NRT M-factor delivery document 02 May 2011

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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: 26 Apr 2011– 02 May 2011
- Prediction: 03 May 2011– 09 May 2011

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
49bb42866320b79f8f349d0795577a38	SCI_MF1_AXNIFE20110503_051904_20110426_193139_20110428_193139
fed48d656fee8151a977f1d62fd79a49	SCI_MF1_AXNIFE20110503_051904_20110427_185453_20110429_185453
287b50e8c02489aea9df0c3f4910d2ed	SCI_MF1_AXNIFE20110503_051904_20110428_181808_20110430_181808
2c268b84e0f082df2d66d23d917d9a7c	SCI_MF1_AXNIFE20110503_051904_20110429_192136_20110501_192136
d1c7a4aa93ec73219e04183bb7cbf424	SCI_MF1_AXNIFE20110503_051904_20110430_184451_20110502_184451
57f8cad8d5bbe4e8dbe32daa605ef67b	SCI_MF1_AXNIFE20110503_051904_20110501_180805_20110503_180805
054ea765658767247e7ce6ec3e2891a9	SCI_MF1_AXNIFE20110503_051904_20110502_191134_20110504_191134
dc6997de99a61efdc255d52207e41720	SCI_MF1_AXNIFE20110503_051904_20110503_183448_20110505_183448
c56aba9c79cf257e34e144ee26653b63	SCI_MF1_AXNIFE20110503_051904_20110504_193817_20110506_193817
1f111f5363db70f28d1191eec9cb73c0	SCI_MF1_AXNIFE20110503_051904_20110505_190131_20110507_190131
234f2992249ed9720f52571fbfd79739	SCI_MF1_AXNIFE20110503_051904_20110506_182446_20110508_182446
a0085e258a81ac38b876c72f345a79b8	SCI_MF1_AXNIFE20110503_051904_20110507_192814_20110509_192814
456d940823b7ada65eafdbfded36e13a	SCI_MF1_AXNIFE20110503_051904_20110508_185129_20110510_185129
19ad63b91df4b222bc82ad2fe1c10964	SCI_MF1_AXNIFE20110503_051904_20110509_181443_20110606_181443

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

validity identifier	M_CAL	M_DL	M_DN
20110426_193139_20110428_193139	meas.	meas.	interp.
20110427_185453_20110429_185453	meas.	meas.	interp.
20110428_181808_20110430_181808	meas.	meas.	meas.
20110429_192136_20110501_192136	meas.	meas.	interp.
20110430_184451_20110502_184451	meas.	meas.	interp.
20110501_180805_20110503_180805	meas.	meas.	interp.
20110502_191134_20110504_191134	meas.	meas.	meas.
20110503_183448_20110505_183448	pred.	pred.	pred.
20110504_193817_20110506_193817	pred.	pred.	pred.
20110505_190131_20110507_190131	pred.	pred.	pred.
20110506_182446_20110508_182446	pred.	pred.	pred.
20110507_192814_20110509_192814	pred.	pred.	pred.
20110508_185129_20110510_185129	pred.	pred.	pred.
20110509_181443_20110606_181443	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	1.0058	1.0376	1.0145	0.9980	0.9835	0.9964	1.0400	OK
2	1.0028	1.0243	1.0095	0.9990	0.9921	0.9988	1.0300	OK
3	1.0012	1.0076	1.0035	0.9997	0.9982	1.0016	1.0100	OK
4	1.0015	1.0012	1.0039	1.0005	0.9995	1.0024	1.0100	OK
5	1.0031	1.0026	1.0033	1.0011	0.9990	1.0017	1.0120	OK
6	1.0062	1.0016	1.0029	1.0020	0.9993	1.0009	1.0100	OK
7	1.0016	1.0008	1.0016	–	–	–	1.0070	OK
8	1.0015	1.0023	1.0011	–	–	–	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 25 Apr 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110426_034239_20110425_182810_20110427_182810` .

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

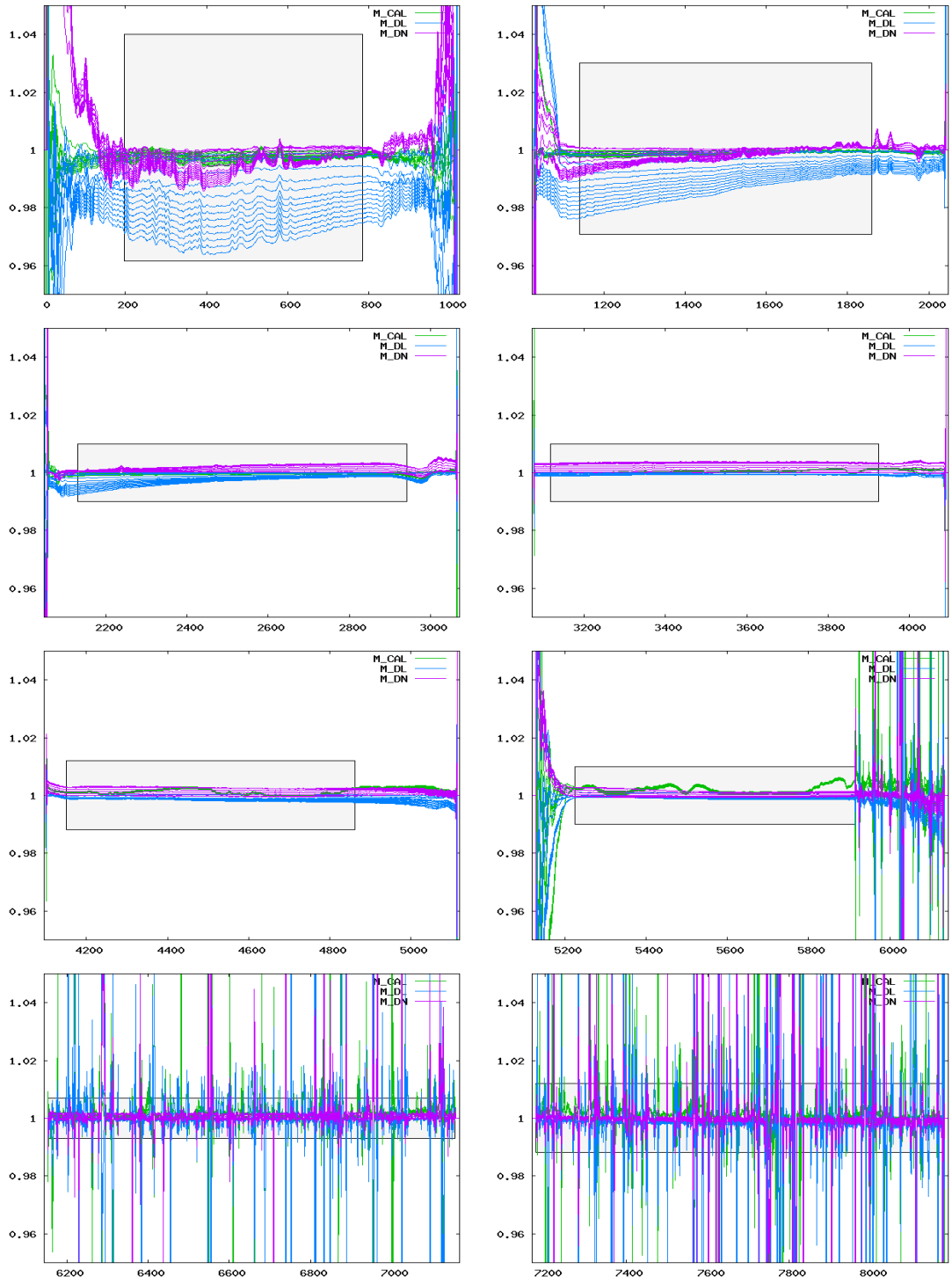

Figure 1: Ratio of delivered m-factors (26 Apr 2011– 09 May 2011) to the corresponding m-factor of the previous delivery day (25 Apr 2011). The grey boxes visualize the maximum ratio allowed.