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 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: 11 Nov 2008– 17 Nov 2008

- Prediction: 18 Nov 2008– 24 Nov 2008

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
aef8ae267ee87cbf11d5c46c4cf5c9de	SCI_MF1_AXNIFE20081118_124300_20081111_181642_20081113_181642
c66d545d8becfc3a45e80bafc7e04844	SCI_MF1_AXNIFE20081118_124300_20081112_192541_20081114_192541
1ce024e3a497a73484ababc319674cfa	SCI_MF1_AXNIFE20081118_124300_20081113_185404_20081115_185404
a43acb998305f2ea81d92077a58caed1	SCI_MF1_AXNIFE20081118_124300_20081114_182227_20081116_182227
dcbf54ea5483d1426c0d1bb39ba29fa7	SCI_MF1_AXNIFE20081118_124300_20081115_193126_20081117_193126
0386e9ee1c14306e0b1e9089e04d18ae	SCI_MF1_AXNIFE20081118_124300_20081116_185949_20081118_185949
e85c5baf7d97d82858b692a0a4d1d695	SCI_MF1_AXNIFE20081118_124300_20081117_182812_20081119_182812
de8372ffb37d7690b811be6790cc3dba	SCI_MF1_AXNIFE20081118_124300_20081118_193711_20081120_193711
9d61f9ffc21fb0ec8473e81014ee1eac	SCI_MF1_AXNIFE20081118_124300_20081119_190534_20081121_190534
24f78a6054c583cbff66e8e255d15a85	SCI_MF1_AXNIFE20081118_124300_20081120_183357_20081122_183357
24b3558ecd843744480288234ed486a9	SCI_MF1_AXNIFE20081118_124300_20081121_194256_20081123_194256
29164417dedc6423b23058327efc660b	SCI_MF1_AXNIFE20081118_124300_20081122_191119_20081124_191119
ba101b3b47a57529c4698061b77084a1	SCI_MF1_AXNIFE20081118_124300_20081123_183942_20081125_183942
5afd1383714a337bf1d2de42f03d8857	SCI_MF1_AXNIFE20081118_124300_20081124_194841_20081222_194841

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

validity identifier	M_CAL	M_DL	M_DN
20081111_181642_20081113_181642	meas.	meas.	meas.
20081112_192541_20081114_192541	meas.	meas.	meas.
20081113_185404_20081115_185404	meas.	meas.	interp.
20081114_182227_20081116_182227	meas.	meas.	interp.
20081115_193126_20081117_193126	meas.	interp.	interp.
20081116_185949_20081118_185949	meas.	meas.	meas.
20081117_182812_20081119_182812	meas.	meas.	pred.
20081118_193711_20081120_193711	pred.	pred.	pred.
20081119_190534_20081121_190534	pred.	pred.	pred.
20081120_183357_20081122_183357	pred.	pred.	pred.
20081121_194256_20081123_194256	pred.	pred.	pred.
20081122_191119_20081124_191119	pred.	pred.	pred.
20081123_183942_20081125_183942	pred.	pred.	pred.
20081124_194841_20081222_194841	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. SCIA-MACHY 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	1.0124	1.0120	1.0085	1.0005	1.0048	1.0017	1.0400	OK
2	1.0017	1.0065	1.0022	1.0004	1.0022	1.0007	1.0200	OK
3	1.0004	1.0015	1.0023	0.9999	1.0003	1.0004	1.0100	OK
4	1.0007	1.0006	1.0026	1.0000	1.0002	1.0006	1.0100	OK
5	1.0008	1.0019	1.0021	0.9999	1.0010	1.0006	1.0120	OK
6	1.0012	1.0035	1.0019	0.9999	1.0020	1.0011	1.0100	OK
7	0.9991	1.0004	0.9996	–	–	–	1.0070	OK
8	0.9998	1.0006	1.0011	–	–	–	1.0120	OK

certain limit l:

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

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 10 Nov 2008, therefore M_{t_0} is taken from the m–factor file SCI_MF1_AXNIFE20081111_205524_20081110_184819_20081112_184819 .

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
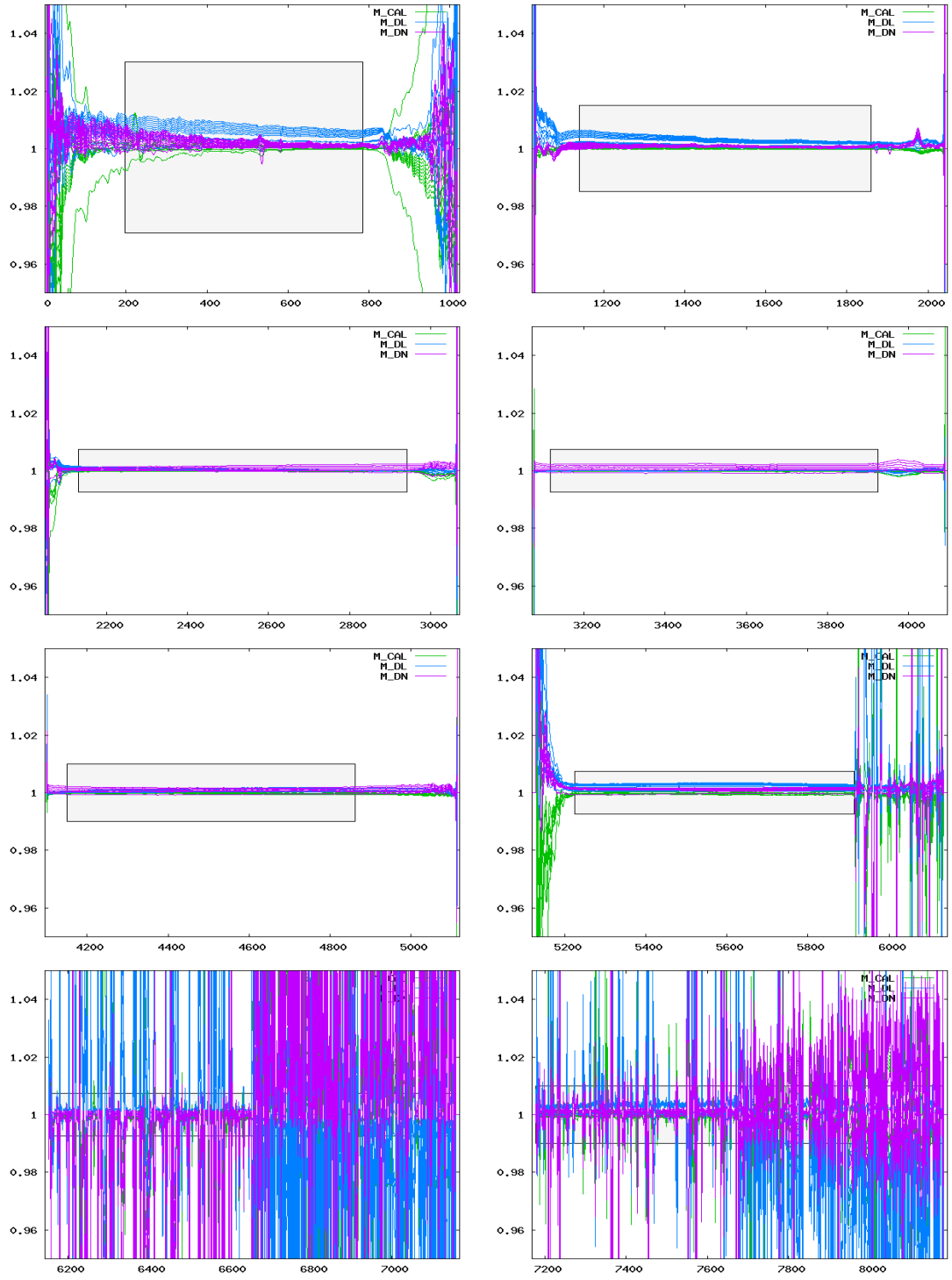
Figure 1: Ratio of delivered m-factors (11 Nov 2008– 24 Nov 2008) to the corresponding m-factor of the previous delivery day (10 Nov 2008). The grey boxes visualize the maximum ratio allowed.