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 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: 25 May 2010– 31 May 2010
- Prediction: 01 Jun 2010– 07 Jun 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
13e06ad71c1985cbd1abcc4ee35e223c	SCI_MF1_AXNIFE20100601_034252_20100525_181641_20100527_181641
4ef6d5236f2c9ea2c68f2e3c7c31c874	SCI_MF1_AXNIFE20100601_034252_20100526_192540_20100528_192540
db23e28e4e87a4424356031c047c7252	SCI_MF1_AXNIFE20100601_034252_20100527_185403_20100529_185403
56c4b4446c8bbde0995288e338732039	SCI_MF1_AXNIFE20100601_034252_20100528_182226_20100530_182226
0801b609b4410884c61029bf39ec2bc5	SCI_MF1_AXNIFE20100601_034252_20100529_193125_20100531_193125
4e9d18f1c0b110f1290d4c69de3ae702	SCI_MF1_AXNIFE20100601_034252_20100530_185948_20100601_185948
926b6afd1c2e9af21a4d72b12db6c873	SCI_MF1_AXNIFE20100601_034252_20100531_182811_20100602_182811
28bb2997cac8e4436a289830e8ba80f9	SCI_MF1_AXNIFE20100601_034252_20100601_193710_20100603_193710
0f084e7aebd33189ef300cb14a790277	SCI_MF1_AXNIFE20100601_034252_20100602_190533_20100604_190533
869a35500485de6f887e3dd44c0e9cc9	SCI_MF1_AXNIFE20100601_034252_20100603_183356_20100605_183356
5ba19a02ae4f4e9a368a85762369b65d	SCI_MF1_AXNIFE20100601_034252_20100604_194255_20100606_194255
047379b400b0ca96b63b4ca19e2a510b	SCI_MF1_AXNIFE20100601_034252_20100605_191118_20100607_191118
cefc6c725a934548b7e5d131c0fa5f5a	SCI_MF1_AXNIFE20100601_034252_20100606_183941_20100608_183941
d68860dc77a8a30e9509ea737998d7e6	SCI_MF1_AXNIFE20100601_034252_20100607_194839_20100705_194839

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

validity identifier	M_CAL	M_DL	M_DN
20100525_181641_20100527_181641	meas.	meas.	interp.
20100526_192540_20100528_192540	meas.	meas.	meas.
20100527_185403_20100529_185403	meas.	meas.	interp.
20100528_182226_20100530_182226	meas.	meas.	interp.
20100529_193125_20100531_193125	meas.	meas.	interp.
20100530_185948_20100601_185948	meas.	meas.	meas.
20100531_182811_20100602_182811	meas.	meas.	pred.
20100601_193710_20100603_193710	pred.	pred.	pred.
20100602_190533_20100604_190533	pred.	pred.	pred.
20100603_183356_20100605_183356	pred.	pred.	pred.
20100604_194255_20100606_194255	pred.	pred.	pred.
20100605_191118_20100607_191118	pred.	pred.	pred.
20100606_183941_20100608_183941	pred.	pred.	pred.
20100607_194839_20100705_194839	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	1.0066	1.0097	1.0163	0.9998	1.0043	1.0045	1.0400	OK
2	1.0009	1.0067	1.0079	1.0002	1.0024	1.0021	1.0200	OK
3	1.0005	1.0018	1.0021	0.9999	1.0004	1.0004	1.0100	OK
4	1.0016	1.0010	1.0010	0.9998	1.0000	1.0002	1.0100	OK
5	1.0009	1.0007	1.0018	0.9996	1.0001	1.0006	1.0120	OK
6	1.0010	1.0015	1.0011	1.0002	1.0003	1.0006	1.0100	OK
7	1.0004	1.0014	1.0007	–	–	–	1.0070	OK
8	1.0017	1.0022	1.0016	–	–	–	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 24 May 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100525_034222_20100524_184818_20100526_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

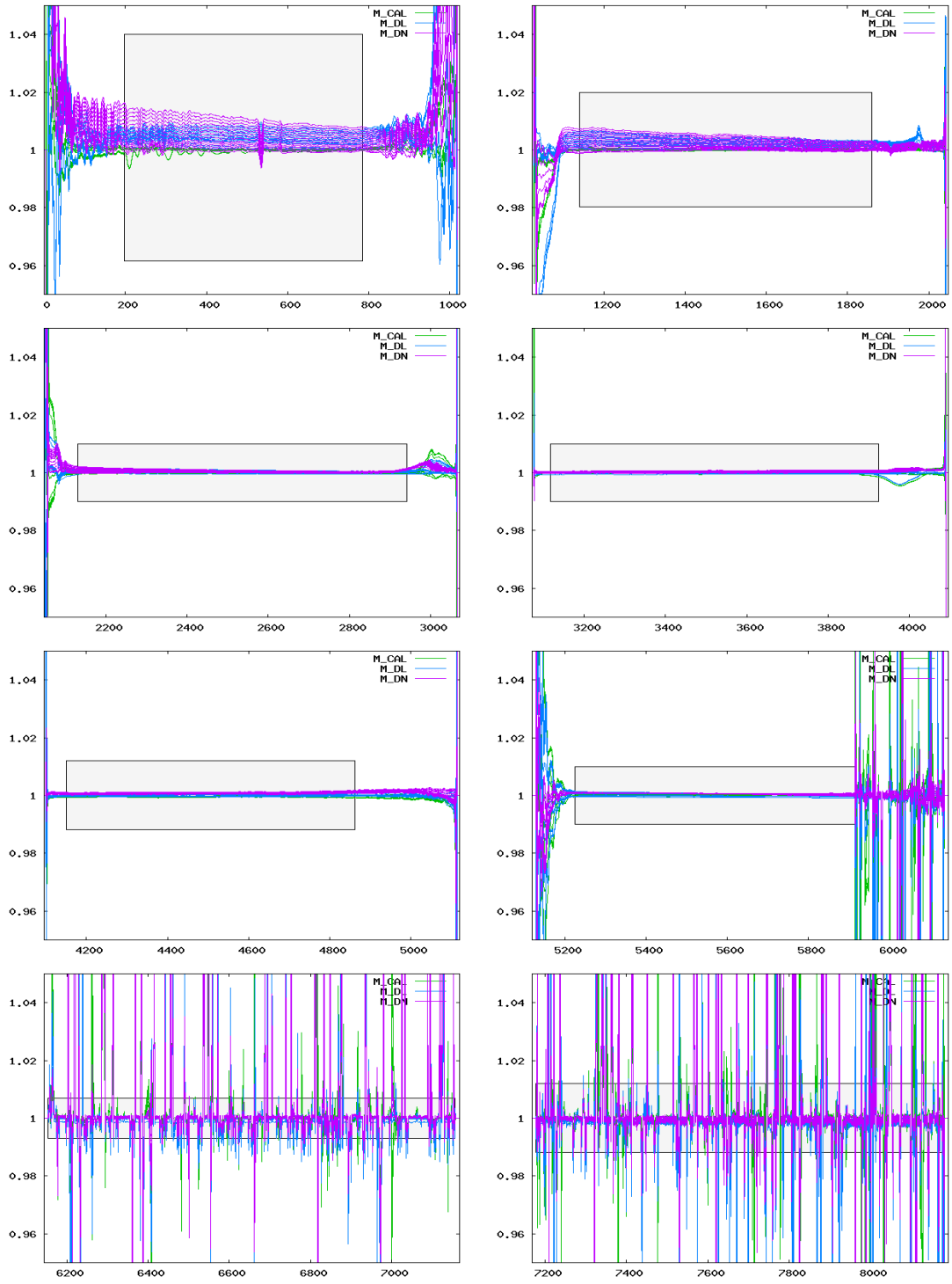

Figure 1: Ratio of delivered m-factors (25 May 2010– 07 Jun 2010) to the corresponding m-factor of the previous delivery day (24 May 2010). The grey boxes visualize the maximum ratio allowed.