NRT M-factor delivery document 03 May 2010

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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 07.01.

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 Apr 2010– 03 May 2010
- Prediction: 04 May 2010– 10 May 2010

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
da8ac7c325c4eb3c97e22a66b295103a	SCI_MF1_AXNIFE20100504_034244_20100427_193710_20100429_193710
7ea9a3d4f6ec82c02f358fffd807dfbe	SCI_MF1_AXNIFE20100504_034244_20100428_190533_20100430_190533
9b534c78cc1494a03385e9996685554c	SCI_MF1_AXNIFE20100504_034244_20100429_183356_20100501_183356
9769543871218ba298e0140a094fb194	SCI_MF1_AXNIFE20100504_034244_20100430_194255_20100502_194255
386f312f663e44ed1c0f8fe7d2eca2dc	SCI_MF1_AXNIFE20100504_034244_20100501_191118_20100503_191118
3b5a7993c6f6f7c61c2acbf75eca0e20	SCI_MF1_AXNIFE20100504_034244_20100502_183941_20100504_183941
7bcee91e479bbac58a251d317c002ab3	SCI_MF1_AXNIFE20100504_034244_20100503_194840_20100505_194840
0f661fb979c0a41b6fb5d64ae058ebe2	SCI_MF1_AXNIFE20100504_034244_20100504_191703_20100506_191703
8c15403eb006e9fe2711c14cf409dae9	SCI_MF1_AXNIFE20100504_034244_20100505_184526_20100507_184526
1b71dc7bf54b6f6cea1a9ac24d9d1e33	SCI_MF1_AXNIFE20100504_034244_20100506_181349_20100508_181349
271e7ec1d298c2bf75f607788f4db260	SCI_MF1_AXNIFE20100504_034244_20100507_192247_20100509_192247
04ae70addc5ef3cf7b24ea91e92bff46	SCI_MF1_AXNIFE20100504_034244_20100508_185110_20100510_185110
8c7fb7c3e53eef412e1878b5a3ea11dc	SCI_MF1_AXNIFE20100504_034244_20100509_181933_20100511_181933
c6d0b20cc2077736f769993b865e6a52	SCI_MF1_AXNIFE20100504_034244_20100510_192832_20100607_192832

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

validity identifier	M_CAL	M_DL	M_DN
20100427_193710_20100429_193710	meas.	meas.	interp.
20100428_190533_20100430_190533	meas.	meas.	meas.
20100429_183356_20100501_183356	meas.	meas.	interp.
20100430_194255_20100502_194255	meas.	meas.	interp.
20100501_191118_20100503_191118	meas.	meas.	interp.
20100502_183941_20100504_183941	meas.	meas.	meas.
20100503_194840_20100505_194840	meas.	meas.	pred.
20100504_191703_20100506_191703	pred.	pred.	pred.
20100505_184526_20100507_184526	pred.	pred.	pred.
20100506_181349_20100508_181349	pred.	pred.	pred.
20100507_192247_20100509_192247	pred.	pred.	pred.
20100508_185110_20100510_185110	pred.	pred.	pred.
20100509_181933_20100511_181933	pred.	pred.	pred.
20100510_192832_20100607_192832	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	1.0169	1.0107	1.0248	0.9987	1.0035	1.0097	1.0400	OK
2	1.0012	1.0050	1.0129	0.9998	1.0019	1.0047	1.0200	OK
3	1.0010	1.0016	1.0049	1.0000	1.0004	1.0005	1.0100	OK
4	1.0012	1.0012	1.0047	1.0004	1.0001	0.9994	1.0100	OK
5	1.0014	1.0027	1.0040	1.0002	0.9995	0.9992	1.0120	OK
6	1.0031	1.0014	1.0047	1.0012	0.9999	0.9992	1.0100	OK
7	1.0011	1.0011	1.0043	–	–	–	1.0070	OK
8	1.0027	1.0053	1.0047	–	–	–	1.0120	OK

certain limit l:

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

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 Apr 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100427_034224_20100426_182811_20100428_182811` .

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

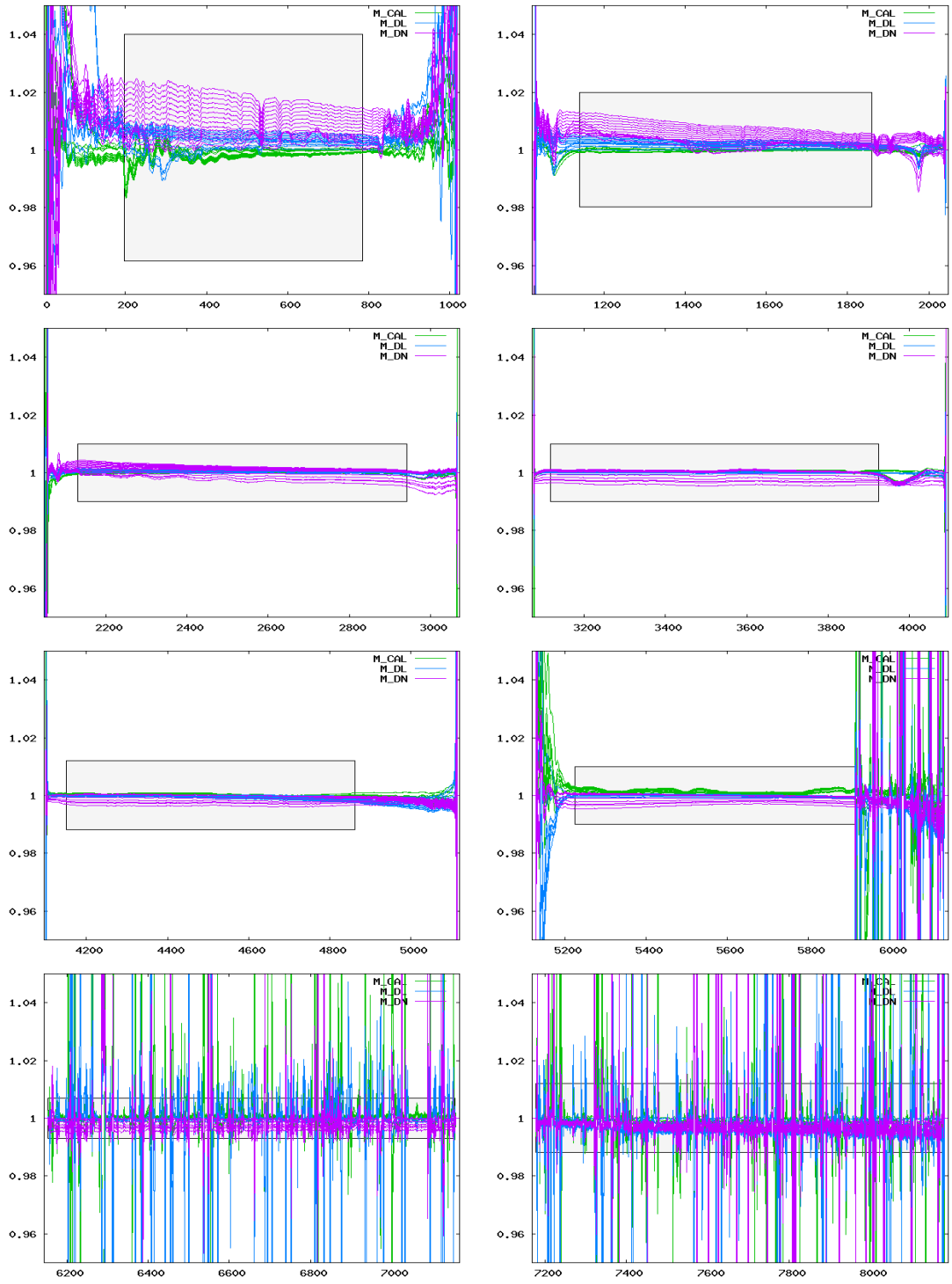

Figure 1: Ratio of delivered m-factors (27 Apr 2010– 10 May 2010) to the corresponding m-factor of the previous delivery day (26 Apr 2010). The grey boxes visualize the maximum ratio allowed.