NRT M-factor delivery document 12 Mar 2012

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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: 06 Mar 2012– 12 Mar 2012
- Prediction: 13 Mar 2012– 19 Mar 2012

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
1e501145e48ecc8980465eab06533732	SCI_MF1_AXNIFE20120313_074451_20120306_183937_20120308_183937
02881810f796e1699300f543106fd23c	SCI_MF1_AXNIFE20120313_074451_20120307_180251_20120309_180251
7e3ebf493a18bd11dd8abf5077bfb99f	SCI_MF1_AXNIFE20120313_074451_20120308_190620_20120310_190620
dd7004aa8047d3dfb4125bb37b840237	SCI_MF1_AXNIFE20120313_074451_20120309_182934_20120311_182934
3e8275d4ddf2ebb96987aee3be53b950	SCI_MF1_AXNIFE20120313_074451_20120310_193303_20120312_193303
074c843f22e5780376166c1329e856fa	SCI_MF1_AXNIFE20120313_074451_20120311_185617_20120313_185617
1c33bc517d2c75e9ed76331642b555f6	SCI_MF1_AXNIFE20120313_074451_20120312_181932_20120314_181932
59d3a483428aa03d8da32166c40242e3	SCI_MF1_AXNIFE20120313_074451_20120313_192300_20120315_192300
d6d00ea0eb62b13a19515779d401d53f	SCI_MF1_AXNIFE20120313_074451_20120314_184615_20120316_184615
44e2dfad87bb0b351e32ef8e3f14274a	SCI_MF1_AXNIFE20120313_074451_20120315_180929_20120317_180929
c03969b39e317e95622d68aca18dd66e	SCI_MF1_AXNIFE20120313_074451_20120316_191258_20120318_191258
4f9901966d3a975a5d7f100db70c0307	SCI_MF1_AXNIFE20120313_074451_20120317_183612_20120319_183612
7f7e3d6fa4db318ae5015554d16448a4	SCI_MF1_AXNIFE20120313_074451_20120318_193941_20120320_193941
4cba1fb95f76e323122319aa3d6575e9	SCI_MF1_AXNIFE20120313_074451_20120319_190255_20120416_190255

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

validity identifier	M_CAL	M_DL	M_DN
20120306_183937_20120308_183937	meas.	meas.	meas.
20120307_180251_20120309_180251	meas.	meas.	interp.
20120308_190620_20120310_190620	meas.	meas.	meas.
20120309_182934_20120311_182934	meas.	meas.	meas.
20120310_193303_20120312_193303	meas.	meas.	meas.
20120311_185617_20120313_185617	pred.	meas.	pred.
20120312_181932_20120314_181932	pred.	meas.	pred.
20120313_192300_20120315_192300	pred.	pred.	pred.
20120314_184615_20120316_184615	pred.	pred.	pred.
20120315_180929_20120317_180929	pred.	pred.	pred.
20120316_191258_20120318_191258	pred.	pred.	pred.
20120317_183612_20120319_183612	pred.	pred.	pred.
20120318_193941_20120320_193941	pred.	pred.	pred.
20120319_190255_20120416_190255	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	1.0085	1.0501	1.0469	0.9985	0.9809	0.9820	1.0600	OK
2	1.0012	1.0188	1.0158	1.0001	0.9934	0.9943	1.0200	OK
3	1.0010	1.0059	1.0053	1.0001	0.9987	0.9996	1.0100	OK
4	1.0006	1.0008	1.0021	1.0001	0.9998	1.0010	1.0100	OK
5	1.0007	1.0022	1.0014	1.0000	0.9993	1.0002	1.0120	OK
6	1.0027	1.0017	1.0014	1.0015	0.9993	0.9999	1.0100	OK
7	1.0025	1.0010	1.0015	–	–	–	1.0070	OK
8	1.0024	1.0018	1.0020	–	–	–	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 05 Mar 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120306_044410_20120305_191622_20120307_191622` .

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

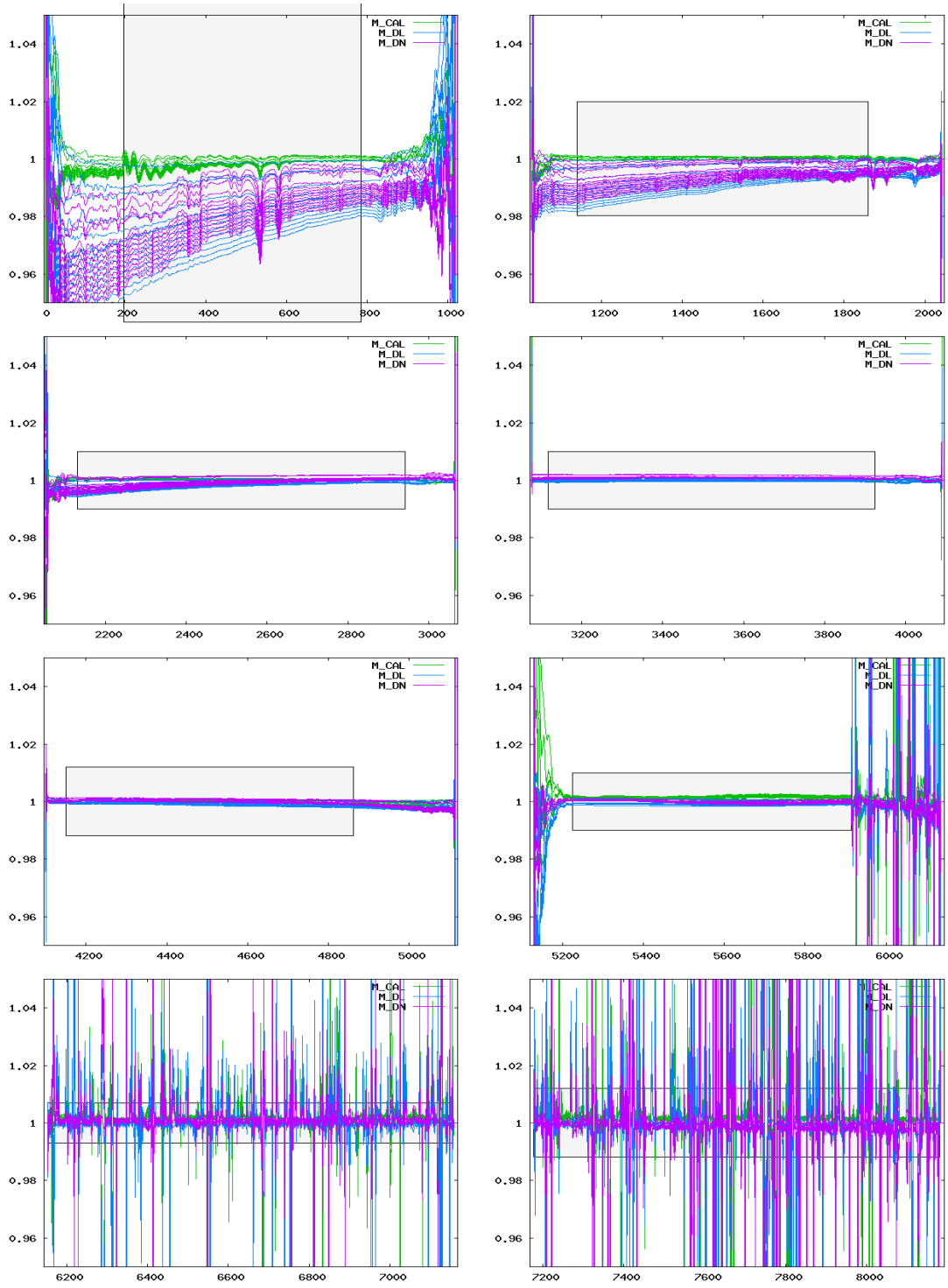

Figure 1: Ratio of delivered m-factors (06 Mar 2012– 19 Mar 2012) to the corresponding m-factor of the previous delivery day (05 Mar 2012). The grey boxes visualize the maximum ratio allowed.