NRT M-factor delivery document
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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: 08 Nov 2011– 14 Nov 2011
- Prediction: 15 Nov 2011– 21 Nov 2011

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
53d60dac72daffb048a3c7171df0f977	SCI_MF1_AXNIFE20111115_083639_20111108_180335_20111110_180335
5cbc59df0f40ce607b85954f2e27710d	SCI_MF1_AXNIFE20111115_083639_20111109_190704_20111111_190704
78e0f0cda16faaf6f0f2a98e9739e02a	SCI_MF1_AXNIFE20111115_083639_20111110_183018_20111112_183018
ea5231818bc71a2886a711c530bf7b09	SCI_MF1_AXNIFE20111115_083639_20111111_193347_20111113_193347
084cdf14b90b9eba5d7c3ed241999b1f	SCI_MF1_AXNIFE20111115_083639_20111112_185701_20111114_185701
695c21bb862087b4f3ba746b0e05db4b	SCI_MF1_AXNIFE20111115_083639_20111113_182016_20111115_182016
4c2741c00cab1fbe2c6bf2ee64d829ff	SCI_MF1_AXNIFE20111115_083639_20111114_192344_20111116_192344
8b716af568f9788a80eb683cc750b39e	SCI_MF1_AXNIFE20111115_083639_20111115_184659_20111117_184659
ba64203c5129933280efb54860c3ebee	SCI_MF1_AXNIFE20111115_083639_20111116_181013_20111118_181013
7ca3feea2fbcbfb51fbe4250685aba41	SCI_MF1_AXNIFE20111115_083639_20111117_191342_20111119_191342
51983083cf628cb4872483f994c66f3a	SCI_MF1_AXNIFE20111115_083639_20111118_183656_20111120_183656
e6753f7eb8ff6046b396fe4a0a47f500	SCI_MF1_AXNIFE20111115_083639_20111119_194025_20111121_194025
b37635f0ae807a0da1b02bbaba021e12	SCI_MF1_AXNIFE20111115_083639_20111120_190339_20111122_190339
eff97e62007c42afcb0d38430866e6d9	SCI_MF1_AXNIFE20111115_083639_20111121_182654_20111219_182654

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

validity identifier	M_CAL	M_DL	M_DN
20111108_180335_20111110_180335	meas.	meas.	interp.
20111109_190704_20111111_190704	meas.	meas.	interp.
20111110_183018_20111112_183018	meas.	meas.	meas.
20111111_193347_20111113_193347	meas.	meas.	interp.
20111112_185701_20111114_185701	meas.	meas.	interp.
20111113_182016_20111115_182016	meas.	meas.	interp.
20111114_192344_20111116_192344	meas.	meas.	meas.
20111115_184659_20111117_184659	pred.	pred.	pred.
20111116_181013_20111118_181013	pred.	pred.	pred.
20111117_191342_20111119_191342	pred.	pred.	pred.
20111118_183656_20111120_183656	pred.	pred.	pred.
20111119_194025_20111121_194025	pred.	pred.	pred.
20111120_190339_20111122_190339	pred.	pred.	pred.
20111121_182654_20111219_182654	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	1.0112	1.1845	1.1519	0.9975	0.9337	0.9556	1.1900	OK
2	1.0041	1.0772	1.0570	0.9981	0.9745	0.9831	1.0800	OK
3	1.0028	1.0238	1.0153	0.9986	0.9936	0.9969	1.0300	OK
4	1.0021	1.0048	1.0015	0.9990	0.9979	1.0000	1.0100	OK
5	1.0019	1.0028	1.0009	0.9989	0.9992	1.0001	1.0120	OK
6	1.0014	1.0023	1.0011	0.9993	1.0009	1.0002	1.0100	OK
7	1.0013	1.0011	1.0014	–	–	–	1.0070	OK
8	1.0010	1.0020	1.0026	–	–	–	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 07 Nov 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111108_074559_20111107_184021_20111109_184021` .

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

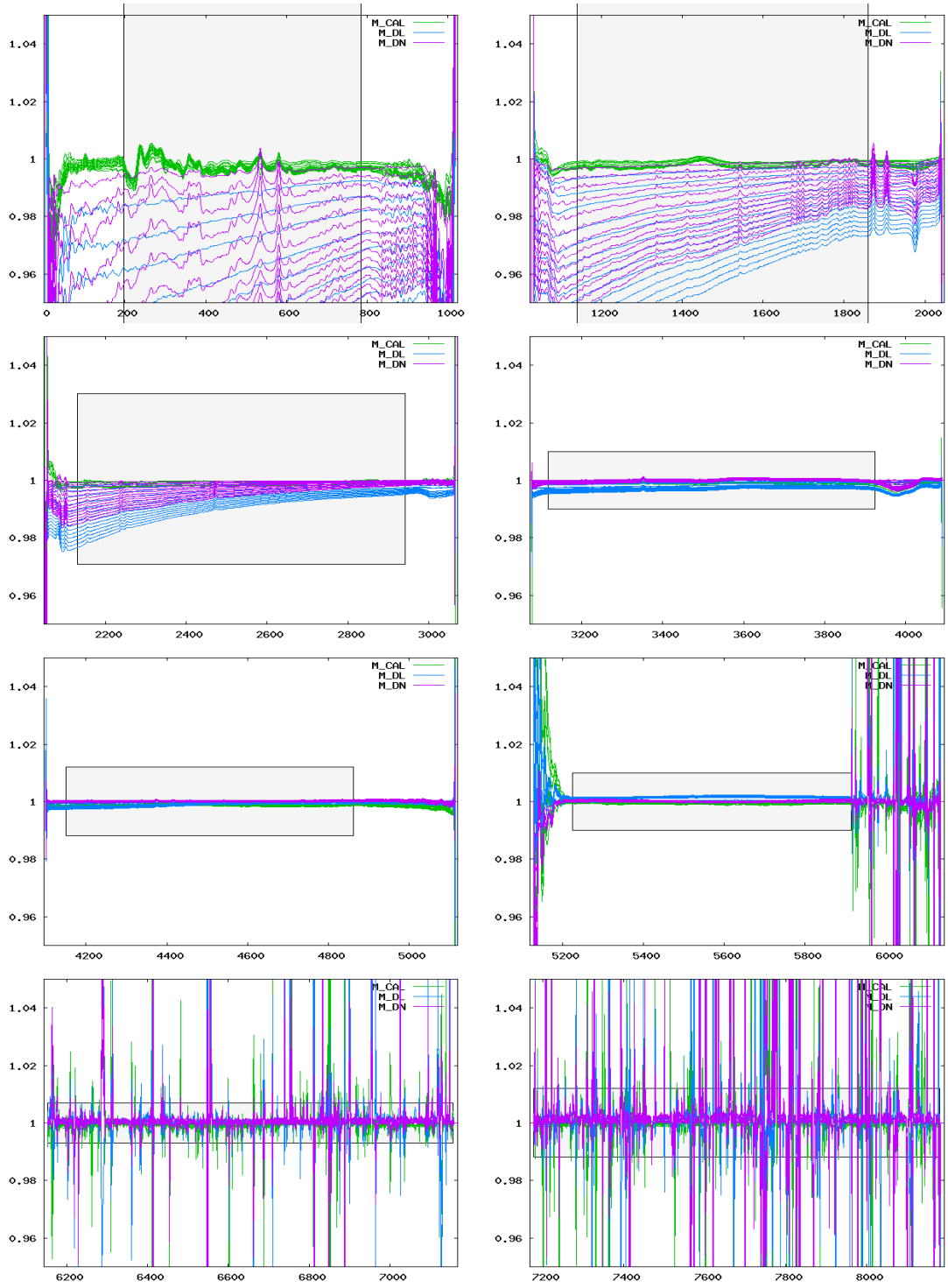

Figure 1: Ratio of delivered m-factors (08 Nov 2011– 21 Nov 2011) to the corresponding m-factor of the previous delivery day (07 Nov 2011). The grey boxes visualize the maximum ratio allowed.