NRT M-factor delivery document
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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 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: 13 May 2008– 19 May 2008

- Prediction: 20 May 2008– 26 May 2008

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
3ef042cf3e2965c90f37d58ec5821f72	SCI_MF1_AXNIFE20080519_215538_20080513_183650_20080515_183650
f21f69b975d3ee91fbeb18764c553d31	SCI_MF1_AXNIFE20080519_215538_20080514_194549_20080516_194549
ca27476fbd4884c05f449d2fa86780aa	SCI_MF1_AXNIFE20080519_215538_20080515_191412_20080517_191412
7a4b79b73c04e5048c59d258309a7ff2	SCI_MF1_AXNIFE20080519_215538_20080516_184235_20080518_184235
7f5123682032d84c21bd088633a00a88	SCI_MF1_AXNIFE20080519_215538_20080517_181058_20080519_181058
6fc95977e41be3347771ad5c099e1fc6	SCI_MF1_AXNIFE20080519_215538_20080518_191956_20080520_191956
14b8a8cbe12fd535ee5e177ffd9dd007	SCI_MF1_AXNIFE20080519_215538_20080519_184819_20080521_184819
b8ef36da88355f8834b3342a63ea3bd6	SCI_MF1_AXNIFE20080519_215538_20080520_181642_20080522_181642
7862413be233dd3e31a1e58ddc1308aa	SCI_MF1_AXNIFE20080519_215538_20080521_192541_20080523_192541
5be40bc3ef27677dea0a3a1be338463e	SCI_MF1_AXNIFE20080519_215538_20080522_185404_20080524_185404
bb6ff5074b26af7cdfa6639b65f08c99	SCI_MF1_AXNIFE20080519_215538_20080523_182227_20080525_182227
d401b9173e0de6016ad2cc67f33759cc	SCI_MF1_AXNIFE20080519_215538_20080524_193126_20080526_193126
472fbdfbd96d20673259a093b9b98c94	SCI_MF1_AXNIFE20080519_215538_20080525_185949_20080527_185949
05b75dbb8f44b7faa9baf185143cd89a	SCI_MF1_AXNIFE20080519_215538_20080526_182812_20080623_182812

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

validity identifier	M_CAL	M_DL	M_DN
20080513_183650_20080515_183650	meas.	meas.	interp.
20080514_194549_20080516_194549	meas.	meas.	interp.
20080515_191412_20080517_191412	meas.	meas.	interp.
20080516_184235_20080518_184235	meas.	meas.	meas.
20080517_181058_20080519_181058	meas.	meas.	pred.
20080518_191956_20080520_191956	meas.	meas.	pred.
20080519_184819_20080521_184819	pred.	pred.	pred.
20080520_181642_20080522_181642	pred.	pred.	pred.
20080521_192541_20080523_192541	pred.	pred.	pred.
20080522_185404_20080524_185404	pred.	pred.	pred.
20080523_182227_20080525_182227	pred.	pred.	pred.
20080524_193126_20080526_193126	pred.	pred.	pred.
20080525_185949_20080527_185949	pred.	pred.	pred.
20080526_182812_20080623_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. SCIA-MACHY 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	1.0104	1.0092	1.0146	0.9994	1.0038	1.0048	1.0400	OK
2	1.0011	1.0043	1.0070	1.0000	1.0020	1.0023	1.0200	OK
3	1.0006	1.0021	1.0021	0.9999	1.0006	1.0003	1.0100	OK
4	1.0006	1.0006	1.0008	1.0000	1.0002	0.9996	1.0100	OK
5	1.0024	1.0022	1.0035	0.9994	0.9999	0.9988	1.0120	OK
6	1.0032	1.0025	1.0013	1.0007	1.0004	0.9997	1.0100	OK
7	1.0004	1.0005	0.9985	–	–	–	1.0070	OK
8	0.9999	0.9995	0.9991	–	–	–	1.0120	OK

certain limit l:

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

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 12 May 2008, therefore M_{t_0} is taken from the m–factor file SCI_MF1_AXNIFE20080512_215706_20080512_190827_20080514_190827 .

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
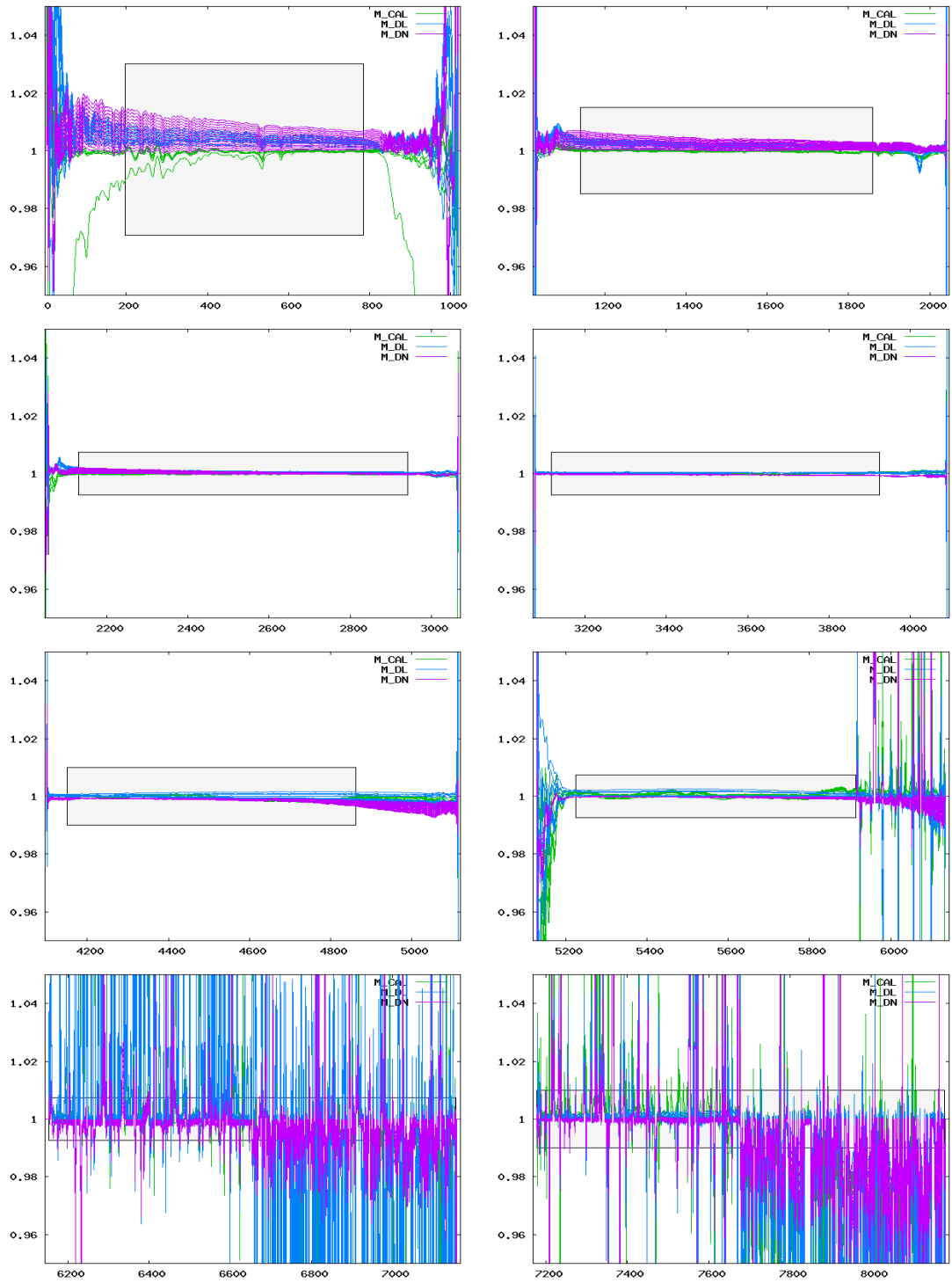
Figure 1: Ratio of delivered m-factors (13 May 2008– 26 May 2008) to the corresponding m-factor of the previous delivery day (12 May 2008). The grey boxes visualize the maximum ratio allowed.