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: 11 May 2010– 17 May 2010
- Prediction: 18 May 2010– 24 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
cb89a10b1512c7c8cfef080c17106025	SCI_MF1_AXNIFE20100518_034227_20100511_185655_20100513_185655
1e294637b42bb6dfec6642fd0ab05f7e	SCI_MF1_AXNIFE20100518_034227_20100512_182518_20100514_182518
20f079110a723945c057fc2d6677e484	SCI_MF1_AXNIFE20100518_034227_20100513_193417_20100515_193417
2a3375d608dc088c97f012a74718852c	SCI_MF1_AXNIFE20100518_034227_20100514_190240_20100516_190240
2104c3e328b3e858fcf3cf897e54316c	SCI_MF1_AXNIFE20100518_034227_20100515_183103_20100517_183103
ec759a5e4f13551031570b897f8fa6ff	SCI_MF1_AXNIFE20100518_034227_20100516_194002_20100518_194002
7783460cb8eeb4869b73ec0a8becd6db	SCI_MF1_AXNIFE20100518_034227_20100517_190825_20100519_190825
65eb34f550a4d6f22b18c889127c68d2	SCI_MF1_AXNIFE20100518_034227_20100518_183648_20100520_183648
61224bc3539085a541e33aa867d0299e	SCI_MF1_AXNIFE20100518_034227_20100519_194547_20100521_194547
65d0d91651a5790d54fb27227cd65bfc	SCI_MF1_AXNIFE20100518_034227_20100520_191410_20100522_191410
61d049ced6c9bd2b133b7fd5bc479c3a	SCI_MF1_AXNIFE20100518_034227_20100521_184233_20100523_184233
481dfc7d7a02a9bcda2a1944088efa3b	SCI_MF1_AXNIFE20100518_034227_20100522_181056_20100524_181056
c31608ad014b2380ba22b1711d993742	SCI_MF1_AXNIFE20100518_034227_20100523_191955_20100525_191955
583185aaacfad9c94ca730871b0c1ad6	SCI_MF1_AXNIFE20100518_034227_20100524_184818_20100621_184818

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

validity identifier	M_CAL	M_DL	M_DN
20100511_185655_20100513_185655	meas.	meas.	interp.
20100512_182518_20100514_182518	meas.	meas.	interp.
20100513_193417_20100515_193417	meas.	meas.	interp.
20100514_190240_20100516_190240	meas.	meas.	meas.
20100515_183103_20100517_183103	meas.	meas.	pred.
20100516_194002_20100518_194002	meas.	meas.	pred.
20100517_190825_20100519_190825	meas.	meas.	pred.
20100518_183648_20100520_183648	pred.	pred.	pred.
20100519_194547_20100521_194547	pred.	pred.	pred.
20100520_191410_20100522_191410	pred.	pred.	pred.
20100521_184233_20100523_184233	pred.	pred.	pred.
20100522_181056_20100524_181056	pred.	pred.	pred.
20100523_191955_20100525_191955	pred.	pred.	pred.
20100524_184818_20100621_184818	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	1.0045	1.0163	1.0392	1.0007	1.0061	1.0140	1.0400	OK
2	1.0012	1.0066	1.0152	1.0002	1.0026	1.0055	1.0200	OK
3	1.0008	1.0038	1.0056	1.0001	1.0008	1.0011	1.0100	OK
4	1.0008	1.0007	1.0008	0.9999	1.0001	0.9999	1.0100	OK
5	1.0027	1.0040	1.0029	0.9990	0.9988	0.9991	1.0120	OK
6	1.0033	1.0016	1.0017	1.0006	0.9997	0.9996	1.0100	OK
7	1.0009	1.0005	1.0013	–	–	–	1.0070	OK
8	1.0042	1.0057	1.0061	–	–	–	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 10 May 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100511_034226_20100510_192832_20100512_192832` .

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

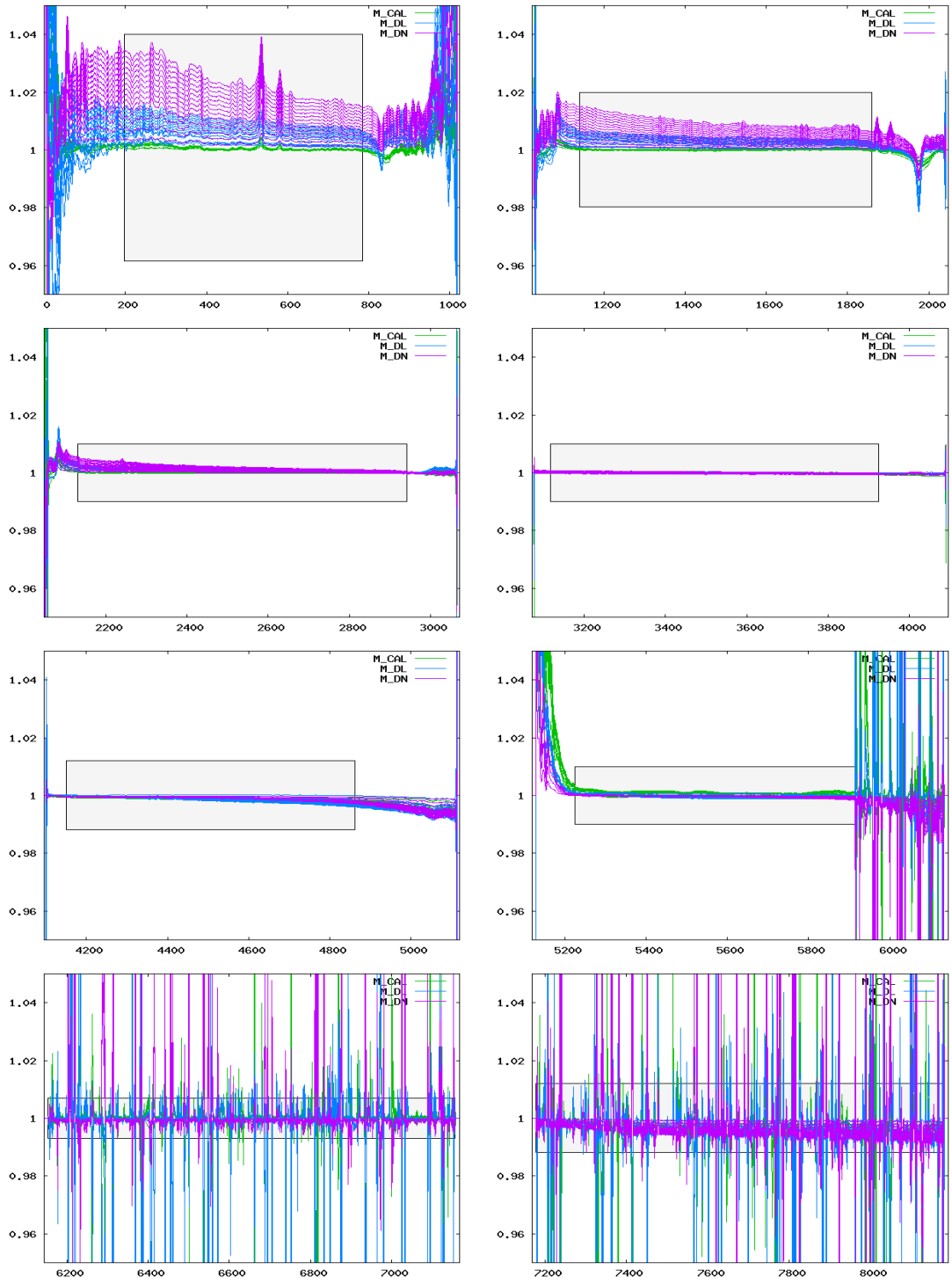

Figure 1: Ratio of delivered m-factors (11 May 2010– 24 May 2010) to the corresponding m-factor of the previous delivery day (10 May 2010). The grey boxes visualize the maximum ratio allowed.