NRT M-factor delivery document 18 Jan 2010

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18 Jan 2010

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 Jan 2010– 18 Jan 2010
- Prediction: 19 Jan 2010– 25 Jan 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
30d476185b24e41a19fe22b38c1540d0	SCI_MF1_AXNIFE20100127_112137_20100112_193710_20100114_193710
b6ed040f26bcdd303f99b7366f46e3d5	SCI_MF1_AXNIFE20100127_112137_20100113_190533_20100115_190533
7a5b61dd73a6121a1b53872fb140bdc4	SCI_MF1_AXNIFE20100127_112137_20100114_183356_20100116_183356
3e6ca6fd088643c51c8e4c8b7eac535b	SCI_MF1_AXNIFE20100127_112137_20100115_194255_20100117_194255
3fd556cc9f487461b63c4e1a0a688fa1	SCI_MF1_AXNIFE20100127_112137_20100116_191118_20100118_191118
f07ddcacdab5700b27a8118d46cedd83	SCI_MF1_AXNIFE20100127_112137_20100117_183941_20100119_183941
63f6091a7c223728d4a0262066f0a40a	SCI_MF1_AXNIFE20100127_112137_20100118_194840_20100120_194840
76e33b4b03e7241643dc46664a1eee6e	SCI_MF1_AXNIFE20100127_112137_20100119_191703_20100121_191703
4d649dd003c713142e6f9e3d9434154d	SCI_MF1_AXNIFE20100127_112137_20100120_184526_20100122_184526
a786fa0f27b1967891e3f210e74513b4	SCI_MF1_AXNIFE20100127_112137_20100121_181349_20100123_181349
fcfbad169292f8131bc430e614194b4c	SCI_MF1_AXNIFE20100127_112137_20100122_192248_20100124_192248
4e4a2e970a434bff10d1014f4273b2d6	SCI_MF1_AXNIFE20100127_112137_20100123_185111_20100125_185111
cdf5966368a24bf86912a9b760d60c8e	SCI_MF1_AXNIFE20100127_112137_20100124_181934_20100126_181934
e31247ee302aae2d261910ce2a028789	SCI_MF1_AXNIFE20100127_112137_20100125_192833_20100222_192833

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

validity identifier	M_CAL	M_DL	M_DN
20100112_193710_20100114_193710	meas.	meas.	interp.
20100113_190533_20100115_190533	meas.	meas.	interp.
20100114_183356_20100116_183356	meas.	meas.	interp.
20100115_194255_20100117_194255	interp.	interp.	interp.
20100116_191118_20100118_191118	interp.	interp.	interp.
20100117_183941_20100119_183941	meas.	meas.	interp.
20100118_194840_20100120_194840	meas.	meas.	meas.
20100119_191703_20100121_191703	pred.	pred.	pred.
20100120_184526_20100122_184526	pred.	pred.	pred.
20100121_181349_20100123_181349	pred.	pred.	pred.
20100122_192248_20100124_192248	pred.	pred.	pred.
20100123_185111_20100125_185111	pred.	pred.	pred.
20100124_181934_20100126_181934	pred.	pred.	pred.
20100125_192833_20100222_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	1.0114	1.0259	1.0050	1.0019	1.0079	0.9997	1.0400	OK
2	1.0031	1.0093	1.0022	1.0012	1.0034	1.0004	1.0200	OK
3	1.0006	1.0020	1.0019	0.9998	1.0003	0.9989	1.0100	OK
4	1.0016	1.0013	1.0022	0.9999	1.0000	0.9989	1.0100	OK
5	1.0024	1.0021	1.0017	1.0008	1.0005	0.9991	1.0120	OK
6	1.0026	1.0015	1.0019	1.0009	0.9999	0.9986	1.0100	OK
7	1.0018	1.0003	1.0007	–	–	–	1.0070	OK
8	1.0046	1.0032	1.0032	–	–	–	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 Jan 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100111_225422_20100111_182811_20100113_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

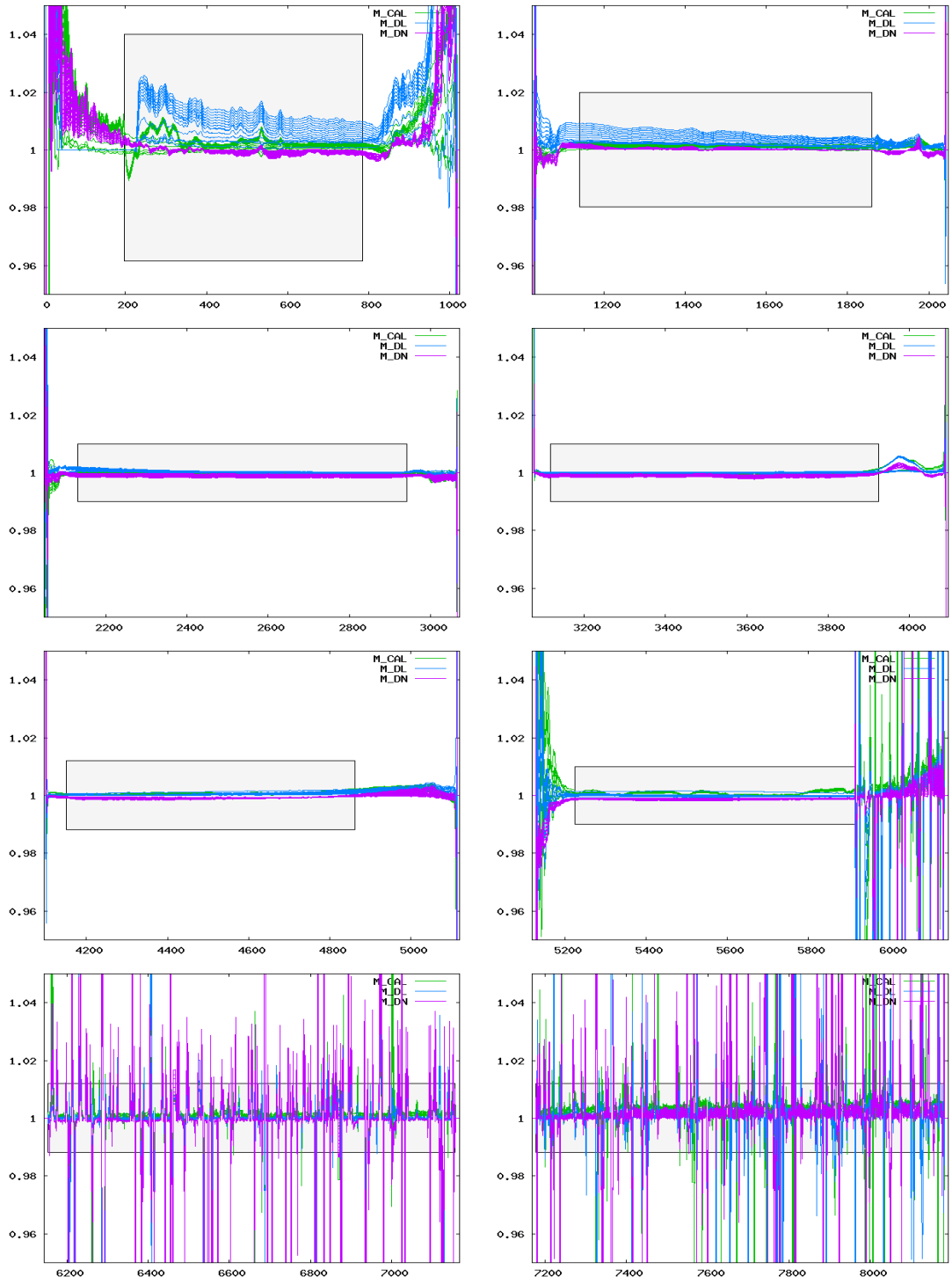

Figure 1: Ratio of delivered m-factors (12 Jan 2010– 25 Jan 2010) to the corresponding m-factor of the previous delivery day (11 Jan 2010). The grey boxes visualize the maximum ratio allowed.