NRT M-factor delivery document 05 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: 28 Feb 2012– 05 Mar 2012
- Prediction: 06 Mar 2012– 12 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
14c5d6943578878f2e814e61e71ff7e1	SCI_MF1_AXNIFE20120306_044410_20120228_193627_20120301_193627
2a0ea7d72a7e9ee1e85cc55f31ad69da	SCI_MF1_AXNIFE20120306_044410_20120229_185942_20120302_185942
fec27cc7394da8b230ef3de429af2f61	SCI_MF1_AXNIFE20120306_044410_20120301_182256_20120303_182256
34b49e06f407815a2b1a028b90b7b055	SCI_MF1_AXNIFE20120306_044410_20120302_192625_20120304_192625
5e6108983380c243126e095a79cff3e8	SCI_MF1_AXNIFE20120306_044410_20120303_184939_20120305_184939
61e579d5eeeeb064726aae914f89c5c8	SCI_MF1_AXNIFE20120306_044410_20120304_181254_20120306_181254
dc20534279abe523718f60761f8c7a57	SCI_MF1_AXNIFE20120306_044410_20120305_191622_20120307_191622
d06e78bb293d83c8fab62a810bb93915	SCI_MF1_AXNIFE20120306_044410_20120306_183937_20120308_183937
b67a14cff1d48bf9f7ae4ef248a948c2	SCI_MF1_AXNIFE20120306_044410_20120307_180251_20120309_180251
891b1ec958d785d024e7e085a0e47f99	SCI_MF1_AXNIFE20120306_044410_20120308_190620_20120310_190620
9163ac5264e4a29caf631b64c8a5ea58	SCI_MF1_AXNIFE20120306_044410_20120309_182934_20120311_182934
7d4ee7c47b3eb35dc555b678a00bdab1	SCI_MF1_AXNIFE20120306_044410_20120310_193303_20120312_193303
802ed376df55c2758c8598aad81f84ea	SCI_MF1_AXNIFE20120306_044410_20120311_185617_20120313_185617
de4f674b2e7a5877312d1b795f0b5e3d	SCI_MF1_AXNIFE20120306_044410_20120312_181932_20120409_181932

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

validity identifier	M_CAL	M_DL	M_DN
20120228_193627_20120301_193627	meas.	meas.	interp.
20120229_185942_20120302_185942	meas.	meas.	meas.
20120301_182256_20120303_182256	meas.	meas.	meas.
20120302_192625_20120304_192625	meas.	meas.	meas.
20120303_184939_20120305_184939	meas.	meas.	meas.
20120304_181254_20120306_181254	interp.	meas.	pred.
20120305_191622_20120307_191622	meas.	meas.	pred.
20120306_183937_20120308_183937	pred.	pred.	pred.
20120307_180251_20120309_180251	pred.	pred.	pred.
20120308_190620_20120310_190620	pred.	pred.	pred.
20120309_182934_20120311_182934	pred.	pred.	pred.
20120310_193303_20120312_193303	pred.	pred.	pred.
20120311_185617_20120313_185617	pred.	pred.	pred.
20120312_181932_20120409_181932	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	1.0073	1.0328	1.0251	1.0014	0.9882	0.9982	1.0400	OK
2	1.0027	1.0112	1.0048	1.0011	0.9963	0.9986	1.0200	OK
3	1.0015	1.0029	1.0028	1.0007	0.9995	0.9991	1.0100	OK
4	1.0011	1.0012	1.0016	1.0005	1.0000	0.9995	1.0100	OK
5	1.0012	1.0025	1.0015	0.9999	0.9992	0.9996	1.0120	OK
6	1.0018	1.0025	1.0014	1.0003	0.9995	0.9999	1.0100	OK
7	1.0010	1.0030	1.0022	–	–	–	1.0070	OK
8	1.0015	1.0034	1.0015	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 27 Feb 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120228_044357_20120227_183259_20120229_183259` .

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

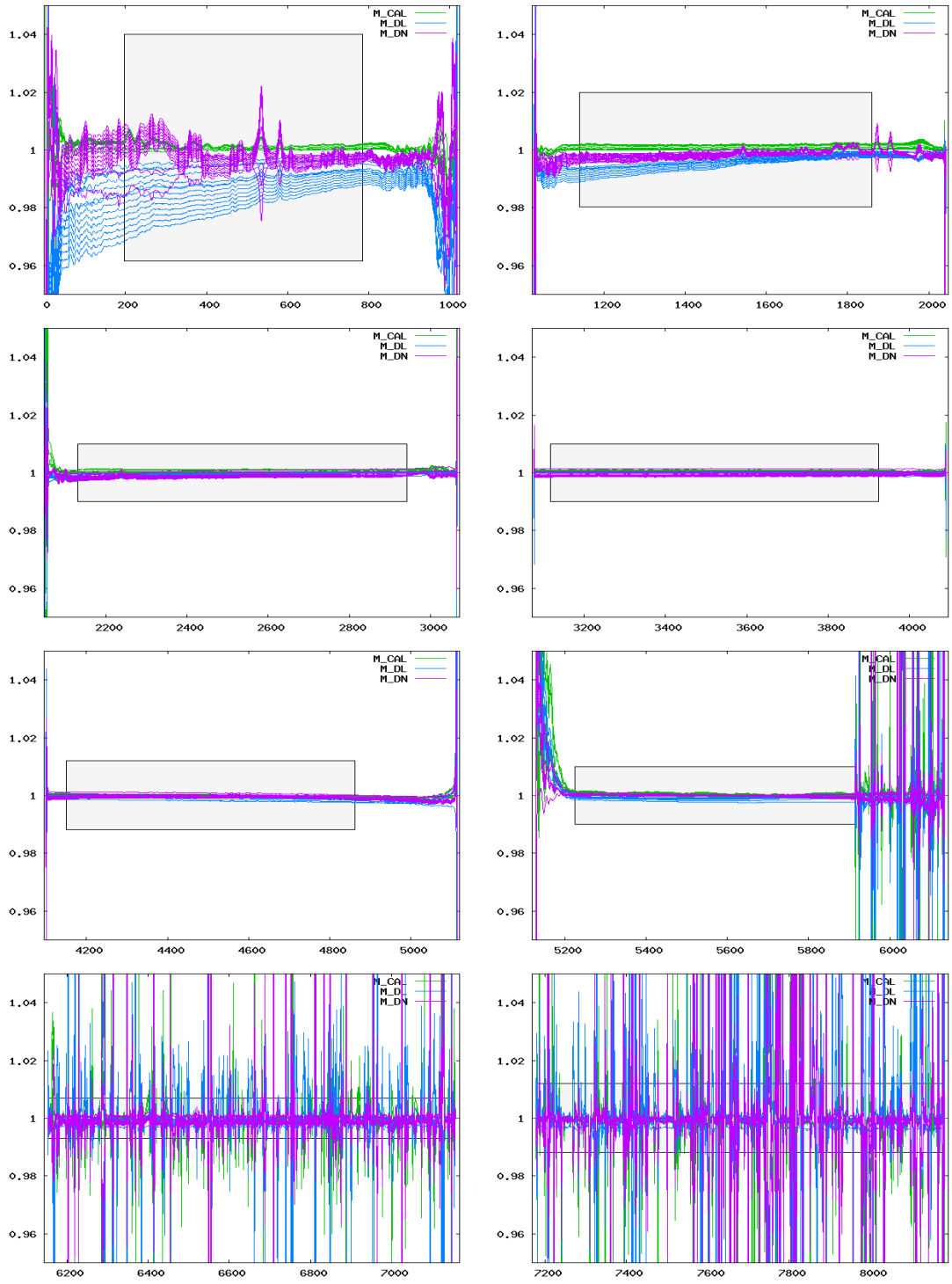

Figure 1: Ratio of delivered m-factors (28 Feb 2012– 12 Mar 2012) to the corresponding m-factor of the previous delivery day (27 Feb 2012). The grey boxes visualize the maximum ratio allowed.