NRT M-factor delivery document 18 May 2009

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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: 12 May 2009– 18 May 2009
- Prediction: 19 May 2009– 25 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
d36b13564ef18ef04e969f8e74ca058b	SCI_MF1_AXNIFE20090518_215526_20090512_193710_20090514_193710
30da41ae26449504f264664f1f1446a1	SCI_MF1_AXNIFE20090518_215526_20090513_190533_20090515_190533
91f95bb9f20654ea550f36fe390eb4b5	SCI_MF1_AXNIFE20090518_215526_20090514_183356_20090516_183356
8fd8454d40c899dbee43b972e539a473	SCI_MF1_AXNIFE20090518_215526_20090515_194255_20090517_194255
68dc193e7329cfec7ef610cf6e66e7a6	SCI_MF1_AXNIFE20090518_215526_20090516_191118_20090518_191118
ef4dd08ad81c1e46da8418720b8902e8	SCI_MF1_AXNIFE20090518_215526_20090517_183941_20090519_183941
970d4f3a5d6670f854d26bab123ed624	SCI_MF1_AXNIFE20090518_215526_20090518_194840_20090520_194840
e67ba806c9eb7c7b3f948389be20d164	SCI_MF1_AXNIFE20090518_215526_20090519_191703_20090521_191703
b574b16c5c9a191058a08974c79edd24	SCI_MF1_AXNIFE20090518_215526_20090520_184526_20090522_184526
415a7d66424e508ba4d355f753d1d1b3	SCI_MF1_AXNIFE20090518_215526_20090521_181349_20090523_181349
0938d30291392650f5867a669a74ad09	SCI_MF1_AXNIFE20090518_215526_20090522_192248_20090524_192248
cf69eb07307c0d86120b0cbca4538251	SCI_MF1_AXNIFE20090518_215526_20090523_185111_20090525_185111
5c0aef1299fe7761949678776ee9ae32	SCI_MF1_AXNIFE20090518_215526_20090524_181934_20090526_181934
17816be6975f91dc7dcf18574c65495f	SCI_MF1_AXNIFE20090518_215526_20090525_192833_20090622_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090512_193710_20090514_193710	meas.	meas.	meas.
20090513_190533_20090515_190533	meas.	meas.	interp.
20090514_183356_20090516_183356	meas.	meas.	interp.
20090515_194255_20090517_194255	interp.	meas.	interp.
20090516_191118_20090518_191118	meas.	meas.	meas.
20090517_183941_20090519_183941	meas.	meas.	pred.
20090518_194840_20090520_194840	pred.	pred.	pred.
20090519_191703_20090521_191703	pred.	pred.	pred.
20090520_184526_20090522_184526	pred.	pred.	pred.
20090521_181349_20090523_181349	pred.	pred.	pred.
20090522_192248_20090524_192248	pred.	pred.	pred.
20090523_185111_20090525_185111	pred.	pred.	pred.
20090524_181934_20090526_181934	pred.	pred.	pred.
20090525_192833_20090622_192833	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	1.0030	1.0204	1.0278	1.0010	1.0083	1.0097	1.0400	OK
2	1.0029	1.0115	1.0116	1.0013	1.0042	1.0042	1.0200	OK
3	1.0009	1.0030	1.0035	1.0004	1.0009	1.0008	1.0100	OK
4	1.0013	1.0012	1.0019	1.0004	1.0002	1.0000	1.0100	OK
5	1.0016	1.0016	1.0013	1.0004	1.0005	1.0001	1.0120	OK
6	1.0025	1.0028	1.0021	1.0013	1.0010	1.0007	1.0100	OK
7	1.0015	1.0003	1.0012	–	–	–	1.0070	OK
8	1.0085	1.0047	1.0053	–	–	–	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 11 May 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090511_215501_20090511_182812_20090513_182812` .

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

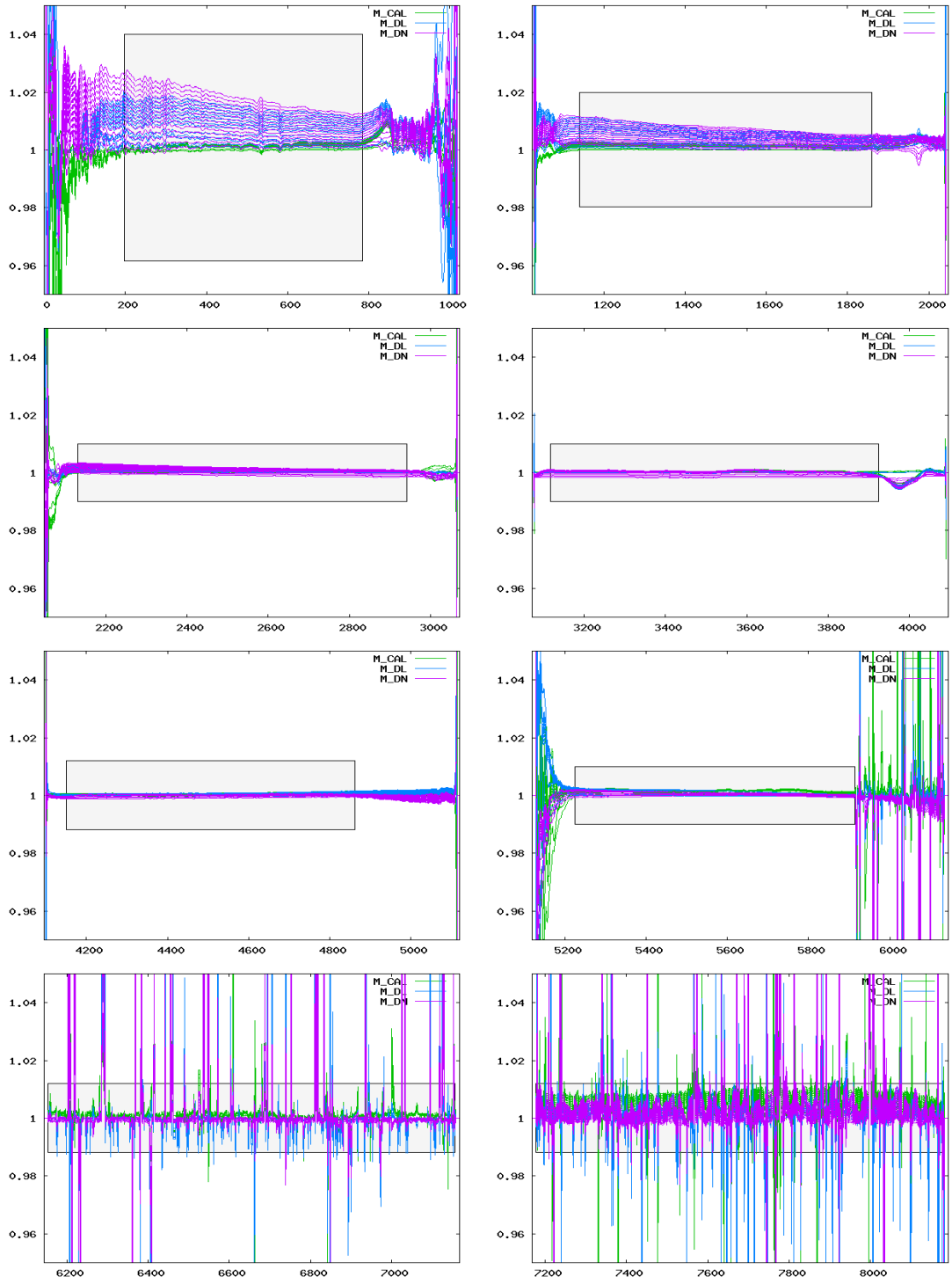

Figure 1: Ratio of delivered m-factors (12 May 2009– 25 May 2009) to the corresponding m-factor of the previous delivery day (11 May 2009). The grey boxes visualize the maximum ratio allowed.