NRT M-factor delivery document 04 May 2009

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04 May 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: 28 Apr 2009– 04 May 2009
- Prediction: 05 May 2009– 11 May 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
d1c5a8526f7264c40f13872fe2dce17d	SCI_MF1_AXNIFE20090504_215443_20090428_183649_20090430_183649
9c3c0d72ae6d0f0288d1855f9f2c2f35	SCI_MF1_AXNIFE20090504_215443_20090429_194548_20090501_194548
f9541778ed60d6d8a4d2bc51e170aefb	SCI_MF1_AXNIFE20090504_215443_20090430_191411_20090502_191411
24cd62e86c99d1b11f23ca05adb35b38	SCI_MF1_AXNIFE20090504_215443_20090501_184234_20090503_184234
ce370bfc546d72cc98dd29e07a66d369	SCI_MF1_AXNIFE20090504_215443_20090502_181057_20090504_181057
20d53e0a6c2dfe97b64bdd0c5966c11c	SCI_MF1_AXNIFE20090504_215443_20090503_191956_20090505_191956
039b46c97c35f1241e784ec2e4b10d40	SCI_MF1_AXNIFE20090504_215443_20090504_184819_20090506_184819
c8a994c60774a34dd01c7d1f57ad6812	SCI_MF1_AXNIFE20090504_215443_20090505_181642_20090507_181642
55e8c5780424e4dab9f610c0b44eb66f	SCI_MF1_AXNIFE20090504_215443_20090506_192541_20090508_192541
1b93c0f5d8a25d51ed00e7b0a11cf7e4	SCI_MF1_AXNIFE20090504_215443_20090507_185404_20090509_185404
aedca6ede60e6dec07be2ab1883c0d91	SCI_MF1_AXNIFE20090504_215443_20090508_182227_20090510_182227
1a814edd6e8f3c26e0329d016a5ceb07	SCI_MF1_AXNIFE20090504_215443_20090509_193126_20090511_193126
12d0ea391f78bd25c6cab9e7bdad3dbe	SCI_MF1_AXNIFE20090504_215443_20090510_185949_20090512_185949
49fb8719d0520e1d909e2f69a4e78b57	SCI_MF1_AXNIFE20090504_215443_20090511_182812_20090608_182812

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

validity identifier	M_CAL	M_DL	M_DN
20090428_183649_20090430_183649	interp.	meas.	interp.
20090429_194548_20090501_194548	meas.	meas.	interp.
20090430_191411_20090502_191411	meas.	meas.	interp.
20090501_184234_20090503_184234	meas.	meas.	meas.
20090502_181057_20090504_181057	meas.	meas.	pred.
20090503_191956_20090505_191956	meas.	meas.	pred.
20090504_184819_20090506_184819	pred.	pred.	pred.
20090505_181642_20090507_181642	pred.	pred.	pred.
20090506_192541_20090508_192541	pred.	pred.	pred.
20090507_185404_20090509_185404	pred.	pred.	pred.
20090508_182227_20090510_182227	pred.	pred.	pred.
20090509_193126_20090511_193126	pred.	pred.	pred.
20090510_185949_20090512_185949	pred.	pred.	pred.
20090511_182812_20090608_182812	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	1.0068	1.0161	1.0310	1.0007	1.0062	1.0100	1.0400	OK
2	1.0026	1.0071	1.0123	1.0006	1.0023	1.0035	1.0200	OK
3	1.0013	1.0037	1.0038	1.0002	1.0008	1.0003	1.0100	OK
4	1.0021	1.0007	1.0010	0.9998	1.0002	0.9996	1.0100	OK
5	1.0046	1.0051	1.0044	0.9987	0.9984	0.9987	1.0120	OK
6	1.0047	1.0018	1.0022	1.0006	0.9994	0.9992	1.0100	OK
7	1.0009	1.0006	1.0010	–	–	–	1.0070	OK
8	1.0089	1.0078	1.0096	–	–	–	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 27 Apr 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090427_215513_20090427_190826_20090429_190826` .

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

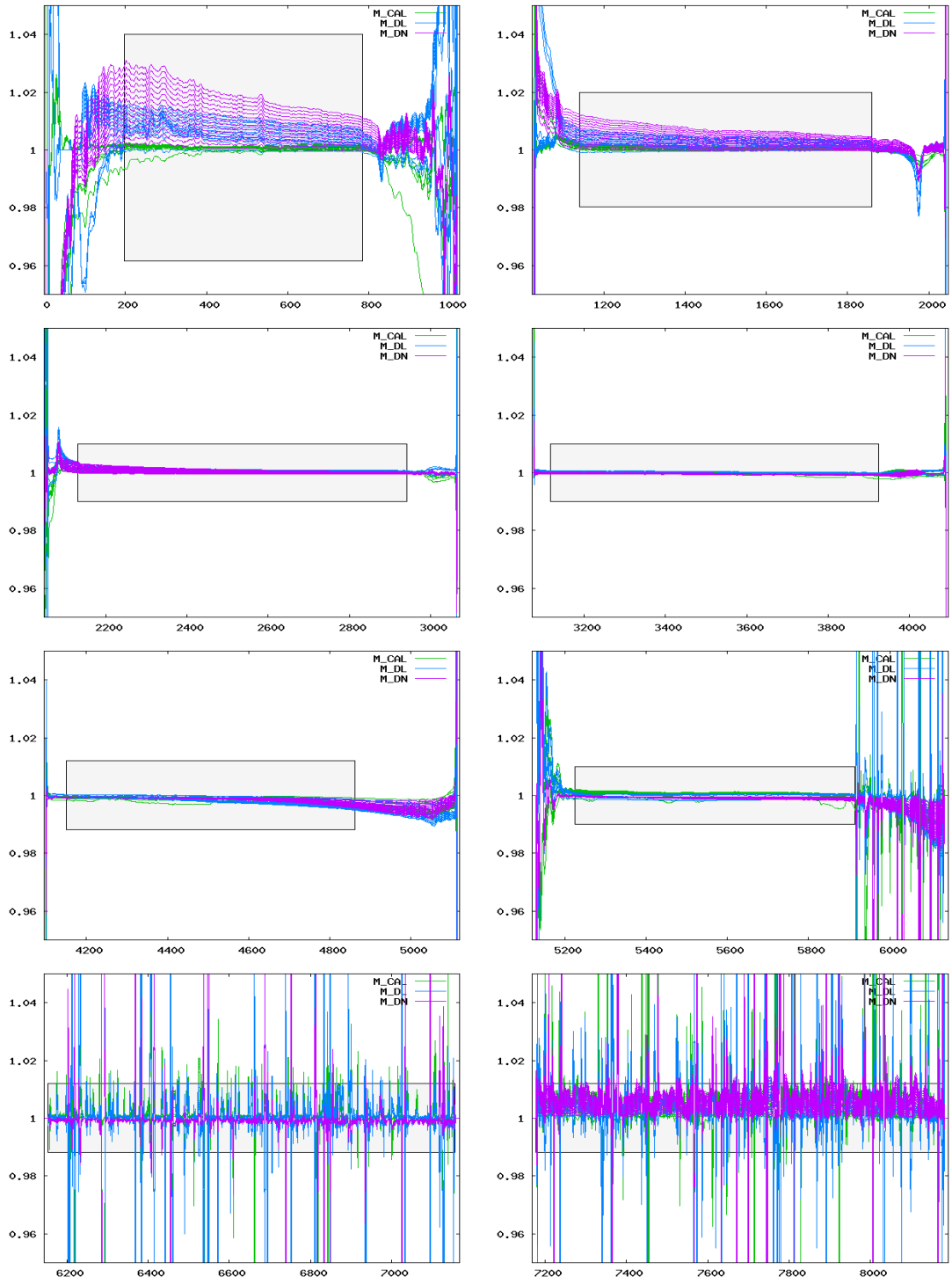

Figure 1: Ratio of delivered m-factors (28 Apr 2009– 11 May 2009) to the corresponding m-factor of the previous delivery day (27 Apr 2009). The grey boxes visualize the maximum ratio allowed.