NRT M-factor delivery document 02 Feb 2009

Klaus Bramstedt, ife Bremen

02 Feb 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: 27 Jan 2009– 02 Feb 2009
- Prediction: 03 Feb 2009– 09 Feb 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
f61aac8d5c4a23717fae58996a9e759c	SCI_MF1_AXNIFE20090203_100440_20090127_193711_20090129_193711
e469e2a4a8c42ef03a58e894844ea6e6	SCI_MF1_AXNIFE20090203_100440_20090128_190534_20090130_190534
ffdca922f3ed0c3257837c5e5cb29271	SCI_MF1_AXNIFE20090203_100440_20090129_183357_20090131_183357
4abf0b0224f5f4d48f9dfb5bc0837eb0	SCI_MF1_AXNIFE20090203_100440_20090130_194256_20090201_194256
ba18d08af79a50d1842e7e09b46a997f	SCI_MF1_AXNIFE20090203_100440_20090131_191119_20090202_191119
2fa6daa65a6d216ad75c637ce17fa780	SCI_MF1_AXNIFE20090203_100440_20090201_183942_20090203_183942
9f8f3d002475fb48b9ad5a0cd1c1d2b7	SCI_MF1_AXNIFE20090203_100440_20090202_194840_20090204_194840
51d2bf9b10c473d5efafc8fd9c289861	SCI_MF1_AXNIFE20090203_100440_20090203_191703_20090205_191703
2440c321c21051ef2d2a2be6fe1f1140	SCI_MF1_AXNIFE20090203_100440_20090204_184526_20090206_184526
bfb7ef9899e62bf13a213414578885b7	SCI_MF1_AXNIFE20090203_100440_20090205_181349_20090207_181349
4624c0f553160bcb4f02728ed3c0d003	SCI_MF1_AXNIFE20090203_100440_20090206_192248_20090208_192248
5dc42af0d64ab9645084bf7cc8ed28a5	SCI_MF1_AXNIFE20090203_100440_20090207_185111_20090209_185111
34365b5192f4ac0ea0c6f118bc8cbbc0	SCI_MF1_AXNIFE20090203_100440_20090208_181934_20090210_181934
6c11f47b10febcccb91f77cc7054d4d4	SCI_MF1_AXNIFE20090203_100440_20090209_192833_20090309_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090127_193711_20090129_193711	meas.	meas.	interp.
20090128_190534_20090130_190534	meas.	meas.	interp.
20090129_183357_20090131_183357	meas.	meas.	meas.
20090130_194256_20090201_194256	meas.	meas.	pred.
20090131_191119_20090202_191119	meas.	meas.	pred.
20090201_183942_20090203_183942	meas.	meas.	pred.
20090202_194840_20090204_194840	pred.	pred.	pred.
20090203_191703_20090205_191703	pred.	pred.	pred.
20090204_184526_20090206_184526	pred.	pred.	pred.
20090205_181349_20090207_181349	pred.	pred.	pred.
20090206_192248_20090208_192248	pred.	pred.	pred.
20090207_185111_20090209_185111	pred.	pred.	pred.
20090208_181934_20090210_181934	pred.	pred.	pred.
20090209_192833_20090309_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	1.0153	1.0379	1.0175	1.0034	1.0108	1.0023	1.0400	OK
2	1.0075	1.0160	1.0044	1.0026	1.0048	1.0017	1.0200	OK
3	1.0016	1.0040	1.0032	1.0002	1.0007	0.9988	1.0100	OK
4	1.0008	1.0008	1.0020	1.0004	1.0002	0.9988	1.0100	OK
5	1.0017	1.0012	1.0022	1.0008	1.0003	0.9990	1.0120	OK
6	1.0113	1.0138	1.0114	1.0005	0.9986	1.0003	1.0100	Not OK
7	1.0007	0.9986	1.0023	–	–	–	1.0070	Not OK
8	1.0267	1.0204	1.0373	–	–	–	1.0120	Not 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 26 Jan 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090126_225422_20090126_182812_20090128_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 exceeds the limits. Additional checks are necessary.

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

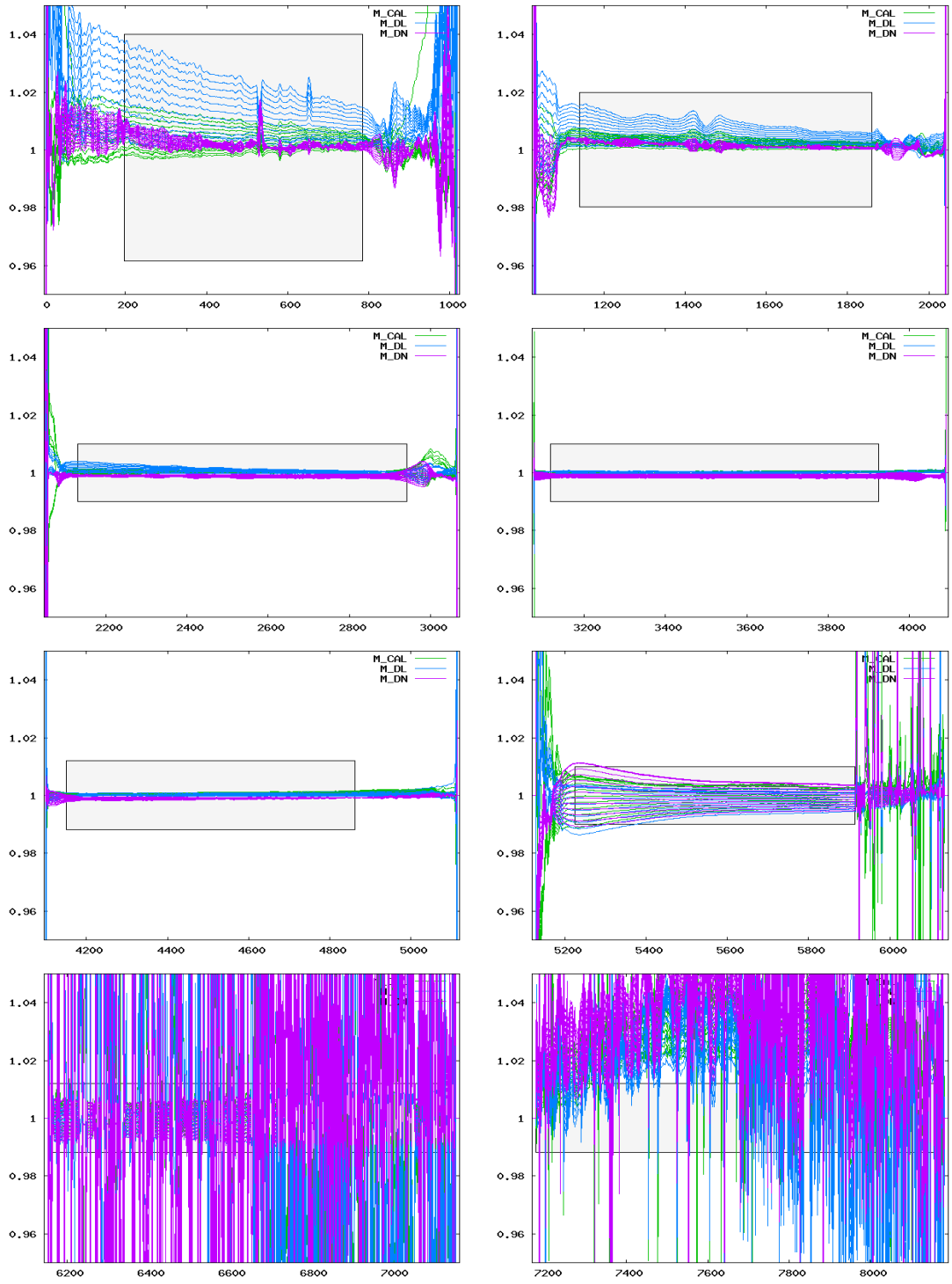

Figure 1: Ratio of delivered m-factors (27 Jan 2009– 09 Feb 2009) to the corresponding m-factor of the previous delivery day (26 Jan 2009). The grey boxes visualize the maximum ratio allowed.