM_4390_FID_3972_TEC_5.tdms"
- * 4. Messung: file = "mer_f_mertis_FM_21_4_SKIM_4378_FID_3972_TEC_5.tdms"
- * 5. Messung: file = "mer_f_mertis_FM_21_5_SKIM_4366_FID_3972_TEC_5.tdms"
- * 6. Messung: file = "mer_f_mertis_FM_21_6_SKIM_4354_FID_3972_TEC_5.tdms"
- * 7. Messung: file = "mer_f_mertis_FM_21_7_SKIM_4342_FID_3972_TEC_5.tdms"
- * 8. Messung: file = "mer_f_mertis_FM_21_8_SKIM_4330_FID_3972_TEC_5.tdms"
- * 9. Messung: file = "mer_f_mertis_FM_21_9_SKIM_4318_FID_3972_TEC_5.tdms"
- * 10. Messung: file = "mer_f_mertis_FM_21_10_SKIM_4306_FID_3972_TEC_5.tdms"

* 11. Messung: file = "mer_f_mertis_FM_21_11_SKIM_4294_FID_3972_TEC_5.tdms"

Auswertung:

* => Mittelung über 500 Dunkelbilder für zeitl. Rauschmaß

1.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_23_LONG_TIME_SERIES_TVC_HUBER_from_-12_to_-2_degC"

* ZIEL: * OP2: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur

* TVC + QM stabil:

* T_IST_HUBER = -12°C

* Optics Base Plate Temp

* 11:46: 8.9°C

* Neuer Arbeitspunkt:

* "linker" Histogramm-Fuß bei: 1450 DN = \$5AA (SOLL, bei Messung Start)

* "rechter" Histogramm-Fuß bei: 12280 DN = \$2ff8 (IST, bei Messung Ende)

* [T_TEC = 15°C, V_SKIM = 4.403, V_FID = 3.971, T_INT = 123µs, No Oversampling]

* Bildhistogram (@Space View) steht mit linker Kante auf Offset 1450 DN

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_23_1_TVC_PLANETView_OPTRIS_BB427_HUBER_-12_to_-2_degC.tdms"

* Huber T_IST_HUBER = -12°C

* 1 Bild / 10s

* Calib. Cycle mit BB300,SpaceView,BB700 alle 500s = 8.3333 min

* HK Period = 10s

* Messung Start:

* 11:48 Uhr: OpticsBasePlate Temp = 8.89°C

* 11:49 Uhr: setze T_SET_HUBER = -2°C

* 19:30 Uhr: OpticsBasePlate Temp = 17.59 °C

* 19:30 Uhr: Messung stop

* vorläufige Auswertung: Frame 2357->Histogram->rechter Fuß bei ca. 12280 DN <=> 16.46°C
Optics_Base_Plate

* setze T_SET_HUBER = -5.2°C , um nächste Messung vorzubereiten

* 19:36: OpticsBasePlateTemp = 17.60 °C

* setze T_CHIP = 15°C

* 4.2.2013:

* Messcomputer (WIN7) hat "sich selbst" neu gestartet

* SPW-Server musste auf "Link1" "AutoTimeUpdate=ON" rekonfiguriert werden

* Camera wurde neu gestartet

4.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_24_LONG_TIME_SERIES_TVC_HUBER_from_-5_2_to_2_8_degC"

* ZIEL: * OP3: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur

* TVC + QM stabil:

* T_IST_HUBER = -5.2°C

* Optics Base Plate Temp

* 14:31: 14.71°C

* Neuer Arbeitspunkt:

* "linker" Histogramm-Fuß bei: 1450 DN = \$5AA (SOLL, bei Messung Start)

* "rechter" Histogramm-Fuß bei: 12280 DN = \$2ff8 (IST, bei Messung Ende)

* [T_TEC = 15°C, V_SKIM = 4.435, V_FID = 3.971, T_INT = 123µs, No Oversampling]

* T_TEC bleibt konstant auf 15°C, da wenig OP-Switching erwünscht sein müsste

* Bildhistogram (@Space View) steht mit linker Kante auf Offset 1450 DN

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_24_1_TVC_PLANETView_OPTRIS_BB427_HUBER_-5_2_to_2_8_degC.tdms"

* Huber T_IST_HUBER = -5.2°C
 * 1 Bild / 10s
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 500s = 8.3333 min
 * HK Period = 10s
 * Messung Start:
 * 14:35 Uhr: OpticsBasePlate Temp = 14.73 °C
 * 14:41 Uhr: setze T_SET_HUBER = 4.2 °C(sollte eigentlich 2.8 sein)

 * 15:30 Uhr: OpticsBasePlate Temp = 17.38 °C
 * 18:04 Uhr: OpticsBasePlate Temp = 23.56 °C

 * 18:05 Uhr: Messung stop

 * 21:01 Uhr: OpticsBasePlate Temp = 24.58 °C bei T_SET_HUBER = 4.2°C

 * vorläufige Auswertung: Frame x->Histogram->rechter Fuß bei ca. 12280 DN <=> x°C Optics_Base_Plate

 * 21:07 Uhr: setze T_SET_HUBER = -1.0 °C (-0.5°C wäre besser, aber per remote nicht setzbar)

 * 6.2.2012:
 * 8:45 Uhr: T_TEC = 25°C
 * 8:46 Uhr: OpticsBasePlate Temp = 19.28 °C
 *

5.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_25_LONG_TIME_SERIES_TVC_HUBER_from_-1_0_to_8_0_degC"
 * ZIEL: * OP4: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur

 * TVC + QM stabil:
 * T_IST_HUBER = -1.0°C

 * Neuer Arbeitspunkt:
 * "linker" Histogramm-Fuß bei: 1450 DN = \$5AA (SOLL, bei Messung Start)
 * "rechter" Histogramm-Fuß bei: 12280 DN = \$2ff8 (IST, bei Messung Ende)
 * [T_TEC = 25°C, V_SKIM = 4.424, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 * Bildhistogramm (@Space View) steht mit linker Kante auf Offset 1450 DN

 * Instrument auf "redundantem Kanal" wegen Kabelproblemen

 * OPTRIS BB @ 427°C vorm KRS5-Fenster

 * 1. Messung: file = "mer_f_mertis_FM_25_LONG_TIME_SERIES_TVC_HUBER_from_-1_0_to_8_0_degC.tdms"
 * Huber T_IST_HUBER = -1.0°C
 * 1 Bild / 10s
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 500s = 8.3333 min
 * HK Period = 10s
 * Messung Start:
 * 11:00 Uhr: OpticsBasePlate Temp = 18.8 °C
 * 11:18 Uhr: setze T_SET_HUBER = 8.0 °C
 * 18:56 Uhr: OpticsBasePlate Temp = 27.09°C
 Messstop!
 * 19:30 Uhr: OpticsBasePlate Temp = 27.10 °C
 * 19:30 Uhr: setze T_SET_HUBER = 3.0 °C(Ziel OpticsBasePlate => 22°C)
 * 20:53 Uhr: korrig. T_SET_HUBER = 2.2 °C(Ziel OpticsBasePlate => 22°C)
 * 23:10 Uhr: korrig. T_SET_HUBER = 2.6 °C(Ziel OpticsBasePlate => 22°C)
 * 6.02.2013:
 * 07:21 Uhr: OpticsBasePlate Temp = 21.86 °C

6.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_26_LONG_TIME_SERIES_TVC_HUBER_from_2_6_to_8_0_degC"
 * ZIEL: * OP5: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur

 * TVC + QM stabil:
 * T_IST_HUBER = 2.6°C
 * T_OPTICS_BASEPLATE = 21.87°C

 * Neuer Arbeitspunkt:
 * "linker" Histogramm-Fuß bei: 1450 DN = \$5AA (SOLL, bei Messung Start)

- * "rechter" Histogramm-Fuß bei: 12280 DN = \$2ff8 (IST, bei Messung Ende)
- * [T_TEC = 25°C, V_SKIM = 4.440, V_FID = 3.971, T_INT = 123µs, No Oversampling]
- * Bildhistogramm (@Space View) steht mit linker Kante auf Offset 1450 DN

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_26_1_LONG_TIME_SERIES_TVC_HUBER_from_2_6_to_8_0_degC.tdms"

- * Huber T_IST_HUBER = 2.6°C
- * 1 Bild / 10s
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 500s = 8.3333 min
- * HK Period = 10s
- * Messung Start:
 - * 7:29 Uhr: OpticsBasePlate Temp = 21.87 °C
 - * 7:38 Uhr: setze T_SET_HUBER = 8.0 °C
- * 12:13: Messung Stop:
- * 12:13 Uhr: OpticsBasePlate Temp = 27.02°C
- * warte auf Stabilisierung für T_BASEPLATE(T_SET_HUBER) Erfahrungswerte...
- * 12:39: OpticsBasePlate Temp = 27.07 °C T_HUBER_SET = 8.0°C

* fahre TVC down - für den Ausbau von MERTIS für zweite Vibrationstests am 7./8.Feb.2013

8.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_27_LONG_TIME_SERIES_TVC_HUBER_from_0_55_to_8_6_degC"

* ZIELE:

- * TVC hochfahren
- * OP4: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
- * erneute Messungen der OPs OP4,OP5 (FM_25,FM_26) wegen zu hoher T_OpticsBasePlate-Überlappung zwischen OP3,OP4 und OP5
- > 1K Überlapp angestrebt

- * !! SpaceView Stirling Cooler erst ab P_KAMMER = 2.0*1E-4 mbar einschalten, Stromaufnahme sollte <2,8 A sein!!
- * !! TurboPumpe erst ab P_KAMMER = 1.0*1E-1 mbar einschalten !!
- * !! MERTIS erst ab P_KAMMER = 2.5*1E-4 mbar einschalten, entspr. Turbopumpe Stufe 3 !!

- * vorheriger OP3: max (T_OpticsBasePlate) = 21.40°C
- * => 1K Überlapp => T_OpticsBasePlate = 20.4°C (soll)
- => T_HUBER_SET = 0.55°C (lt. Statistik vorheriger Messungen)

- * 10:00 Uhr: Vorpumpe ein, SpaceView Stirling Cooler off, Turbopumpe off, MERTIS off
- * 10:20 Uhr: T_HUBER_SET = 0.55°C
- * 10:39 Uhr: Stirling ein => 2.1 A Stromaufnahme bei ca.2.5*1E-4 mbar
- * 10:52 Uhr: MERTIS On auf redundantem Kanal

* Setting im SPW-Terminal für Jeweils 20 Bilder pro POI-Target:

- * "setprop OBPARTIS_BB3_VIEW_CALIBRATION_ACQ_NUM 20"
- * "setprop OBPARTIS_BB7_VIEW_CALIBRATION_ACQ_NUM 20"
- * "setprop OBPARTIS_SPACE_VIEW_CALIBRATION_ACQ_NUM 20"

* wegen d. geringen T-Intervalls d. OPs -> höhere Rate für Messspunkte erwünscht:

- * Science Repetition Rate = 2000 msec
- * Calibration Period = 250 s
- * HK Period = 2000 msec

- * 11:13 Uhr: P_KAMMER = 3.6*1E-5 mbar
- T_OpticsBasePlate = 20.17 °C
- * 11:24 Uhr: T_OpticsBasePlate = 20.46 °C
- * 12:49 Uhr: T_OpticsBasePlate = 20.65 °C
- * 13:05 Uhr: T_OpticsBasePlate = 20.62 °C
- * 16:21 Uhr: T_OpticsBasePlate = 20.54 °C

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* OPTRIS BB @ 427°C vorm KRS5-Fenster

* Arbeitspunkt-Settings für OP4:

- * [T_TEC = 25°C, V_SKIM = 4.435, V_FID = 3.971, T_INT = 123µs, No Oversampling]
- * Bildhistogramm (@Space View) mit linker "Kante" auf Offset 1450 DN

und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* 1. Messung: file = "mer_f_mertis_FM_27_LONG_TIME_SERIES_TVC_HUBER_from_0_55_to_8_6_degC.tdms"

* Huber T_IST_HUBER = 0.55°C
 * 1 Bild / 2s
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

* Messung Start:

* 16:29 Uhr: OpticsBasePlate Temp = 20.54 °C
 * 16:39 Uhr: setze T_SET_HUBER = 8.6 °C

* Messung Stop:

* 19:05 Uhr OpticsBasePlate Temp = 26.70 °C (noch nicht stabil)

* 20:13 Uhr: OpticsBasePlate Temp = 27.64 °C (noch nicht stabil)

* 20:35 Uhr: OpticsBasePlate Temp = 27.79 °C

9.Feb.2013:

* 0:12 Uhr: OpticsBasePlate Temp = 28.24 °C

9.Feb.2013 - Thomas Säuberlich

* Session: "FM_28"

* Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_5_0_to_12_0_degC"

* ZIEL: * OP5: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur

* vorheriger OP4: max (T_OpticsBasePlate) = 25.67°C

* => 1K Überlapp => T_OpticsBasePlate = 24.67°C(soll)
 => T_HUBER_SET = 5.00°C (lt. Statistik vorheriger Messungen)

* 00:18 Uhr:

* setze T_SET_HUBER = 5.00°C (warten...)
 * T_OPTICS_BASEPLATE = 28.24°C

* 07:50 Uhr:

T_OPTICS_BASEPLATE = 24.79°C

* TVC + QM stabil:

* T_SET_HUBER = 5.00°C
 * T_OPTICS_BASEPLATE = 24.79°C

* Arbeitspunkt-Settings für OP5:

* [T_TEC = 25°C, V_SKIM = 4.458, V_FID = 3.971, T_INT = 123µs, No Oversampling]

* Bildhistogram (@Space View) mit linker "Kante" auf Offset 1450 DN

und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_28_1_LONG_TIME_SERIES_TVC_HUBER_from_5_0_to_12_0_degC.tdms"

* Huber T_IST_HUBER = 5.00°C
 * 1 Bild / 2s
 * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

* Messung Start:

* 7:56 Uhr: OpticsBasePlate Temp = 24.79 °C
 * 8:06 Uhr: setze T_SET_HUBER = 12.00 °C

* Messung Stop:

* 12:37 Uhr: OpticsBasePlate Temp = 31.65 °C

* warte auf Stabilisierung für T_BASEPLATE(T_SET_HUBER) Erfahrungswerte...

* x Uhr: OpticsBasePlate Temp = 31.77°C
 T_IST_HUBER = 12°C

8.93

9.Feb.2013 - Thomas Säuberlich

* Session: "FM_29"
 * Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_8_9_to_15_0_degC"
 * ZIEL: * OP6: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
 * vorheriger OP5: max (T_OpticsBasePlate) = 29.48°C
 * => 1K Überlapp => T_OpticsBasePlate = 28.48°C(soll)
 => T_HUBER_SET = 8.9 °C (lt. Statistik vorheriger Messungen)

* 13:28 Uhr:
 * setze T_SET_HUBER = 8.9 °C (warten...)
 * T_OPTICS_BASEPLATE = 31.79°C

* 17:47 Uhr: T_OPTICS_BASEPLATE = 28.94°C(warten...)
 * 18:02 Uhr: T_OPTICS_BASEPLATE = 28.92°C(warten...)
 * 18:04 Uhr: setze T_SET_HUBER = 8.5 °C (warten...)
 * 22:54 Uhr: T_OPTICS_BASEPLATE = 28.41°C

* TVC + QM stabil:
 * T_SET_HUBER = 8.5°C
 * T_OPTICS_BASEPLATE = 28.41 °C

* Arbeitspunkt-Settings für OP6:

* [T_TEC = 25°C, V_SKIM = 4.478, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 * Bildhistogramm (@Space View) mit linker "Kante" auf Offset 1450 DN
 und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* Instrument auf "redundantem Kanal" wegen Kabelproblemen
 * OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_29_1_LONG_TIME_SERIES_TVC_HUBER_from_8_5_to_15_0_degC.tdms"
 * Huber T_IST_HUBER = 8.5°C
 * 1 Bild / 2s
 * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

* Messung Start:
 * 22:59 Uhr: OpticsBasePlate Temp = 28.41 °C
 * 23:07 Uhr: setze T_SET_HUBER = 15.0 °C

10.Feb.2013:
 * Messung Stop:
 * 01:26 Uhr: OpticsBasePlate Temp = 33.57 °C

* warte auf Stabilisierung für T_BASEPLATE(T_SET_HUBER) Erfahrungswerte...
 * 08:18 Uhr: OpticsBasePlate Temp = 35.08°C
 T_IST_HUBER = 15.0 °C

10.Feb.2013 - Thomas Säuberlich

* Session: "FM_30"
 * Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_12_0_to_17_0_degC"
 * ZIEL: * OP7: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
 * vorheriger OP6: max (T_OpticsBasePlate) = 32.62 °C
 * => 1K Überlapp => T_OpticsBasePlate = 31.62 °C (soll)
 => T_HUBER_SET = 12.0 °C(lt. Statistik vorheriger Messungen)

* 08:58 Uhr:
 * T_IST_HUBER = 15.0 °C
 * setze T_SET_HUBER = 12.0 °C
 * T_OPTICS_BASEPLATE = 35.08 °C
 * 08:59 Uhr:
 * setze T_TEC = 35.00 °C (warten...)

* 13:27 Uhr:		T_OPTICS_BASEPLATE	= 31.09 °C	(warten...)
* 13:28 Uhr:	setze	T_SET_HUBER	= 12.6 °C	(warten...)
* 15:34 Uhr:		T_OPTICS_BASEPLATE	= 31.42 °C	(warten...)
* 18:14 Uhr:		T_OPTICS_BASEPLATE	= 31.52 °C	

* TVC + QM stabil:				
*		T_SET_HUBER	= 12.6 °C	
*		T_OPTICS_BASEPLATE	= 31.52 °C	

* Arbeitspunkt-Settings für OP7:

* [T_TEC = 35°C, V_SKIM = 4.469, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 * Bildhistogram (@Space View) mit linker "Kante" auf Offset 1450 DN
 und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* Instrument auf "redundantem Kanal" wegen Kabelproblemen
 * OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_30_1_LONG_TIME_SERIES_TVC_HUBER_from_12_0_to_17_0_degC.tdms"
 * Huber T_IST_HUBER = 12.6 °C
 * 1 Bild / 2s
 * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

* Messung Start:				
* 18:15 Uhr:		OpticsBasePlate Temp	= 31.52 °C	
* 18:24 Uhr:	setze	T_SET_HUBER	= 17.0 °C	

10.Feb.2013:				
* Messung Stop:				
* 21:30 Uhr:		OpticsBasePlate Temp	= 35.34 °C	

 10.Feb.2013 - Thomas Säuberlich

* Session: "FM_31"
 * Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_14_7_to_19_0_degC"

* ZIEL: * OP8: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
 * vorheriger OP7: max (T_OpticsBasePlate) = 34.65 °C
 * => 1K Überlapp => T_OpticsBasePlate = 33.65 °C (soll)
 => T_HUBER_SET = 14.2 °C (lt. Statistik vorheriger Messungen)

* 22:25 Uhr:				
*		T_IST_HUBER	= 17.0 °C	
*	setze	T_SET_HUBER	= 14.2 °C	
*		T_OPTICS_BASEPLATE	= 35.59 °C	
*	setze	T_TEC	= 35.00 °C	(warten...)

11.Feb.2013:				
* 07:00 Uhr:				
*		T_OPTICS_BASEPLATE	= 33.08 °C	
*	setze	T_SET_HUBER	= 14.7 °C	(warten...)

* 08:23 Uhr:		T_OPTICS_BASEPLATE	= 33.32 °C	(warten...)
* 10:10 Uhr:		T_OPTICS_BASEPLATE	= 33.49 °C	(warten...)
* 10:10 Uhr:	setze	V_SKIM	= 4.480 V	
* 10:16 Uhr:	setze	T_SET_HUBER	= 14.9 °C	(warten...)

* TVC + QM stabil:				
*		T_SET_HUBER	= 14.9 °C	
*		T_OPTICS_BASEPLATE	= 33.64 °C	

* Arbeitspunkt-Settings für OP8:

* [T_TEC = 35°C, V_SKIM = 4.480, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 * Bildhistogram (@Space View) mit linker "Kante" auf Offset 1450 DN
 und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* Instrument auf "redundantem Kanal" wegen Kabelproblemen
 * OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_31_1_LONG_TIME_SERIES_TVC_HUBER_from_14_9_to_19_0_degC.tdms"
 * Huber T_IST_HUBER = 14.9 °C
 * 1 Bild / 2s
 * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

 * Messung Start:
 * 11:33 Uhr: OpticsBasePlate Temp = 33.64 °C
 * 11:40 Uhr: setze T_SET_HUBER = 19.0 °C

 * Messung Stop:
 * 14:36 Uhr: OpticsBasePlate Temp = 37.25 °C
 * 15:36 Uhr: OpticsBasePlate Temp = 37.54 °C
 * 15:41 Uhr: OpticsBasePlate Temp = 37.55 °C

 10.Feb.2013 - Thomas Säuberlich

* Session: "FM_32"
 * Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_16_7_to_20_7_degC"

 * ZIEL: * OP9: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
 * vorheriger OP8: max (T_OpticsBasePlate) = 36.50 °C
 * => 1K Überlapp => T_OpticsBasePlate = 35.50 °C (soll)
 => T_HUBER_SET = 16.4 °C (lt. Statistik vorheriger Messungen)

 * 18:07 Uhr:
 * T_IST_HUBER = 19.0 °C
 * T_OPTICS_BASEPLATE = 37.72 °C

 * 18:12 Uhr:
 * T_IST_HUBER = 19.0 °C
 * setze T_SET_HUBER = 16.4 °C
 * T_OPTICS_BASEPLATE = 37.72 °C

 * 22:46 Uhr:
 * T_OPTICS_BASEPLATE = 35.26 °C
 * setze T_SET_HUBER = 16.7 °C (warten...)

 12.Feb.2013:
 * TVC + QM stabil:
 * T_SET_HUBER = 16.7 °C
 * T_OPTICS_BASEPLATE = 35.46 °C

* Arbeitspunkt-Settings für OP9:

* [T_TEC = 35°C, V_SKIM = 4.491, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 * Bildhistogram (@Space View) mit linker "Kante" auf Offset 1450 DN
 und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

* Instrument auf "redundantem Kanal" wegen Kabelproblemen
 * OPTRIS BB @ 427°C vorm KRS5-Fenster

* 1. Messung: file = "mer_f_mertis_FM_32_1_LONG_TIME_SERIES_TVC_HUBER_from_16_7_to_20_7_degC.tdms"
 * Huber T_IST_HUBER = 16.7 °C
 * 1 Bild / 2s
 * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 * HK Period = 2s

 * Messung Start:
 * 06:50 Uhr: OpticsBasePlate Temp = 35.46 °C
 * 07:02 Uhr: setze T_SET_HUBER = 20.7 °C

 * Messung Stop:
 * 10:29 Uhr: OpticsBasePlate Temp = 39.12 °C

12.Feb.2013 - Thomas Säuberlich

- * Session: "FM_33"
- * Session-Name: "LONG_TIME_SERIES_TVC_HUBER_from_18_6_to_22_6_degC"

- * ZIEL: * OP10: Bestimmung des Bildoffsets in Abh. der Instrument-Umgebungstemperatur
 - * vorheriger OP9: max (T_OpticsBasePlate) = 38.29 °C
 - * => 1K Überlapp => T_OpticsBasePlate = 37.29 °C (soll)
 - => T_HUBER_SET = 18.6 °C (lt. Statistik vorheriger Messungen)

- * 10:52 Uhr:
 - * T_IST_HUBER = 20.7 °C
 - * T_OPTICS_BASEPLATE = 39.21 °C
 - * setze T_SET_HUBER = 18.6 °C

- * 10:53 Uhr:
 - * T_OPTICS_BASEPLATE = 39.21 °C
 - * setze T_SET_HUBER = 18.6 °C (warten...)

- * 15:04 Uhr:
 - * T_OPTICS_BASEPLATE = 37.41 °C

- * TVC + QM stabil:
 - * 16:21 Uhr T_SET_HUBER = 18.6 °C
 - * 16:21 Uhr T_OPTICS_BASEPLATE = 37.36 °C

- * Arbeitspunkt-Settings für OP10:
 - * [T_TEC = 35°C, V_SKIM = 4.501, V_FID = 3.971, T_INT = 123µs, No Oversampling]
 - * Bildhistogramm (@Space View) mit linker "Kante" auf Offset 1450 DN und Pixel (x,y)=(146,37)€ (Ref-Area) wird wegen eines sehr kleinen Offsets ignoriert

- * Instrument auf "redundantem Kanal" wegen Kabelproblemen
- * OPTRIS BB @ 427°C vorm KRS5-Fenster

- * 1. Messung: file = "mer_f_mertis_FM_33_1_LONG_TIME_SERIES_TVC_HUBER_from_18_6_to_22_6_degC.tdms"
 - * Huber T_IST_HUBER = 18.6 °C
 - * 1 Bild / 2s
 - * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 - * HK Period = 2s

 - * Messung Start:
 - * 16:25 Uhr: setze T_SET_HUBER = 22.6 °C
 - * 16:27 Uhr: OpticsBasePlate Temp = 37.36 °C

 - * Messung Stop windows7 mal wieder versagt hat. Der Versuch einer Remote-Anmeldung erbrachte:
 - "Anmeldung nicht möglich, da ein Gerät nicht richtig funktioniert"
 - * vorläufige Problem-"Lösung" durch Ausnutzen einer Sicherheitslücke:
 - => REBOOT von einem ANDEREN WIN7-Rechner per command-line erzwingen
 - 129.247.x.x: cmd: "shutdown /r /m \\129.247.211.26"

 - * 18:13 Uhr: OpticsBasePlate Temp = 40.06 °C
 - * 18:13 Uhr: setze T_SET_HUBER = 18.6 °C (warten...)
 - * 22:08 Uhr: OpticsBasePlate Temp = 37.52 °C (warten...)
 - * 22:42 Uhr: OpticsBasePlate Temp = 37.46 °C (warten...)

- 13.Feb.2013:
- 1. Messung, 2.Versuch:
 - * file = "mer_f_mertis_FM_33_1_LONG_TIME_SERIES_TVC_HUBER_from_18_6_to_22_6_degC.tdms"
 - * Huber T_IST_HUBER = 18.6 °C
 - * 1 Bild / 2s
 - * Cycle mit BB300,SpaceView,BB700 alle 250s = 4.17 min
 - * HK Period = 2s

 - * Messung Start:
 - * 06:52 Uhr: T_OPTICS_BASEPLATE = 37.35 °C
 - * 06:55 Uhr: setze T_SET_HUBER = 22.6 °C

 - * Messung Stop:
 - * 9:34 Uhr: T_OPTICS_BASEPLATE = x °C

* 11:18 Uhr: T_OPTICS_BASEPLATE = 41.18 °C
 * 12:17 Uhr: T_OPTICS_BASEPLATE = 41.26 °C

 19.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_35_Radiom_Calib_OP1_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP1 für wenigstens tiefe und hohe Temperatur innerhalb des Arbeitsbereiches

* Aus den Untersuchungen dieser Messreihe ergeben möglicherweise zusätzliche Instrument-Temperaturen, bei den radiom. kalibriert wird

* Messungen unter Vakuumbedingungen

* Update auf neue Onboard Software:

* Version auf Redundant ist "APS V3.2.1298 02/2012" und die Konfiguration "FM_RED_CFG Rev: 1298 manual" lt. B. Ulmer

* Setting im SPW-Terminal für Jeweils 20 Bilder pro POI-Target:

* "setprop OBPARTIS_BB3_VIEW_CALIBRATION_ACQ_NUM 20"

* "setprop OBPARTIS_BB7_VIEW_CALIBRATION_ACQ_NUM 20"

* "setprop OBPARTIS_SPACE_VIEW_CALIBRATION_ACQ_NUM 20"

* Messung im "ScienceMode":

OPERATION:

* "Science Repetition Rate (ms)" = 300 ms
 * "Calibration Period (sec)" = 30 s
 * "TIS Background Rate #" = 10
 * "Pointing Mode" = Move
 * "Compression Mode" = No Compression
 * "Pixel Binning" = 1x1
 * "Min Sensor Head Temp. (°C)" = 10
 * "Calibration cycle invert" unchecked
 * "PARTIR_REPETITION_FACTOR" = 3
 * "TIS window size" = 160x120 pixel
 * "TIS Period (sec)" = 100
 * "TIR Period (sec)" = 100

* BOL, TEC, RAD, POI, BB700 = ON, restliche units OFF
 * "HK Period (msec)" = 300

FUNCTIONAL PARAMETERS:

* "TIS Oversampling" = NO
 * "TIR Oversampling" = YES
 * "POI Move Mode" = with_Possensors
 * "TIS DATA Processing Mode" = Nominal
 * "Bias volt setting mode" = manual !!!!!

!!!!

* Instrument auf "redundantem Kanal" wegen Kabelproblemen

* Arbeitspunkt (OP1):

* [T_TEC = 5°C, V_SKIM = 4.397 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* 21:20 Uhr:

* HUBER ist auf T_soll_Huber = -24.0 °C
 * T_Optics_Base_Plate = -1.89 °C fallend
 => * setze T_soll_Huber = -23.0 °C

* 21:38 Uhr:

* setze T_soll_Huber = -23.5 °C

* 22:38 Uhr:

* setze T_soll_Huber = -24.0 °C
 * setze über Nacht Calibration Period = 300 s

20.Feb.2013:

* 6:38 Uhr:
 * setze über Nacht Calibration Period = 300 s
 * T_Optics_Base_Plate = -2.32 °C
 * setze Calibration Period = 30 s

* 10:01 Uhr:
 * T_Optics_Base_Plate = -0.72 °C

* 10:37 Uhr:
 * TVC + FM stabil:
 * HUBER ist auf T_soll = -24.0°C
 * T_Optics_Base_Plate = -0.67°C

* OPTRIS- bzw. Szenentemperaturen sind so gewählt, dass äquidistante Flüsse für die jeweiligen Radianzintegrale [8µm...14µm] entstehen (Jörg Knollenberg):

n	T_Optris_set [K]	T_Optris_set [°C]
1	300	27
2	429	156
3	512	239
4	581	308
5	642	369
6	700	427

1. Messung: file = "mer_f_mertis_FM_35_1_Radiom_Calib_OP1_TVC_low_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.67 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_35_2_Radiom_Calib_OP1_TVC_low_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.65 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_35_3_Radiom_Calib_OP1_TVC_low_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.64 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_35_4_Radiom_Calib_OP1_TVC_low_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.62 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_35_5_Radiom_Calib_OP1_TVC_low_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.59 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_35_6_Radiom_Calib_OP1_TVC_low_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = -0.55 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

12:35 Uhr:
 * Messungen zuende
 * T_Optics_Base_Plate = -0.52 °C
 * setze T_OPTRIS_SOLL = 27°C
 * warten...

14:42 Uhr: * T_Optics_Base_Plate = -0.54 °C
 15:15 Uhr: * T_Optics_Base_Plate = -0.57 °C

7. Messung: file = "mer_f_mertis_FM_35_7_Radiom_Calib_OP1_TVC_low_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 2 min + 40 s
 * POI @ BB300
 * Optics BasePlateTemp = -0.57 °C

- 15:15 Uhr: * T_Optics_Base_Plate = -0.58 °C
 * Ziel: T_Optics_Base_Plate = 9.2 °C
 => 15:33 Uhr: setze T_SET_HUBER = -14.7 °C (für VTK-Vi ist das -15,3)
- 21:16 Uhr: * T_Optics_Base_Plate = 8.20 °C stabil
 * setze T_SET_HUBER = -13.6 °C (für VTK-Vi ist das -14,4)
- 21.Feb.2013:
 7:30 Uhr: * T_Optics_Base_Plate = 9.50 °C stabil
8. Messung: file = "mer_f_mertis_FM_35_8_Radiom_Calib_OP1_TVC_high_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 2 min + 40 s
 * POI @ BB300
 * Optics BasePlateTemp = 9.50 °C
- * Windows Absturz vermutlich verursacht durch DataSocket => kein Remotelogin möglich; Neustart erforderlich
- 10:08 Uhr: * T_Optics_Base_Plate = 9.48 °C stabil
- * Arbeitspunkt (OP1) [T_TEC = 5°C, V_SKIM = 4.397 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]
 * Messungen nun im Wechsel mit FM_36_low...
9. Messung: file = "mer_f_mertis_FM_35_9_Radiom_Calib_OP1_TVC_high_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.48 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster
10. Messung: file = "mer_f_mertis_FM_35_10_Radiom_Calib_OP1_TVC_high_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.40 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster
 * Probleme mit Bolom. Temp. Stable - Flag
11. Messung: file = "mer_f_mertis_FM_35_11_Radiom_Calib_OP1_TVC_high_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.36 °C ---> 9.37°C
 * OPTRIS BB@239°C vorm KRS5-Fenster
 * Probleme mit Bolom. Temp. Stable - Flag
12. Messung: file = "mer_f_mertis_FM_35_12_Radiom_Calib_OP1_TVC_high_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.36 °C ---> 9.38°C
 * OPTRIS BB@308°C vorm KRS5-Fenster
13. Messung: file = "mer_f_mertis_FM_35_13_Radiom_Calib_OP1_TVC_high_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.40 °C ---> 9.42°C
 * OPTRIS BB@369°C vorm KRS5-Fenster
14. Messung: file = "mer_f_mertis_FM_35_14_Radiom_Calib_OP1_TVC_high_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.47 °C ---> 9.50°C
 * OPTRIS BB@427°C vorm KRS5-Fenster
- 9
- 13:33 Uhr: * T_Optics_Base_Plate = 9.54 °C
 * Ziel: T_Optics_Base_Plate = 4.65 °C
 => 13:35 Uhr: setze T_SET_HUBER = -18.50°C (für VTK-Vi ist das -19,5)
- 22.Feb.2013:
 09:30 Uhr: * T_Optics_Base_Plate = 4.52°C stabil
15. Messung: file = "mer_f_mertis_FM_35_15_Radiom_Calib_OP1_TVC_medium_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * Optics BasePlateTemp = 4.52 °C
16. Messung: file = "mer_f_mertis_FM_35_16_Radiom_Calib_OP1_TVC_medium_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 4.47 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

17. Messung: file = "mer_f_mertis_FM_35_17_Radiom_Calib_OP1_TVC_medium_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 4.47 °C ---> 4.48°C
 * OPTRIS BB@156°C vorm KRS5-Fenster
18. Messung: file = "mer_f_mertis_FM_35_18_Radiom_Calib_OP1_TVC_medium_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 4.49 °C ---> ?°C
 * OPTRIS BB@239°C vorm KRS5-Fenster
19. Messung: file = "mer_f_mertis_FM_35_19_Radiom_Calib_OP1_TVC_medium_Optris_BB308_at_Planet.tdms"
 * 20 Calib-Cycles Messdauer zu groß, SubBilderserien auswerten!
 * T_Optics_Base_Plate = 4.52 °C ---> 4.54°C
 * OPTRIS BB@308°C vorm KRS5-Fenster
20. Messung: file = "mer_f_mertis_FM_35_20_Radiom_Calib_OP1_TVC_medium_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 4.59 °C ---> 4.60°C
 * OPTRIS BB@369°C vorm KRS5-Fenster
21. Messung: file = "mer_f_mertis_FM_35_21_Radiom_Calib_OP1_TVC_medium_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 4.61 °C ---> 4.63°C
 * OPTRIS BB@427°C vorm KRS5-Fenster
- * POI positionen:
- | | | | |
|---|-------|----------------|-------------|
| * | 0 <=> | Planet | (20 Bilder) |
| * | 1 <=> | SpaceView | (20 Bilder) |
| * | 2 <=> | Shutter im FOV | 0 |
| * | 3 <=> | BB7 | (20 Bilder) |
| * | 4 <=> | BB3 | (20 Bilder) |
- 13:31 Uhr: * T_Optics_Base_Plate = 4.80 °C
 * Ziel: T_Optics_Base_Plate = 7.10 °C
 => 13:31 Uhr: setze T_SET_HUBER = -15.80°C (für VTK-Vi ist das -16,2)
- 24.Feb.2013: * T_Optics_Base_Plate = 7.17 °Cstabil
- 25.Feb.2013: * 9:48 Uhr: T_Optics_Base_Plate = 7.20 °Cstabil
22. Messung: file = "mer_f_mertis_FM_35_22_Radiom_Calib_OP1_TVC_medium2_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * Optics BasePlateTemp = 7.20 °C
23. Messung: file = "mer_f_mertis_FM_35_23_Radiom_Calib_OP1_TVC_medium2_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.17 °C ---> 7.16°C
 * OPTRIS BB@27°C vorm KRS5-Fenster
24. Messung: file = "mer_f_mertis_FM_35_24_Radiom_Calib_OP1_TVC_medium2_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.15 °C ---> 7.15°C
 * OPTRIS BB@156°C vorm KRS5-Fenster
25. Messung: file = "mer_f_mertis_FM_35_25_Radiom_Calib_OP1_TVC_medium2_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.16 °C ---> 7.16°C
 * OPTRIS BB@239°C vorm KRS5-Fenster
26. Messung: file = "mer_f_mertis_FM_35_26_Radiom_Calib_OP1_TVC_medium2_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.18 °C ---> 7.19°C
 * OPTRIS BB@308°C vorm KRS5-Fenster
27. Messung: file = "mer_f_mertis_FM_35_27_Radiom_Calib_OP1_TVC_medium2_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.22 °C ---> 7.24°C
 * OPTRIS BB@369°C vorm KRS5-Fenster
28. Messung: file = "mer_f_mertis_FM_35_28_Radiom_Calib_OP1_TVC_medium2_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 7.26 °C ---> 7.29 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

12:10 Uhr: * T_Optics_Base_Plate = 7.29 °C
 * Ziel: T_Optics_Base_Plate = 2.00 °C
 => 12:12 Uhr: setze T_SET_HUBER = -21.20°C (für VTK-Vi ist das)

26.Feb.2013:
 12:00 Uhr: * T_Optics_Base_Plate = 1.84 °C stabil

29. Messung: file = "mer_f_mertis_FM_35_29_Radiom_Calib_OP1_TVC_medium2_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * Optics BasePlateTemp = 1.84°C

30. Messung: file = "mer_f_mertis_FM_35_30_Radiom_Calib_OP1_TVC_low2_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 1.84 °C ---> 1.82 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster
 * Letzten POI-Zyklus möglichst ignorieren, da FOV nicht frei war

31. Messung: file = "mer_f_mertis_FM_35_31_Radiom_Calib_OP1_TVC_low2_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 1.81 °C ---> 1.80 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

32. Messung: file = "mer_f_mertis_FM_35_32_Radiom_Calib_OP1_TVC_low2_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 1.81 °C ---> 1.82 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

33. Messung: file = "mer_f_mertis_FM_35_33_Radiom_Calib_OP1_TVC_low2_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 1.83 °C ---> 1.86 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

34. Messung: file = "mer_f_mertis_FM_35_34_Radiom_Calib_OP1_TVC_low2_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 1.89 °C ---> x °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

35. Messung: file = "mer_f_mertis_FM_35_35_Radiom_Calib_OP1_TVC_low2_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = x °C ---> x °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

 21.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_36_Radiom_Calib_OP2_TVC"

* ZIEL:
 * Radiometrische Kalibrierung bei OP2 für wenigstens tiefe
 und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP2):
 * [T_TEC = 15°C, V_SKIM = 4.403 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen im Wechsel mit FM_35_high

1. Messung: file = "mer_f_mertis_FM_36_1_Radiom_Calib_OP2_TVC_low_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.49 °C ---> 9.44°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_36_2_Radiom_Calib_OP2_TVC_low_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles

* T_Optics_Base_Plate = 9.40 °C ---> 9.36°C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_36_3_Radiom_Calib_OP2_TVC_low_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.37 °C ---> 9.35°C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_36_4_Radiom_Calib_OP2_TVC_low_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.38 °C ---> 9.37°C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_36_5_Radiom_Calib_OP2_TVC_low_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.42 °C ---> 9.42°C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_36_6_Radiom_Calib_OP2_TVC_low_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 9.46 °C ---> 9.45°C
 * OPTRIS BB@427°C vorm KRS5-Fenster

27.Feb.2013:

* 14:xx Uhr: Setze OP2-Detektor-Settings

* Arbeitspunkt (OP2) [T_TEC = 15°C, V_SKIM = 4.403 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

14:x Uhr: * T_Optics_Base_Plate = 1.89 °C
 * Ziel: T_Optics_Base_Plate = 15.29°C
 => 14:x Uhr: setze T_SET_HUBER = -6.8 °C

20:26 Uhr: * T_Optics_Base_Plate = 14.54 °C
 => 20:39 Uhr: setze T_SET_HUBER = -6.1 °C

22:46 Uhr: * T_Optics_Base_Plate = 15.28 °C
 => 20:39 Uhr: setze T_SET_HUBER = -6.2 °C

27.Feb.2013:

08:51 Uhr: * T_Optics_Base_Plate = 15.46 °C stabil
 10:14 Uhr: * T_Optics_Base_Plate = 15.45 °C stabil

7. Messung: file = "mer_f_mertis_FM_36_7_Radiom_Calib_OP2_TVC_high_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 15.45 °C ---> 15.45°C

* Messungen im Wechsel mit FM_37_low

8. Messung: file = "mer_f_mertis_FM_36_8_Radiom_Calib_OP2_TVC_high_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.40 °C ---> 15.39°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_36_9_Radiom_Calib_OP2_TVC_high_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.38 °C ---> 15.38°C
 * OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_36_10_Radiom_Calib_OP2_TVC_high_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.41 °C ---> 15.42°C
 * OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_36_11_Radiom_Calib_OP2_TVC_high_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.48 °C ---> 15.50°C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_36_12_Radiom_Calib_OP2_TVC_high_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.52 °C ---> 15.54°C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_36_13_Radiom_Calib_OP2_TVC_high_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.62 °C ---> 15.65°C
 * OPTRIS BB@427°C vorm KRS5-Fenster

 27.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_37_Radiom_Calib_OP3_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP3 für wenigstens tiefe
 und hohe Temperaturgrenzen des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP3):

* [T_TEC = 15°C, V_SKIM = 4.435 V, V_FID= 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_38_OP4_low

1. Messung: file = "mer_f_mertis_FM_37_1_Radiom_Calib_OP3_TVC_low_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.39 °C ---> 15.39°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_37_2_Radiom_Calib_OP3_TVC_low_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.39 °C ---> 15.39°C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_37_3_Radiom_Calib_OP3_TVC_low_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.42 °C ---> 15.44°C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_37_4_Radiom_Calib_OP3_TVC_low_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 15.48°C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_37_5_Radiom_Calib_OP3_TVC_low_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 15.54 °C ---> 15.57°C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_37_6_Radiom_Calib_OP3_TVC_low_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = ?°C ---> 15.62 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

13:20 Uhr: * T_Optics_Base_Plate = 15.66 °C
 * Ziel: T_Optics_Base_Plate = 20.10 °C
 => 13:20 Uhr: setze T_SET_HUBER = -1.3 °C (für VTK-vi ist das -2,7)

13:25 Uhr: Setze Arbeitspunkt (OP3):
 * [T_TEC = 15°C, V_SKIM = 4.435 V, V_FID= 3.971 V, t_INT = 123 µs, No Oversampling]

22:44 Uhr: * T_Optics_Base_Plate = 20.28°C
 => 22:45 Uhr: setze T_SET_HUBER = -1.4 °C (für VTK-vi ist das -2,6)

* Ziel-Korrektur: T_Optics_Base_Plate = 21.0 °C
 => 22:57 Uhr: setze T_SET_HUBER = -1.0 °C (ideal -0,6 --> aber Vorsicht wegen Remote-

Enteisung)

=>

28.Feb.2013:

10:30 Uhr: * T_Optics_Base_Plate = 20.62°C (stabil aber nicht im Überlappungsbereich)

=> 22:57 Uhr: setze T_SET_HUBER = -0.6 °C

* Arbeitspunkt (OP3):

* [T_TEC = 15°C, V_SKIM = 4.435 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

8. Messung: file = "mer_f_mertis_FM_37_8_Radiom_Calib_OP3_TVC_high_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.67 °C ---> 20.70 °C

* OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_37_9_Radiom_Calib_OP3_TVC_high_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.73°C ---> 20.75°C

* OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_37_10_Radiom_Calib_OP3_TVC_high_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.78°C ---> 20.80°C

* OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_37_11_Radiom_Calib_OP3_TVC_high_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.83°C ---> 20.84°C

* OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_37_12_Radiom_Calib_OP3_TVC_high_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.88 °C ---> 20.91°C

* OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_37_13_Radiom_Calib_OP3_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.95 °C ---> 20.99 °C

* OPTRIS BB@427°C vorm KRS5-Fenster

18:27 Uhr:

* System thermisch stabil ;)

* T_Optics_Base_Plate = 21.08°C, T_SET_HUBER = -0.6°C

7. Messung: file = "mer_f_mertis_FM_37_7_Radiom_Calib_OP3_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,

* Radiometer Repetition Factor = 8

* Messdauer 5 min

* POI @ BB300

* T_Optics_Base_Plate = 21.08°C ---> 21.07°C

28.Feb.2013 - Thomas Säuberlich

* Session-Name: "FM_38_Radiom_Calib_OP4_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP4 für wenigstens tiefe
und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP4):

* [T_TEC = 25°C, V_SKIM = 4.435 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_37_OP3_high

1. Messung: file = "mer_f_mertis_FM_38_1_Radiom_Calib_OP4_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.7 °C ---> 20.69°C

* OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_38_2_Radiom_Calib_OP4_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 20.75°C ---> 20.74°C

* OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_38_3_Radiom_Calib_OP4_TVC_low_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 20.80°C ---> 20.78°C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_38_4_Radiom_Calib_OP4_TVC_low_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 20.84°C ---> 20.83°C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_38_5_Radiom_Calib_OP4_TVC_low_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 20.91 °C ---> 20.90°C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_38_6_Radiom_Calib_OP4_TVC_low_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 20.99 °C ---> ?°C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14:03 Uhr: * T_Optics_Base_Plate = 21.02 °C

18:27 Uhr: * System thermisch stabil ;)
 * dann Messung FM_37_7 durchgeführt und T_TEC auf 25°C bzw. OP4

18:35 Uhr: * T_Optics_Base_Plate = 21.07°C (warten auf Stabilisierung)

----- MESSUNG muss noch gemacht werden -----

7. Messung: file = "mer_f_mertis_FM_38_7_Radiom_Calib_OP4_TVC_low_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = °C ---> °C

21:03 Uhr: * T_Optics_Base_Plate = 20.22 °C
 * Ziel: T_Optics_Base_Plate = 25.24 °C
 => 21:06 Uhr: setze T_SET_HUBER = 4.9 °C

1.März.2013:

07:01 Uhr: * T_Optics_Base_Plate = 25.46 °C
 => 07:01 Uhr: setze T_SET_HUBER = 4.7 °C

10:00 Uhr: * T_Optics_Base_Plate = 25.30 °C

* Arbeitspunkt (OP4):

* [T_TEC = 25°C, V_SKIM = 4.435 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_39_OP5_low

8. Messung: file = "mer_f_mertis_FM_38_8_Radiom_Calib_OP4_TVC_high_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.25 °C ---> 25.22°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_38_9_Radiom_Calib_OP4_TVC_high_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.16 °C ---> 25.16 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_38_10_Radiom_Calib_OP4_TVC_high_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.18 °C ---> 25.19 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_38_11_Radiom_Calib_OP4_TVC_high_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.24 °C ---> 25.26 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_38_12_Radiom_Calib_OP4_TVC_high_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.32 °C ---> 25.34 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_38_13_Radiom_Calib_OP4_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.40 °C ---> 25.42 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_38_14_Radiom_Calib_OP4_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 25.28 °C ---> 25.28°C

 1.März.2013 - Thomas Säuberlich

* Session-Name: "FM_39_Radiom_Calib_OP5_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP5 für wenigstens tiefe
 und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP5):

* [T_TEC = 25°C, V_SKIM = 4.458 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_38_OP4_high

1. Messung: file = "mer_f_mertis_FM_39_1_Radiom_Calib_OP5_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.21°C ---> 25.19°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_39_2_Radiom_Calib_OP5_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.16°C ---> 25.17°C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_39_3_Radiom_Calib_OP5_TVC_low_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.19°C ---> 25.21°C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_39_4_Radiom_Calib_OP5_TVC_low_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.26°C ---> 25.28°C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_39_5_Radiom_Calib_OP5_TVC_low_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.34°C ---> 25.37°C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_39_6_Radiom_Calib_OP5_TVC_low_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 25.42°C ---> 25.45°C
 * OPTRIS BB@427°C vorm KRS5-Fenster

7. Messung: file = "mer_f_mertis_FM_39_7_Radiom_Calib_OP5_TVC_low_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 25.28°C ---> 25.26°C

13:43 Uhr: * T_Optics_Base_Plate = 25.46 °C

* Ziel: T_Optics_Base_Plate = 29.00 °C

=> 13:43 Uhr: setze T_SET_HUBER = 8.7 °C

3.März.2013:

13:43 Uhr: * T_Optics_Base_Plate = 29.15 °C (stabil)

4.März.2013:

11:39 Uhr: * T_Optics_Base_Plate = 29.16 °C (stabil)

* Arbeitspunkt (OP5):

* [T_TEC = 25°C, V_SKIM = 4.458 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

8. Messung: file = "mer_f_mertis_FM_39_8_Radiom_Calib_OP5_TVC_high_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 29.06 °C ---> 29.03 °C

* OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_39_9_Radiom_Calib_OP5_TVC_high_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 28.89 °C ---> ? °C

* OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_39_10_Radiom_Calib_OP5_TVC_high_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 28.9? °C ---> 28. °C

* OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_39_11_Radiom_Calib_OP5_TVC_high_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 29.05 °C ---> 29.07 °C

* OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_39_12_Radiom_Calib_OP5_TVC_high_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 29.24 °C ---> 29.26 °C

* OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_39_13_Radiom_Calib_OP5_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 29.29 °C ---> 29.31 °C

* OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_39_14_Radiom_Calib_OP5_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,

* Radiometer Repetition Factor = 8

* Messdauer 5 min

* POI @ BB300

* T_Optics_Base_Plate = 29.01 °C ---> 28.99°C

 4.März.2013 - Thomas Säuberlich

* Session-Name: "FM_40_Radiom_Calib_OP6_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP6 für wenigstens tiefe
 und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP6):

* [T_TEC = 25°C, V_SKIM = 4.478 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_39_OP5_high

1. Messung: file = "mer_f_mertis_FM_40_1_Radiom_Calib_OP6_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 29.03 °C ---> 29.01 °C

* OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_40_2_Radiom_Calib_OP6_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = ? °C ---> 28.90 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_40_3_Radiom_Calib_OP6_TVC_low_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 28.99 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_40_4_Radiom_Calib_OP6_TVC_low_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 29.07 °C ---> 29.10 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_40_5_Radiom_Calib_OP6_TVC_low_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 29.20 °C ---> 29.23 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_40_6_Radiom_Calib_OP6_TVC_low_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 29.32 °C ---> 29.35 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

7. Messung: file = "mer_f_mertis_FM_40_7_Radiom_Calib_OP6_TVC_low_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 29.01°C ---> 29.01°C

15:17 Uhr: * T_Optics_Base_Plate = 29.37 °C
 * Ziel: T_Optics_Base_Plate = 32.10 °C
 => 15:17 Uhr: setze T_SET_HUBER = 11.9 °C (warten...)

23:05 Uhr: * T_Optics_Base_Plate = 32.46 °C (stabil)
 => 23:06 Uhr: setze T_SET_HUBER = 11.5 °C (warten...)

5.März.2013:

11:15 Uhr: * T_Optics_Base_Plate = 32.04 °C (stabil)

8. Messung: file = "mer_f_mertis_FM_40_8_Radiom_Calib_OP6_TVC_high_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 32.04 °C ---> ? °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_40_9_Radiom_Calib_OP6_TVC_high_Optris_BB-156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 31.73 °C ---> 31.72 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_40_10_Radiom_Calib_OP6_TVC_high_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 31.76 °C ---> 31.79 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_40_11_Radiom_Calib_OP6_TVC_high_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 31.61 °C ---> 31.63 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_40_12_Radiom_Calib_OP6_TVC_high_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 31.69 °C ---> 31.73 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_40_13_Radiom_Calib_OP6_TVC_high_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 31.85 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

5.März.2013 - Thomas Säuberlich

* Session-Name: "FM_41_Radiom_Calib_OP7_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP7 für wenigstens tiefe und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP7):

* [T_TEC = 35°C, V_SKIM = 4.469 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

* Messungen zeitgleich und im Wechsel mit FM_40_OP6_high

1. Messung: file = "mer_f_mertis_FM_41_1_Radiom_Calib_OP7_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 32.01 °C ---> 31.95 °C

* OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_41_2_Radiom_Calib_OP7_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 31.79 °C ---> 31.73 °C

* OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_41_3_Radiom_Calib_OP7_TVC_low_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 31.79 °C ---> 31.77 °C

* OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_41_4_Radiom_Calib_OP7_TVC_low_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 31.63 °C ---> 31.62 °C

* OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_41_5_Radiom_Calib_OP7_TVC_low_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 31.74 °C ---> 31.74 °C

* OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_41_6_Radiom_Calib_OP7_TVC_low_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 31.85 °C ---> 31.8 °C

* OPTRIS BB@427°C vorm KRS5-Fenster

7. Messung: existiert nicht

15:05 Uhr:

* T_Optics_Base_Plate = 31.88 °C

* T_TEC = 35°C

* Ziel: T_Optics_Base_Plate = 34.10 °C

=> 15:13 Uhr: setze T_SET_HUBER = 14.5 °C (warten...)

* DataSocket Crash -> Programm-Neustart

23:04 Uhr:

* T_Optics_Base_Plate = 33.90 °C (stabil)

=> 23:05 Uhr: setze T_SET_HUBER = 14.7 °C (warten...)

* DataSocket Crash -> Programm-Neustart

6.März.2013:

09:56 Uhr* T_Optics_Base_Plate = 34.11 °C (stabil)

* Arbeitspunkt (OP7):

* [T_TEC = 35°C, V_SKIM = 4.469 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

8. Messung: file = "mer_f_mertis_FM_41_8_Radiom_Calib_OP7_T41VC_high_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 34.11 °C ---> 34.11 °C

* OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_41_9_Radiom_Calib_OP7_TVC_high_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles

* T_Optics_Base_Plate = 34.10 °C ---> 34.11 °C

* OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_41_10_Radiom_Calib_OP7_TVC_high_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.11 °C ---> 34.12 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_41_11_Radiom_Calib_OP7_TVC_high_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.14 °C ---> 34.15 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_41_12_Radiom_Calib_OP7_TVC_high_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 34.19 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_41_13_Radiom_Calib_OP7_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 34.31 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_41_14_Radiom_Calib_OP7_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 34.11°C ---> 34.11°C

 6.März.2013 - Thomas Säuberlich

* Session-Name: "FM_42_Radiom_Calib_OP8_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP8 für wenigstens tiefe
 und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP8):

* [T_TEC = 35°C, V_SKIM = 4.480 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

1. Messung: file = "mer_f_mertis_FM_42_1_Radiom_Calib_OP8_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.02 °C ---> 34.03 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_42_2_Radiom_Calib_OP8_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.11 °C ---> 34.11 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_42_3_Radiom_Calib_OP8_TVC_low_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.11 °C ---> 34.14 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_42_4_Radiom_Calib_OP8_TVC_low_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.15 °C ---> ? °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_42_5_Radiom_Calib_OP8_TVC_low_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.19 °C ---> 34.22 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_42_6_Radiom_Calib_OP8_TVC_low_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 34.24 °C ---> ? °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

7. Messung: file = "mer_f_mertis_FM_42_7_Radiom_Calib_OP8_TVC_low_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300

* T_Optics_Base_Plate = 34.11°C ----> 34.09°C

15:37 Uhr: * T_Optics_Base_Plate = 34.31 °C
 * T_TEC = 35 °C
 * Ziel: T_Optics_Base_Plate = 36.00 °C
 => 15:37 Uhr: setze T_SET_HUBER = 16.6 °C (warten...)

22:02 Uhr: * T_Optics_Base_Plate = 35.96 °C (stabil)

6.März.2013:
 9:55 Uhr: * T_Optics_Base_Plate = 35.95°C (stabil)

* Arbeitspunkt (OP8):
 * [T_TEC = 35°C, V_SKIM = 4.480 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

8. Messung: file = "mer_f_mertis_FM_42_8_Radiom_Calib_OP8_TVC_high_Optris_BB27_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 35.95 °C ----> 35.96 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_42_9_Radiom_Calib_OP8_TVC_high_Optris_BB156_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 35.96 °C ----> 35.96 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_42_10_Radiom_Calib_OP8_TVC_high_Optris_BB239_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 35.97 °C ----> 35.98 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

11. Messung: file = "mer_f_mertis_FM_42_11_Radiom_Calib_OP8_TVC_high_Optris_BB308_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 36.02 °C ----> 36.03 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_42_12_Radiom_Calib_OP8_TVC_high_Optris_BB369_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 36.06 °C ----> 36.07 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_42_13_Radiom_Calib_OP8_TVC_high_Optris_BB427_at_Planet.tdms"
 * 10 Calib-Cycles
 * T_Optics_Base_Plate = 36.11 °C ----> 36.13 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_42_14_Radiom_Calib_OP8_TVC_high_Noise_BB300.tdms"
 * Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 35.96°C ----> 35.96°C

6.März.2013 - Thomas Säuberlich

* Session-Name: "FM_43_Radiom_Calib_OP9_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP9 für wenigstens tiefe und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP9):

* [T_TEC = 35°C, V_SKIM = 4.491 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

6.März.2013:

06:24 Uhr: * T_Optics_Base_Plate = 35.96°C (stabil) (=> Messung 7)
 9:55 Uhr: * T_Optics_Base_Plate = 35.95°C (stabil)

1. Messung: file = "mer_f_mertis_FM_43_1_Radiom_Calib_OP9_TVC_low_Optris_BB27_at_Planet.tdms"

- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 35.96 °C ---> 35.96 °C
 - * OPTRIS BB@27°C vorm KRS5-Fenster
2. Messung: file = "mer_f_mertis_FM_43_2_Radiom_Calib_OP9_TVC_low_Optris_BB156_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 35.96 °C ---> 35.97 °C
 - * OPTRIS BB@156°C vorm KRS5-Fenster
3. Messung: file = "mer_f_mertis_FM_43_3_Radiom_Calib_OP9_TVC_low_Optris_BB239_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 35.98 °C ---> 36.00 °C
 - * OPTRIS BB@239°C vorm KRS5-Fenster
4. Messung: file = "mer_f_mertis_FM_43_4_Radiom_Calib_OP9_TVC_low_Optris_BB308_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 36.03 °C ---> 36.05 °C
 - * OPTRIS BB@308°C vorm KRS5-Fenster
5. Messung: file = "mer_f_mertis_FM_43_5_Radiom_Calib_OP9_TVC_low_Optris_BB369_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 36.07 °C ---> 36.10 °C
 - * OPTRIS BB@369°C vorm KRS5-Fenster
6. Messung: file = "mer_f_mertis_FM_43_6_Radiom_Calib_OP9_TVC_low_Optris_BB427_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 36.13 °C ---> 36.16 °C
 - * OPTRIS BB@427°C vorm KRS5-Fenster
7. Messung: file = "mer_f_mertis_FM_43_7_Radiom_Calib_OP9_TVC_low_Noise_BB300.tdms"
- * Framerate 10 / s,
 - * Radiometer Repetition Factor = 8
 - * Messdauer 5 min
 - * POI @ BB300
 - * T_Optics_Base_Plate = 35.96 °C ---> 35.97 °C
-
- 14:11 Uhr:
- * T_Optics_Base_Plate = 36.21 °C
 - * T_TEC = 35 °C
 - * Ziel: T_Optics_Base_Plate = 37.80 °C
 - => 14:11 Uhr: setze T_SET_HUBER = 18.4 °C (warten...)
- 22:55 Uhr:
- * T_Optics_Base_Plate = 37.74 °C (stabil)
 - * Durchführung Messung 14
-
- 8.März.2013:
- 10:58 Uhr:
- * T_Optics_Base_Plate = 37.70 °C (stabil)
- * OP9 <=> [T_TEC = 35°C, V_SKIM = 4.491 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]
8. Messung: file = "mer_f_mertis_FM_43_8_Radiom_Calib_OP9_TVC_high_Optris_BB27_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 37.70 °C ---> 37.70 °C
 - * OPTRIS BB@27°C vorm KRS5-Fenster
9. Messung: file = "mer_f_mertis_FM_43_9_Radiom_Calib_OP9_TVC_high_Optris_BB156_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 37.66 °C ---> 37.65 °C
 - * OPTRIS BB@156°C vorm KRS5-Fenster
10. Messung: file = "mer_f_mertis_FM_43_10_Radiom_Calib_OP9_TVC_high_Optris_BB239_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 37.67 °C ---> 37.68 °C
 - * OPTRIS BB@239°C vorm KRS5-Fenster
11. Messung: file = "mer_f_mertis_FM_43_11_Radiom_Calib_OP9_TVC_high_Optris_BB308_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 37.72 °C ---> ? °C
 - * OPTRIS BB@308°C vorm KRS5-Fenster
12. Messung: file = "mer_f_mertis_FM_43_12_Radiom_Calib_OP9_TVC_high_Optris_BB369_at_Planet.tdms"
- * 10 Calib-Cycles
 - * T_Optics_Base_Plate = 37.80 °C ---> 37.81 °C
 - * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_43_13_Radiom_Calib_OP9_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 37.87 °C ---> 37.89 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_43_14_Radiom_Calib_OP9_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 37.74°C ---> 37.74°C

 8.März.2013 - Thomas Säuberlich

* Session-Name: "FM_44_Radiom_Calib_OP10_TVC"

* ZIEL:

* Radiometrische Kalibrierung bei OP10 für wenigstens tiefe
 und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* Arbeitspunkt (OP10):

* [T_TEC = 35°C, V_SKIM = 4.501 V, V_FID = 3.971 V, t_INT = 123 µs, No Oversampling]

1. Messung: file = "mer_f_mertis_FM_44_1_Radiom_Calib_OP10_TVC_low_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 37.70 °C ---> 37.71°C
 * OPTRIS BB@27°C vorm KRS5-Fenster

2. Messung: file = "mer_f_mertis_FM_44_2_Radiom_Calib_OP10_TVC_low_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 37.65 °C ---> 37.66 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

3. Messung: file = "mer_f_mertis_FM_44_3_Radiom_Calib_OP10_TVC_low_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> ? °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

4. Messung: file = "mer_f_mertis_FM_44_4_Radiom_Calib_OP10_TVC_low_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 37.78 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

5. Messung: file = "mer_f_mertis_FM_44_5_Radiom_Calib_OP10_TVC_low_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 37.81 °C ---> 37.85 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

6. Messung: file = "mer_f_mertis_FM_44_6_Radiom_Calib_OP10_TVC_low_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 37.89 °C ---> 37.94 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

7. Messung: file = "mer_f_mertis_FM_44_7_Radiom_Calib_OP10_TVC_low_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 37.71°C ---> 37.71°C

14:18 Uhr:

* T_Optics_Base_Plate = 37.96 °C
 * OP10, T_TEC = 35 °C
 * Ziel: T_Optics_Base_Plate = 39.90 °C
 => setze T_SET_HUBER = 20.6 °C (warten...)

10.März.2013:

17:50: * DataSocket crash
 * T_Optics_Base_Plate = 39.87 °C

04:30 Uhr:

* Windows Crash, Rechner hat sich selbst neu gestartet

10:23 Uhr: * T_Optics_Base_Plate = 39.89 °C

8. Messung: file = "mer_f_mertis_FM_44_8_Radiom_Calib_OP10_TVC_high_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.89 °C ---> 39.89 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

9. Messung: file = "mer_f_mertis_FM_44_9_Radiom_Calib_OP10_TVC_high_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.99 °C ---> 39.99 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

10. Messung: file = "mer_f_mertis_FM_44_10_Radiom_Calib_OP10_TVC_high_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.98 °C ---> 39.98 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

* Rechner-Neustart wegen stehengebliebender EGSE,

* Messungen 8,9,10 werden später wiederholt, da keine Bilder in den entspr. Messfiles enthalten sind

11. Messung: file = "mer_f_mertis_FM_44_11_Radiom_Calib_OP10_TVC_high_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.92 °C ---> ? °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

12. Messung: file = "mer_f_mertis_FM_44_12_Radiom_Calib_OP10_TVC_high_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.95 °C ---> 39.97 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

13. Messung: file = "mer_f_mertis_FM_44_13_Radiom_Calib_OP10_TVC_high_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = ? °C ---> 40.01 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

14. Messung: file = "mer_f_mertis_FM_44_14_Radiom_Calib_OP10_TVC_high_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 39.87 °C ---> 39.87 °C

19:31 Uhr: * T_Optics_Base_Plate = 39.89 °C

* OP10, T_TEC = 35 °C

* Ziel: T_Optics_Base_Plate = 38.80 °C

=> setze T_SET_HUBER = 19.5 °C (warten...)

12.März.2013:

=> setze T_SET_HUBER = 19.5 °C (warten...)

* DEBUG: neuen Spacewire-USB Server mit Error-Counter verwendet

9:45 Uhr: * T_Optics_Base_Plate = 38.80 °C (stabil)

15. Messung: file = "mer_f_mertis_FM_44_15_Radiom_Calib_OP10_TVC_medium_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.80 °C ---> 38.80 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

16. Messung: file = "mer_f_mertis_FM_44_16_Radiom_Calib_OP10_TVC_medium_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.80 °C ---> 38.80 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

17. Messung: file = "mer_f_mertis_FM_44_17_Radiom_Calib_OP10_TVC_medium_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.81 °C ---> 38.81 °C

* OPTRIS BB@239°C vorm KRS5-Fenster

18. Messung: file = "mer_f_mertis_FM_44_18_Radiom_Calib_OP10_TVC_medium_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.83 °C ---> 38.84 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

19. Messung: file = "mer_f_mertis_FM_44_19_Radiom_Calib_OP10_TVC_medium_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.85 °C ---> 38.86 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

20. Messung: file = "mer_f_mertis_FM_44_20_Radiom_Calib_OP10_TVC_medium_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.89 °C ---> 38.91 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

21. Messung: file = "mer_f_mertis_FM_44_21_Radiom_Calib_OP10_TVC_medium_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 38.79°C ---> 38.79°C

23:03 Uhr: * T_Optics_Base_Plate = 38.77 °C
 * OP10, T_TEC = 35 °C
 * Ziel: T_Optics_Base_Plate = 38.21 °C
 => setze T_SET_HUBER = 19.0 °C (warten...)

14.März.2013:

10:17 Uhr: * T_Optics_Base_Plate = 38.29 °C

22. Messung: file = "mer_f_mertis_FM_44_22_Radiom_Calib_OP10_TVC_low2_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.29 °C ---> 38.29 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

23. Messung: file = "mer_f_mertis_FM_44_23_Radiom_Calib_OP10_TVC_low2_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.29 °C ---> 38.30 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

24. Messung: file = "mer_f_mertis_FM_44_24_Radiom_Calib_OP10_TVC_low2_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.30 °C ---> 38.31 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

25. Messung: file = "mer_f_mertis_FM_44_25_Radiom_Calib_OP10_TVC_low2_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.35 °C ---> 38.37 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

26. Messung: file = "mer_f_mertis_FM_44_26_Radiom_Calib_OP10_TVC_low2_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 38.39 °C ---> 38.41 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

27. Messung: file = "mer_f_mertis_FM_44_27_Radiom_Calib_OP10_TVC_low2_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.42°C ---> 38.44 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

28. Messung: file = "mer_f_mertis_FM_44_28_Radiom_Calib_OP10_TVC_low2_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 38.29°C ---> 38.27°C

21:49 Uhr: * T_Optics_Base_Plate = 38.27 °C
 * OP10, T_TEC = 35 °C
 * Ziel: T_Optics_Base_Plate = 39.35 °C
 => setze T_SET_HUBER = 20.0 °C (warten...)

15.März.2013:

* DataSocket-Crash über Nacht => Rechner neu gestartet

10:52: * T_Optics_Base_Plate = 39.23 °C (stabil)

29. Messung: file = "mer_f_mertis_FM_44_29_Radiom_Calib_OP10_TVC_medium2_Optris_BB27_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.23 °C ---> 39.21 °C
 * OPTRIS BB@27°C vorm KRS5-Fenster

30. Messung: file = "mer_f_mertis_FM_44_30_Radiom_Calib_OP10_TVC_medium2_Optris_BB156_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.20 °C ---> 39.20 °C
 * OPTRIS BB@156°C vorm KRS5-Fenster

31. Messung: file = "mer_f_mertis_FM_44_31_Radiom_Calib_OP10_TVC_medium2_Optris_BB239_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.21 °C ---> 39.22 °C
 * OPTRIS BB@239°C vorm KRS5-Fenster

32. Messung: file = "mer_f_mertis_FM_44_32_Radiom_Calib_OP10_TVC_medium2_Optris_BB308_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.24 °C ---> 39.26 °C
 * OPTRIS BB@308°C vorm KRS5-Fenster

33. Messung: file = "mer_f_mertis_FM_44_33_Radiom_Calib_OP10_TVC_medium2_Optris_BB369_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.30 °C ---> 39.32 °C
 * OPTRIS BB@369°C vorm KRS5-Fenster

34. Messung: file = "mer_f_mertis_FM_44_34_Radiom_Calib_OP10_TVC_medium2_Optris_BB427_at_Planet.tdms"

* 10 Calib-Cycles
 * T_Optics_Base_Plate = 39.34 °C ---> 39.37 °C
 * OPTRIS BB@427°C vorm KRS5-Fenster

35. Messung: file = "mer_f_mertis_FM_44_35_Radiom_Calib_OP10_TVC_medium2_Noise_BB300.tdms"

* Framerate 10 / s,
 * Radiometer Repetition Factor = 8
 * Messdauer 5 min
 * POI @ BB300
 * T_Optics_Base_Plate = 39.23 °C ---> 39.23 °C

18.März.2013 - Thomas Säuberlich

* Session-Name: "FM_45_Radiom_Calib_Verification"

* ZIEL:

* Radiometrische Kalibrierung bei OP10 für wenigstens tiefe und hohe Temperatur innerhalb des Arbeitsbereiches

* Messungen unter Vakuumbedingungen

* alle Arbeitspunkte sollen durchfahren werden im Auto-OP-Mode

* BB OPTRIS @ 280°C

* Messung im "ScienceMode":

OPERATION:

* "Science Repetition Rate (ms)"	= 10000 ms
* "Calibration Period (sec)"	= 300 s
* "TIS Background Rate #"	= 10
* "Pointing Mode"	= Move
* "Compression Mode"	= No Compression
* "Pixel Binning"	= 1x1
* "Min Sensor Head Temp. (°C)"	= 10
* "Calibration cycle invert"	unchecked
* "PAR_TIR_REPETITION_FACTOR"	= 1
* "TIS window size"	= 160x120 pixel
* "TIS Period (sec)"	= 100
* "TIR Period (sec)"	= 100
* BOL, TEC, RAD, POI, BB700	= ON, restliche units OFF
* "HK Period (msec)"	= 300

FUNCTIONAL PARAMETERS:

* "TIS Oversampling" = NO
 * "TIR Oversampling" = YES
 * "POI Move Mode" = with_Possensors
 * "TIS DATA Processing Mode" = Nominal
 * "Bias volt setting mode" = auto !!!!!

* 1. Messung: file = "mer_f_mertis_FM_45_1_TVC_PLANETView_OPTRIS_BB280_HUBER_20_0_to_-22_0_degC.tdms"

* Huber T_IST_HUBER = 20.0°C
 * 1 Bild / 10s
 * T_OPTRIS_BB = 280°C
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
 * HK Period = 10s
 * 10:52 Uhr:

* Messung Start
 * Arbeitspunkt (OP10) @ Start, dann Automode
 * [T_TEC = 35°C, V_SKIM = 4.501 V, V_FID= 3.971 V, t_INT = 123 µs, No Oversampling]
 * T_SET_HUBER_START = 20°C
 * T_Optics_Base_Plate = 39.27°C(leicht steigend wegen OPTRIS BB @ 280°C)

* 12:19 Uhr: T_Optics_Base_Plate = 38.53°C (fallend), Auto-OP=10
 * 13:31 Uhr: T_Optics_Base_Plate = 38.15°C (fallend), Auto-OP=10
 * 14:17 Uhr: T_Optics_Base_Plate = 38.04°C (fallend), Auto-OP=10
 * 14:47 Uhr: T_Optics_Base_Plate = 38.00°C (fallend), Auto-OP=10

* 14:52 Uhr:
 * T_SET_HUBER_END = -22.0°C
 * T_Optics_Base_Plate = 38.53°C (fallend), Auto-OP=10

* 16:03 Uhr: T_Optics_Base_Plate = 21.89°C (fallend), Auto-OP=4
 * 19:11 Uhr: T_Optics_Base_Plate = 1.37°C (fallend), Auto-OP=1
 * 21:24 Uhr: T_Optics_Base_Plate = -0.19°C (leicht fallend), Auto-OP=1

* 21:27 Uhr: T_Optics_Base_Plate = -0.21°C (leicht fallend), Auto-OP=1
 * Messung Stop

* => "Vor-Auswertung" ergibt, dass Frame #4894 ein Offset-Ausreißer ist

* Bild #4894:
 * liegt exakt am Umschaltzeitpunkt zwischen OP7->OP6
 * POI_POS = 0 (PLANET @ OPTRIS BB@280°C)
 * Ref-Avg bei ca. = 3260 DN
 * T_Optics_Base_Plate = 31.51 °C
 * hk_temp_bb3 = 33.42 °C
 * OP7: OP_avg_img_ref_low = 3882 DN (31.52°C)
 * OP_avg_img_ref_high = 8365 DN (34.65°C)

* Bild #4893 vs. #4894 vs. #4895

	Img-Idx	Ref-Avg[DN]	POI-POS	OP#	T_TEC[°C]	
V_SKIM[V]	Comment					
	4893	5656	SPACE-VIEW (1)	7	34.994	4.469
	4894	3260	PLANET-VIEW(0)	6 7	34.994	4.478
(?) Ausreißer	4895	9287	PLANET-VIEW(0)	6	26.090	4.210

=> Vermutung: Img#4894 zeigt Anfang der Einschwingphase OP7 nach OP6, denn:

* T_BOL_CHIP = 35°C => T_BOL_CHIP = 25°C
 * V_SKIM = 4.469 V => V_SKIM = 4.478 V
 * POI @ SPACE #4893 => POI @ Planet #4894

* zu niedrigerer Bild-Ref-Offset, da Änderung V_Skim sofort und Änderung T_BOL_CHIP relativ langsam wirkt

* POI POS@ #4894 ist @ PLANET-View, mit dem größten Signalhub vgl. mit anderen Viewports

19.März.2013:

* 08:44 Uhr: T_Optics_Base_Plate = -0.48°C (stabil), Auto-OP=1

* 2. Messung: file = "mer_f_mertis_FM_45_2_TVC_PLANETView_OPTRIS_BB280_HUBER_-22_0_SINE_2K.tdms"

* Huber T_IST_HUBER = -22.0°C

- * 1 Bild / 10s
- * T_OTRIS_BB = 280°C
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
- * HK Period = 10s
- * 17:07 Uhr:
- * alles hing, Rechner neu gestartet
- * Huber mittels IDL-Programm HUBER_CONTROL (Laptop) so angesteuert, dass über Mittelwert von -22°C ein Sinus mit einer Amplitude von 2K und einer periode von 140 min gelegt wird (Simulation Mercury cold case). Sinus etwa 10 min nach Beginn der Aufzeichnung gestartet.

- * Messung Start
- * Uhren von PC und Laptop synchronisiert
- * Arbeitspunkt OP1, Automode
- * OP1 = [T_TEC = 5°C, V_SKIM = 4.397 V, V_FID= 3.971 V, t_INT = 123 µs, No Oversampling]

- * T_SET_HUBER_START = -22°C
- * T_Optics_Base_Plate = -0.3 °C
- * P = 2.4 10-5 mbar

20.März.2013:

* 3. Messung: file = "mer_f_mertis_FM_45_3_TVC_PLANETView_OTRIS_BB280_HUBER_-22_0_to_22_0_degC.tdms"

- * Huber T_IST_HUBER = -22.0°C
- * T_OTRIS_BB = 280°C
- * 1 Bild / 10s
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
- * HK Period = 10s
- * 10:18 Uhr:
- * Messung Start,
- * OP-Automode
- * init. Arbeitsbereich OP1 = [T_TEC = 5°C, V_SKIM = 4.397 V, V_FID= 3.971 V, t_INT = 123 µs, No

Oversampling]

- * T_SET_HUBER_START = -22°C
- * T_Optics_Base_Plate = -0.48 °C

- * 10:43 Uhr:
- * T_SET_HUBER_END = 22.0°C
- * T_Optics_Base_Plate = -0.48°C (stabil), Auto-OP=1
- * 11:05 Uhr:T_Optics_Base_Plate = 2.24 °C (steigend), Auto-OP=1
- * 11:34 Uhr:T_Optics_Base_Plate = 11.87 °C (steigend), Auto-OP=2
- * 12:09 Uhr:T_Optics_Base_Plate = 22.25 °C (steigend), Auto-OP=4
- * 19:29 Uhr:T_Optics_Base_Plate = 39.80 °C (steigend), Auto-OP=10
- * Messung Stop

* => Auswertung ergibt, dass bestimmte Frames, die während der OP-Umschaltungen aufgenommen wurden, geskippt werden müssen,

da sie entweder/oder/und:

- * Ref-Offsets außerhalb der DN-Intervalle der OP-Definitionen sind
- * T_TEC noch nicht stabil ist

* => es ist empfehlenswert, die OP-Umschaltung primär am Bild-Ref-Offset auszurichten und zu garantieren, dass Ref-Offset und die T_TEC-Temperatur

den Definitionen der OP-Bereiche entsprechen und dass zugleich die Chip-Temperatur hinreichend stabil ist. Erst dann sind die gewonnenen

Bilddaten für eine Umrechnung in Radianzbilder geeignet, bzw. kompatibel zu den Kalibrierungsdaten.

* 4. Messung: file = "mer_f_mertis_FM_45_1_TVC_PLANETView_OTRIS_BB280_HUBER_22_0_to_-22_0_degC.tdms"

- * Huber T_IST_HUBER = 20.0°C
- * 1 Bild / 10s
- * T_OTRIS_BB = 280°C
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
- * HK Period = 10s
- * 13:37 Uhr:
- * Messung Start
- * Arbeitspunkt (OP10) @ Start, dann Automode
- * [T_TEC = 35°C, V_SKIM = 4.501 V, V_FID= 3.971 V, t_INT = 123 µs, No Oversampling]
- * T_SET_HUBER_START = 22°C
- * T_Optics_Base_Plate = 39.85°C(stabil)

- * 14:30 Uhr:
- * T_SET_HUBER = -22.0°C
- * T_Optics_Base_Plate = ?°C (), Auto-OP=10

* 22.März.2013:

* 00:50 Uhr:
 * T_Optics_Base_Plate = -0.40°C (), Auto-OP=1
 * Messung stop

* 10:04 Uhr:
 * T_Optics_Base_Plate = -0.43°C (), Auto-OP=1

* 5. Messung: file = "mer_f_mertis_FM_45_5_TVC_PLANETView_OPTRIS_BB280_HUBER_-22_0_to_22_0_degC.tdms"

* Huber T_IST_HUBER = -22.0°C
 * 1 Bild / 10s
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
 * T_OPTRIS_BB = 280°C
 * HK Period = 10s

* 10:06 Uhr:
 * Messung Start
 * OP-Automode
 * init. Arbeitsbereich OP1 = [T_TEC = 5°C, V_SKIM = 4.397 V, V_FID= 3.971 V, t_INT = 123 µs, No

Oversampling]

* T_SET_HUBER_START = -22°C
 * T_Optics_Base_Plate = -0.43 °C (stabil)

* 11:10 Uhr:
 * T_SET_HUBER_END = 22.0°C
 * T_Optics_Base_Plate = ?°C, Auto-OP=1

* 11:27 Uhr:T_Optics_Base_Plate = 1.84°C (steigend),Auto-OP=1
 * 11:41 Uhr:T_Optics_Base_Plate = 6.00°C (steigend),Auto-OP=1

23.03.2013, 07:50 Uhr:

* Messung Stop
 * T_Optics_Base_Plate = 39.85°C (stabil), Auto-OP=10

25.03.2013

* 6. Messung: file = "mer_f_mertis_FM_45_6_TVC_PLANETView_OPTRIS_BB280_HUBER_P22_SINE_5K.tdms"

* Huber T_IST_HUBER = +22.0°C
 * 1 Bild / 10s
 * T_OPTRIS_BB = 280°C
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
 * HK Period = 10s
 * Huber mittels IDL-Programm HUBER_CONTROL (Laptop) so angesteuert, dass über Mittelwert von +22°C ein

Sinus

mit einer Amplitude von 5K und einer periode von 135 min gelegt wird (Simulation Mercury hot case).
 Sinus etwa 10 min nach Beginn der Aufzeichnung gestartet.

* Messung Start
 * Arbeitspunkt ?, Automode
 * T_SET_HUBER_START = +22°C
 * T_Optics_Base_Plate = 38.81 °C
 * P = 2.0 10-5 mbar

26.03.2013

* 7. Messung: file = "mer_f_mertis_FM_45_7_TVC_PLANETView_OPTRIS_BB280_HUBER_P06_SINE_6K.tdms"

* Huber T_IST_HUBER = +6.0°C
 * 1 Bild / 10s
 * T_OPTRIS_BB = 280°C
 * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
 * HK Period = 10s
 * Huber mittels IDL-Programm HUBER_CONTROL (Laptop) so angesteuert, dass über Mittelwert von +6°C ein Sinus
 mit einer Amplitude von 6K und einer periode von 140 min gelegt wird (Simulation Mercury hot case).
 Sinus etwa 10 min nach Beginn der Aufzeichnung gestartet.

* Messung Start
 * Arbeitspunkt ?, Automode
 * T_SET_HUBER_START = +6°C
 * T_Optics_Base_Plate = 24.83 °C
 * P = 2.1 10-5 mbar

* 8. Messung: file = "mer_f_mertis_FM_45_8_TVC_PLANETView_OPTRIS_BB80_HUBER_P06_SINE_6K.tdms"

* Huber T_IST_HUBER = +6.0°C
 * 1 Bild / 10s

- * T_OTRIS_BB = 80°C
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
- * HK Period = 10s
- * Huber mittels IDL-Programm HUBER_CONTROL (Laptop) so angesteuert, dass über Mittelwert von +6°C ein Sinus mit einer Amplitude von 6K und einer periode von 140 min gelegt wird (Simulation Mercury hot case). Sinus etwa 10 min nach Beginn der Aufzeichnung gestartet.

- * Messung Start
- * Arbeitspunkt ?, Automode
- * T_SET_HUBER_START = +6°C
- * T_Optics_Base_Plate = ? °C
- * P = 2.1 10-5 mbar

28.03.2013

* 9. Messung: file = "mer_f_mertis_FM_45_9_TVC_PLANETView_OTRIS_BB120_HUBER_P06_SINE_6K.tdms"

- * Huber T_IST_HUBER = +6.0°C
- * 1 Bild / 10s
- * T_OTRIS_BB = 120°C
- * Calib. Cycle mit BB300,SpaceView,BB700 alle 300s = 5 min
- * HK Period = 10s
- * Huber mittels IDL-Programm HUBER_CONTROL (Laptop) so angesteuert, dass über Mittelwert von +6°C ein Sinus mit einer Amplitude von 6K und einer periode von 140 min gelegt wird (Simulation Mercury hot case). Sinus etwa 10 min nach Beginn der Aufzeichnung gestartet.

- * Messung Start
- * Arbeitspunkt ?, Automode
- * T_SET_HUBER_START = +6°C
- * T_Optics_Base_Plate = 24.44 °C
- * P = 2.1 10-5 mbar