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: 01 Nov 2011– 07 Nov 2011

- Prediction: 08 Nov 2011– 14 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
98c47eb5e6e0cb2fa1fd3561ee80dfb8	SCI_MF1_AXNIFE20111108_074559_20111101_190026_20111103_190026
45afb9f0fdd2aaf2c227552dbc644591	SCI_MF1_AXNIFE20111108_074559_20111102_182340_20111104_182340
18c37c1f38500989fcffb0d3abf66385	SCI_MF1_AXNIFE20111108_074559_20111103_192709_20111105_192709
7b663dce92ee181592d0e2a7d1391031	SCI_MF1_AXNIFE20111108_074559_20111104_185023_20111106_185023
4efca7029d90428b5c397fc862a36612	SCI_MF1_AXNIFE20111108_074559_20111105_181338_20111107_181338
188d608dc7e133634d601bde2ca04e96	SCI_MF1_AXNIFE20111108_074559_20111106_191706_20111108_191706
eca44fda0504a6ff8cc9b0c197e0c765	SCI_MF1_AXNIFE20111108_074559_20111107_184021_20111109_184021
390523112c0dcd3b351d2e78c02d2720	SCI_MF1_AXNIFE20111108_074559_20111108_180335_20111110_180335
ba9ac822d971dffba6e346139fdc6f0f	SCI_MF1_AXNIFE20111108_074559_20111109_190704_20111111_190704
a5b17be4e20dd30313294f2fbfdde536	SCI_MF1_AXNIFE20111108_074559_20111110_183018_20111112_183018
ac61956974327d7a0ed4755df9d745ad	SCI_MF1_AXNIFE20111108_074559_20111111_193347_20111113_193347
261c7d8c5c173f817158a5af1ea74c80	SCI_MF1_AXNIFE20111108_074559_20111112_185701_20111114_185701
bc889d846bbb20c0b609966a3180b6f5	SCI_MF1_AXNIFE20111108_074559_20111113_182016_20111115_182016
1d5321bec85597bdf15aff1b7f9bb11c	SCI_MF1_AXNIFE20111108_074559_20111114_192344_20111212_192344

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

validity identifier	M_CAL	M_DL	M_DN
20111101_190026_20111103_190026	meas.	meas.	interp.
20111102_182340_20111104_182340	meas.	meas.	interp.
20111103_192709_20111105_192709	meas.	meas.	meas.
20111104_185023_20111106_185023	meas.	meas.	interp.
20111105_181338_20111107_181338	meas.	meas.	interp.
20111106_191706_20111108_191706	meas.	meas.	interp.
20111107_184021_20111109_184021	meas.	meas.	meas.
20111108_180335_20111110_180335	pred.	pred.	pred.
20111109_190704_20111111_190704	pred.	pred.	pred.
20111110_183018_20111112_183018	pred.	pred.	pred.
20111111_193347_20111113_193347	pred.	pred.	pred.
20111112_185701_20111114_185701	pred.	pred.	pred.
20111113_182016_20111115_182016	pred.	pred.	pred.
20111114_192344_20111212_192344	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	1.0269	1.1447	1.1557	0.9957	0.9484	0.9548	1.1600	OK
2	1.0022	1.0587	1.0482	1.0003	0.9815	0.9847	1.0600	OK
3	1.0016	1.0154	1.0110	1.0008	0.9967	0.9984	1.0160	OK
4	1.0010	1.0023	1.0018	1.0005	0.9992	1.0010	1.0100	OK
5	1.0009	1.0014	1.0018	1.0003	0.9997	1.0013	1.0120	OK
6	1.0019	1.0019	1.0042	1.0007	1.0010	1.0024	1.0100	OK
7	1.0009	1.0011	1.0039	–	–	–	1.0070	OK
8	1.0012	1.0014	1.0031	–	–	–	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 31 Oct 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111101_104231_20111031_193711_20111102_193711` .

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
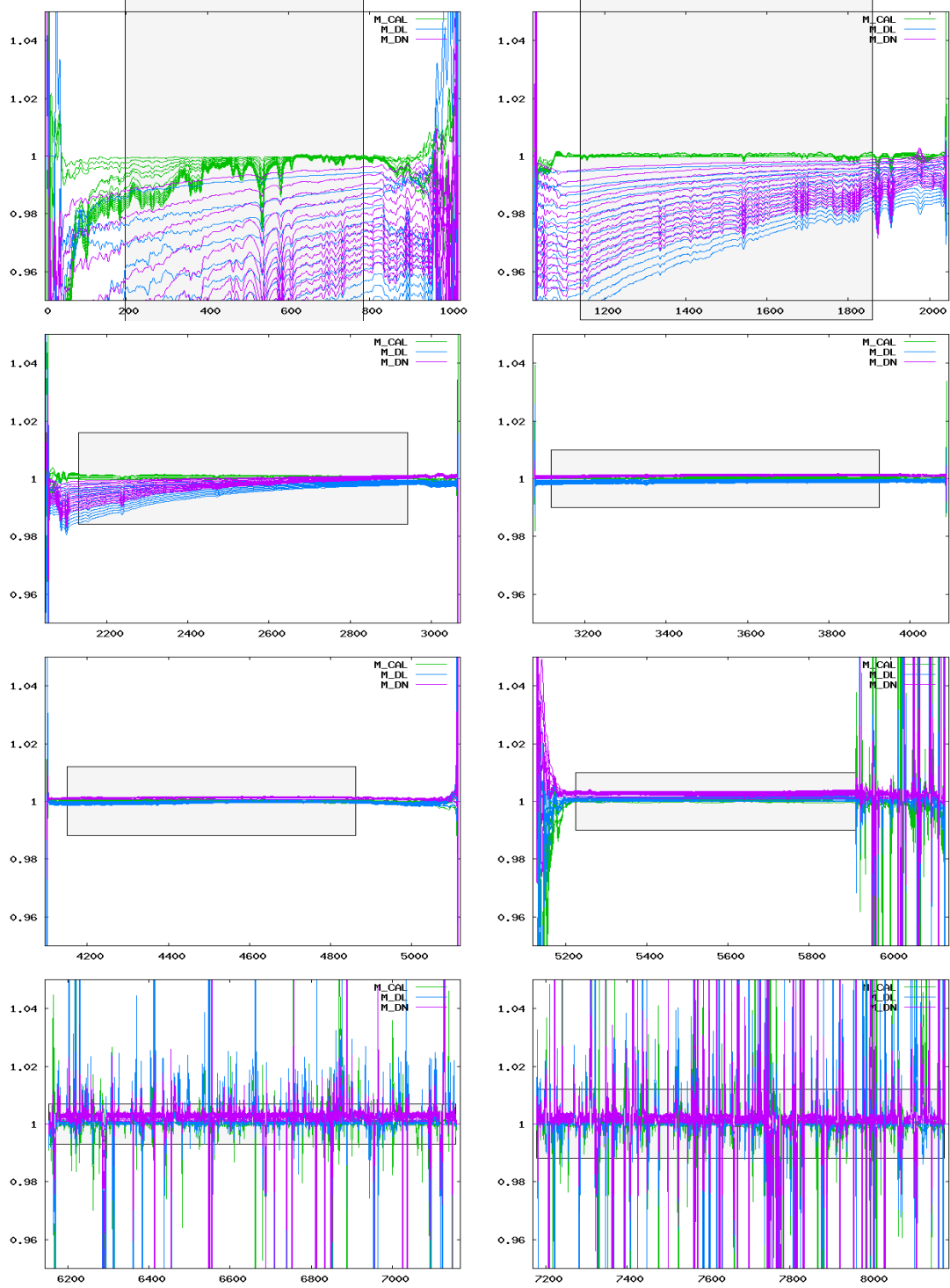
Figure 1: Ratio of delivered m-factors (01 Nov 2011– 14 Nov 2011) to the corresponding m-factor of the previous delivery day (31 Oct 2011). The grey boxes visualize the maximum ratio allowed.