NRT M-factor delivery document 09 Nov 2009

Klaus Bramstedt, ife Bremen

09 Nov 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: 03 Nov 2009– 09 Nov 2009
- Prediction: 10 Nov 2009– 16 Nov 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
358b5b0ff51ac593946d633caa9859a3	SCI_MF1_AXNIFE20091109_230030_20091103_193710_20091105_193710
7011f9c63e082e38f79998546b52a37d	SCI_MF1_AXNIFE20091109_230030_20091104_190533_20091106_190533
13fc903e9a85d9ccbb5aba7e10a0afde	SCI_MF1_AXNIFE20091109_230030_20091105_183356_20091107_183356
ec9d35b1f2ccea57ef635efbef2ffdbc	SCI_MF1_AXNIFE20091109_230030_20091106_194255_20091108_194255
64593c51c8fa4806c0c6e38b034a1cd9	SCI_MF1_AXNIFE20091109_230030_20091107_191118_20091109_191118
fbb48be529d1bfd2398d097b920ee9b0	SCI_MF1_AXNIFE20091109_230030_20091108_183941_20091110_183941
6525cb6c2b9fdcf297960d217c6454cb	SCI_MF1_AXNIFE20091109_230030_20091109_194840_20091111_194840
ad22e41a701e0fabd5dd48030aa41062	SCI_MF1_AXNIFE20091109_230030_20091110_191703_20091112_191703
9c93003862e38c88d702c98a8b09ccfc	SCI_MF1_AXNIFE20091109_230030_20091111_184526_20091113_184526
e557817382f4760b7f2a199128875a8d	SCI_MF1_AXNIFE20091109_230030_20091112_181349_20091114_181349
f5204ddf97db4572b4179dc92830676b	SCI_MF1_AXNIFE20091109_230030_20091113_192248_20091115_192248
734ade5db27145edec2e4c4046b84886	SCI_MF1_AXNIFE20091109_230030_20091114_185111_20091116_185111
baf14454906c48ad7d7b85928d03ed63	SCI_MF1_AXNIFE20091109_230030_20091115_181934_20091117_181934
7bcbac4cb7f82aedebf1c2cd99b1de42	SCI_MF1_AXNIFE20091109_230030_20091116_192833_20091214_192833

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

validity identifier	M_CAL	M_DL	M_DN
20091103_193710_20091105_193710	meas.	meas.	interp.
20091104_190533_20091106_190533	meas.	meas.	interp.
20091105_183356_20091107_183356	meas.	meas.	meas.
20091106_194255_20091108_194255	meas.	meas.	interp.
20091107_191118_20091109_191118	meas.	meas.	interp.
20091108_183941_20091110_183941	meas.	meas.	interp.
20091109_194840_20091111_194840	meas.	pred.	meas.
20091110_191703_20091112_191703	pred.	pred.	pred.
20091111_184526_20091113_184526	pred.	pred.	pred.
20091112_181349_20091114_181349	pred.	pred.	pred.
20091113_192248_20091115_192248	pred.	pred.	pred.
20091114_185111_20091116_185111	pred.	pred.	pred.
20091115_181934_20091117_181934	pred.	pred.	pred.
20091116_192833_20091214_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	1.0060	1.0152	1.0131	1.0006	1.0057	1.0035	1.0400	OK
2	1.0027	1.0079	1.0064	1.0009	1.0028	1.0017	1.0200	OK
3	1.0008	1.0015	1.0034	1.0001	1.0004	0.9990	1.0100	OK
4	1.0011	1.0010	1.0046	1.0003	1.0003	0.9986	1.0100	OK
5	1.0022	1.0024	1.0037	1.0007	1.0010	0.9993	1.0120	OK
6	1.0013	1.0023	1.0040	1.0004	1.0012	0.9997	1.0100	OK
7	1.0012	1.0020	1.0031	–	–	–	1.0070	OK
8	1.0031	1.0032	1.0029	–	–	–	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 02 Nov 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091102_225423_20091102_182811_20091104_182811` .

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

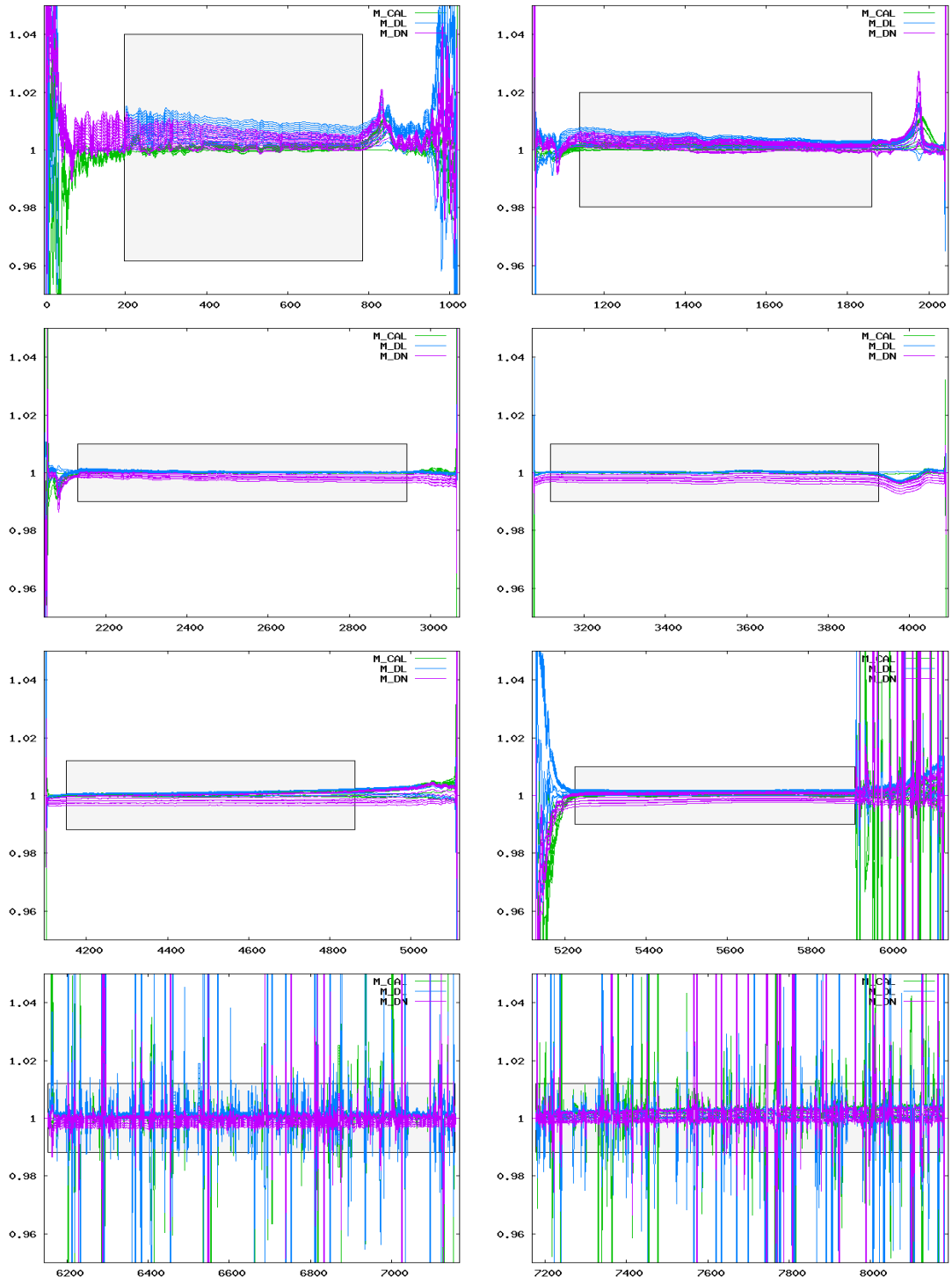

Figure 1: Ratio of delivered m-factors (03 Nov 2009– 16 Nov 2009) to the corresponding m-factor of the previous delivery day (02 Nov 2009). The grey boxes visualize the maximum ratio allowed.