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: 09 Aug 2011– 15 Aug 2011
- Prediction: 16 Aug 2011– 22 Aug 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
257401f09eb10e766e0555c50e121c1e	SCI_MF1_AXNIFE20110816_040659_20110809_184054_20110811_184054
ec4690769d22f27a2895f68389de6e8c	SCI_MF1_AXNIFE20110816_040659_20110810_194422_20110812_194422
df0e4a819ed1947c7218f1ada28f722a	SCI_MF1_AXNIFE20110816_040659_20110811_190736_20110813_190736
bb80f6b53410c409f031e2420754c5e0	SCI_MF1_AXNIFE20110816_040659_20110812_183051_20110814_183051
dcb37403631018f64c150b99c76f66ca	SCI_MF1_AXNIFE20110816_040659_20110813_193419_20110815_193419
7349a55606849999aa041d057d6270c3	SCI_MF1_AXNIFE20110816_040659_20110814_185734_20110816_185734
25d206e9edefeb2ee3956669fc25464b	SCI_MF1_AXNIFE20110816_040659_20110815_182049_20110817_182049
6394355857a66beeda10895d2ba998a6	SCI_MF1_AXNIFE20110816_040659_20110816_192417_20110818_192417
f32fe7a86e59b232bb85b09bb292abd8	SCI_MF1_AXNIFE20110816_040659_20110817_184732_20110819_184732
edb9a08b29d3510396b0962f3c5107fe	SCI_MF1_AXNIFE20110816_040659_20110818_181046_20110820_181046
1d5dab2cc0528360bd93b7c44be89fcb	SCI_MF1_AXNIFE20110816_040659_20110819_191414_20110821_191414
4fa5e6acfc379a3ce4b4cb4da8e6744e	SCI_MF1_AXNIFE20110816_040659_20110820_183729_20110822_183729
fd47197ee1b0340e72472f1d22fb3ad9	SCI_MF1_AXNIFE20110816_040659_20110821_194057_20110823_194057
00b6c659301d68493bed69c526303589	SCI_MF1_AXNIFE20110816_040659_20110822_190412_20110919_190412

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

validity identifier	M_CAL	M_DL	M_DN
20110809_184054_20110811_184054	meas.	meas.	interp.
20110810_194422_20110812_194422	meas.	meas.	interp.
20110811_190736_20110813_190736	meas.	meas.	interp.
20110812_183051_20110814_183051	meas.	meas.	interp.
20110813_193419_20110815_193419	meas.	meas.	meas.
20110814_185734_20110816_185734	meas.	meas.	pred.
20110815_182049_20110817_182049	meas.	meas.	pred.
20110816_192417_20110818_192417	pred.	pred.	pred.
20110817_184732_20110819_184732	pred.	pred.	pred.
20110818_181046_20110820_181046	pred.	pred.	pred.
20110819_191414_20110821_191414	pred.	pred.	pred.
20110820_183729_20110822_183729	pred.	pred.	pred.
20110821_194057_20110823_194057	pred.	pred.	pred.
20110822_190412_20110919_190412	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	1.0185	1.0150	1.0284	1.0004	1.0008	0.9901	1.0400	OK
2	1.0017	1.0013	1.0084	1.0004	1.0003	0.9972	1.0200	OK
3	1.0013	1.0004	1.0022	0.9997	0.9999	1.0001	1.0100	OK
4	1.0006	1.0006	1.0016	0.9997	1.0001	1.0011	1.0100	OK
5	1.0009	1.0016	1.0020	0.9997	1.0005	1.0011	1.0120	OK
6	1.0012	1.0019	1.0023	0.9996	1.0010	1.0012	1.0100	OK
7	1.0010	1.0014	1.0022	–	–	–	1.0070	OK
8	1.0007	1.0042	1.0035	–	–	–	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 08 Aug 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110809_040337_20110808_191739_20110810_191739` .

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

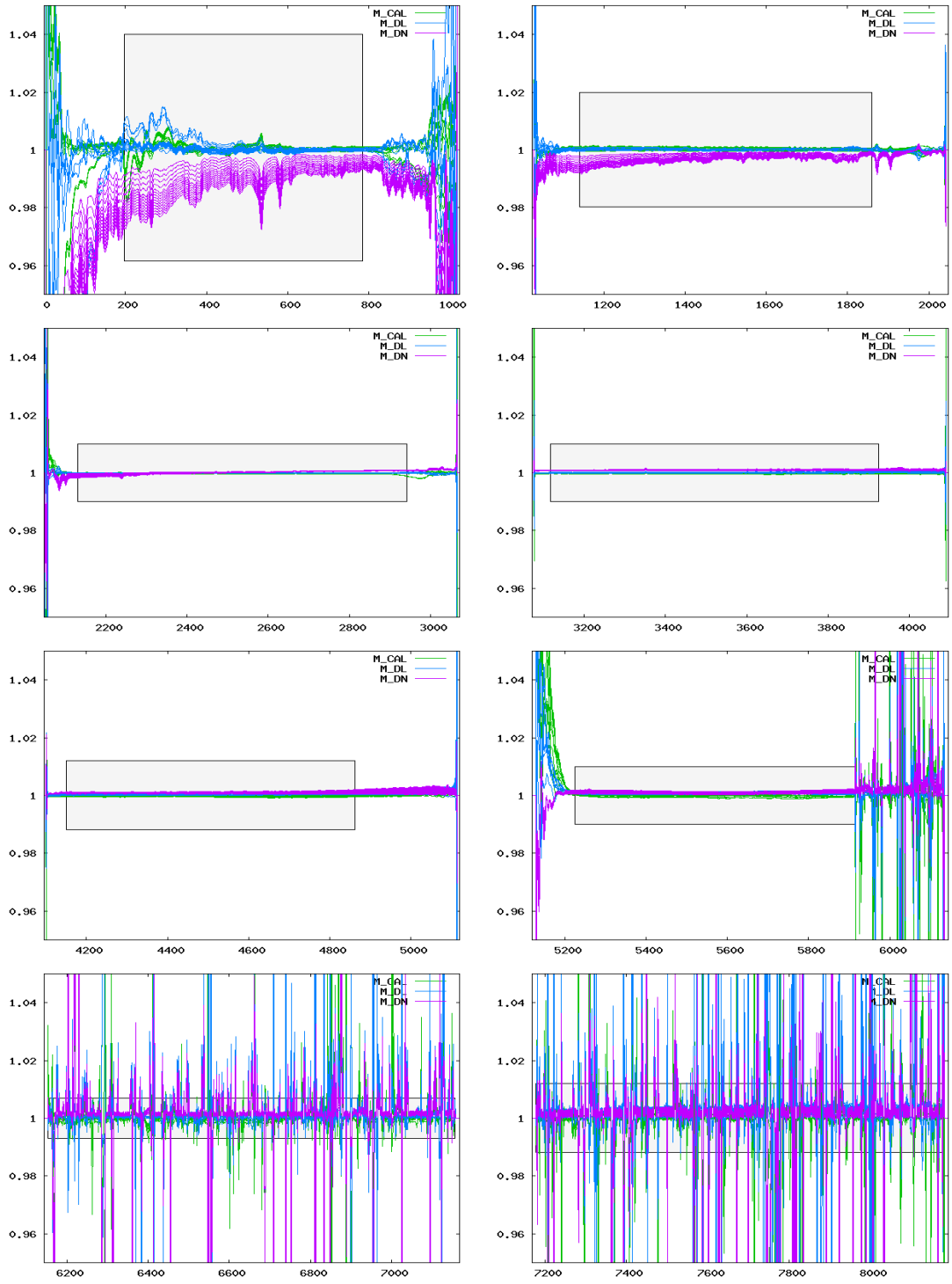

Figure 1: Ratio of delivered m-factors (09 Aug 2011– 22 Aug 2011) to the corresponding m-factor of the previous delivery day (08 Aug 2011). The grey boxes visualize the maximum ratio allowed.