NRT M-factor delivery document 02 Nov 2009

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02 Nov 2009

1 Content

This document describes the m–factor dataset, produced by ife/Bremen according to m–factor tech-note [1]. M–factors for the calibration light path (M_CAL), the limb light path (M_DL) and the nadir light path (M_DN) to the science detectors are included. All other m–factors are set to the default value of 1.0, i. e. have no effect. The m–factors are delivered as auxiliary files as defined in the SCIAMACHY IODD [2]. M–factor version is 06.01.

This document describes a delivery within the near real time (NRT) setup of the Envisat ground segment. A delivery is foreseen every 7 days, it contains the calculated data for the past 7 days (including the current day) and an extrapolation for the next 7 days. In nominal case, the extrapolated m–factors will not be used. They are available in case of an early start of the level 1–2 processing or an delay in the m–factor delivery. The current package contains m–factors for:

- Calculated: 27 Oct 2009– 02 Nov 2009
- Prediction: 03 Nov 2009– 09 Nov 2009

Note: If there is no appropriate monitoring measurement for the delivery day available at the time of calculation, also the nominal calculated m–factors may contain predicted values. Especially for M_DN this will be the case, as the corresponding measurement is performed only every 3 days.

2 Delivered files

Table 1 gives the MD5 sums (md5 text mode) [3] and the names of the delivered m-factor files.

Table 2 gives information, how the file content is calculated: Based on actual measurements (*meas.*), an interpolated m–factor (*interp.*) or a predicted, i. e. extrapolated m–factor value (*pred.*) for three light paths.

Table 1: MD5 sum and filename of the delivered m-factor files.

md5-sum	m-factor auxiliary file
6fd7fbb3454e8ebe1d0cdaf27052fbf3	SCI_MF1_AXNIFE20091102_225423_20091027_181641_20091029_181641
8c845a332065e5cdf6b825d1ab02ed0b	SCI_MF1_AXNIFE20091102_225423_20091028_192540_20091030_192540
42663aa56a1e5226ff21756bb1d88ea2	SCI_MF1_AXNIFE20091102_225423_20091029_185403_20091031_185403
126ed53a2f0b079395c95ef1307b41b2	SCI_MF1_AXNIFE20091102_225423_20091030_182226_20091101_182226
232be63be00e7df86f3d1c2eed04f3d9	SCI_MF1_AXNIFE20091102_225423_20091031_193125_20091102_193125
cd00010e1b0174f48c76d492aa284034	SCI_MF1_AXNIFE20091102_225423_20091101_185948_20091103_185948
7efdbd41e23c9c78a068feaa078e9f9e	SCI_MF1_AXNIFE20091102_225423_20091102_182811_20091104_182811
9cce9339410825867b12078065b89bac	SCI_MF1_AXNIFE20091102_225423_20091103_193710_20091105_193710
041137a8dd749bd7074f23c867d8b070	SCI_MF1_AXNIFE20091102_225423_20091104_190533_20091106_190533
2192cf2c5df3a5ab3096400b5c0bbb51	SCI_MF1_AXNIFE20091102_225423_20091105_183356_20091107_183356
934d830fe649aa8571ce56b98935ccc5	SCI_MF1_AXNIFE20091102_225423_20091106_194255_20091108_194255
f299d33af82b22b421bfe7f5300974fd	SCI_MF1_AXNIFE20091102_225423_20091107_191118_20091109_191118
20f10576b565a7a088ccd092c04dbeae	SCI_MF1_AXNIFE20091102_225423_20091108_183941_20091110_183941
43aa47f50b5e3e7b7c2064e0804edc50	SCI_MF1_AXNIFE20091102_225423_20091109_194840_20091207_194840

Table 2: Source information for the individual m–factors of the delivery set.

validity identifier	M_CAL	M_DL	M_DN
20091027_181641_20091029_181641	meas.	meas.	meas.
20091028_192540_20091030_192540	meas.	meas.	interp.
20091029_185403_20091031_185403	meas.	meas.	interp.
20091030_182226_20091101_182226	meas.	meas.	interp.
20091031_193125_20091102_193125	meas.	meas.	meas.
20091101_185948_20091103_185948	meas.	meas.	meas.
20091102_182811_20091104_182811	pred.	pred.	pred.
20091103_193710_20091105_193710	pred.	pred.	pred.
20091104_190533_20091106_190533	pred.	pred.	pred.
20091105_183356_20091107_183356	pred.	pred.	pred.
20091106_194255_20091108_194255	pred.	pred.	pred.
20091107_191118_20091109_191118	pred.	pred.	pred.
20091108_183941_20091110_183941	pred.	pred.	pred.
20091109_194840_20091207_194840	pred.	pred.	pred.

3 Content check

M–factors describe the degradation of the instrument and are used to compensate for it in the radiometric calibration. Fast changes with time are not expected, i. e. the ratio $M_{ratio,t}$ of m–factors M_t this delivery to the m–factor M_{t_0} of the previous delivery day should be close to 1. The ratio $M_{ratio,t}$ and its reciprocal value should not exceed a

Table 3: Detector pixels used for the calculations described in this document. SCIAMACHY has 8 channels with 1024 pixels per channel. The pixel range is given as the first and last pixel in each channel. For channel 2, the pixel number is given in wavelength order, i. e. the pixel numbers are already reversed.

channel	1	2	3	4	5	6	7	8
pixel	197	1140	2131	3117	4151	5226	6154	7178
range	784	1859	2943	3925	4863	5914	7157	8181

Table 4: Content check results.

	max. ratio (ch. 6/7: median)			mean ratio				
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN	limit	status
1	1.0085	1.0187	1.0201	1.0022	1.0067	1.0050	1.0400	OK
2	1.0026	1.0076	1.0062	1.0009	1.0028	1.0020	1.0200	OK
3	1.0007	1.0019	1.0024	1.0000	1.0002	1.0005	1.0100	OK
4	1.0003	1.0003	1.0021	1.0000	1.0000	1.0006	1.0100	OK
5	1.0010	1.0011	1.0018	0.9999	1.0000	1.0002	1.0120	OK
6	1.0025	1.0017	1.0025	1.0008	1.0009	1.0004	1.0100	OK
7	1.0009	1.0018	1.0028	–	–	–	1.0070	OK
8	1.0021	1.0010	1.0007	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

This limit is defined for each channel. The limits are derived from a time-series of deliveries simulated for 2007 [1]. For channel 1 to 6, each individual pixel for each dataset has to meet the criteria. Channel 7 and 8 are the infrared detectors with a varying number of bad or dead pixels with unpredictable behavior. A criterion for each pixel is not applicable, therefore a median over the channel is used as $M_{ratio,t}$ and has to meet the criteria. Blind pixels, the overlap regions and channel 6+ are excluded from the calculations, see table 3.

The previous delivery day t_0 is 26 Oct 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091026_225459_20091026_184818_20091028_184818` .

Table 4 summarizes the results for this delivery. Also the settings for the limit are given. For information only, also the mean ratio is given. *OK* in the last column means, that the criteria is fulfilled for the channel.

This delivery is within all limits and can be used.

4 Visualization of content check

Figure 1 shows the ratio $M_{ratio,t}$ for all delivered m–factors for each channel. The grey boxes visualize the maximum ratio allowed.

References

[1] Bramstedt, K, Calculation of SCIAMACHY M-Factors, *Technical note*, IFE-SCIA-TN-2007-01-CalcMFactor, Issue 1, ife Bremen, 2008.

[2] Balzer, W, and Slijkhus, S, *Technical document*, SCIAMACHY Level 0 to 1b Processing Input / Output Data Definition, ENV-TN-DLR-SCIA-0005, Issue 5, DLR Oberpfaffenhofen, 2000.

[3] RFC 1321 - The MD5 Message-Digest Algorithm, *Internet RFC/STD/FYI/BCP Archives*, 1992

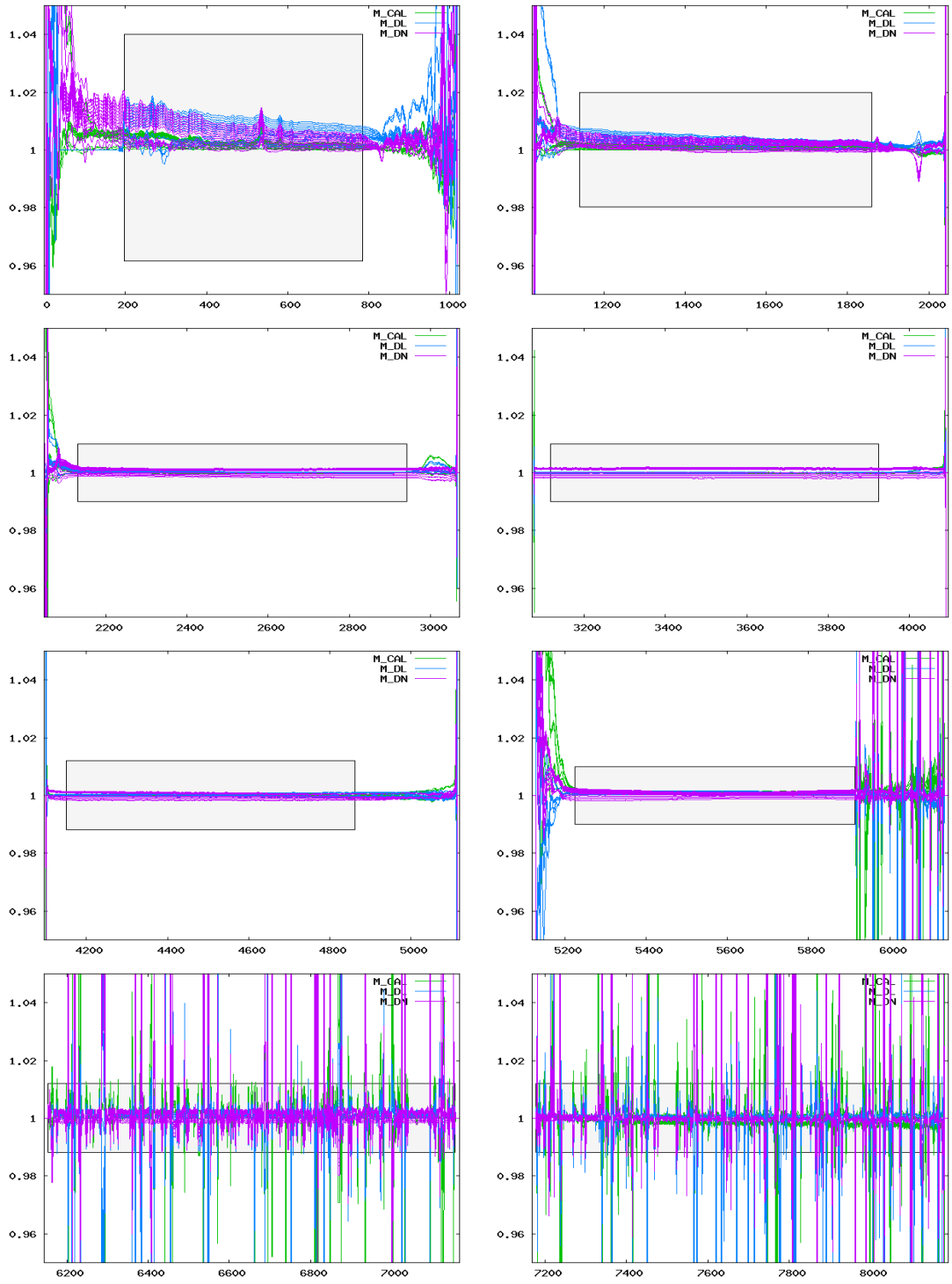

Figure 1: Ratio of delivered m-factors (27 Oct 2009– 09 Nov 2009) to the corresponding m-factor of the previous delivery day (26 Oct 2009). The grey boxes visualize the maximum ratio allowed.