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: 04 Oct 2011– 10 Oct 2011

- Prediction: 11 Oct 2011– 17 Oct 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
98b9dda72adf6ac371c0917415007317	SCI_MF1_AXNIFE20111011_073646_20111004_192720_20111006_192720
4849cb0b18c5c121e303d4daa90a852c	SCI_MF1_AXNIFE20111011_073646_20111005_185034_20111007_185034
c07f2705b703b9acaaefb993df2630ec	SCI_MF1_AXNIFE20111011_073646_20111006_181349_20111008_181349
b599032ca1c7ac55700179f9a35bc07b	SCI_MF1_AXNIFE20111011_073646_20111007_191717_20111009_191717
a3a32d4f28e574d959d6343436d7cdc3	SCI_MF1_AXNIFE20111011_073646_20111008_184032_20111010_184032
873c260634fc5fdb40a995c71dec786b	SCI_MF1_AXNIFE20111011_073646_20111009_180346_20111011_180346
143945028fefc080417efa39f47e05e3	SCI_MF1_AXNIFE20111011_073646_20111010_190715_20111012_190715
ece305e8b27ff95f7a6d9aa12377df93	SCI_MF1_AXNIFE20111011_073646_20111011_183029_20111013_183029
dec93a5608d6bbea92ba1531d91f4cb4	SCI_MF1_AXNIFE20111011_073646_20111012_193358_20111014_193358
83322a51a4c81d2e4d5f45e41be66bbf	SCI_MF1_AXNIFE20111011_073646_20111013_185712_20111015_185712
78b3873955c78cbf6e587da9defd9819	SCI_MF1_AXNIFE20111011_073646_20111014_182027_20111016_182027
f164a8eb3622e4cd1fece2e91ac1df9f	SCI_MF1_AXNIFE20111011_073646_20111015_192355_20111017_192355
14145ecad3b14a609064aa530d41becc	SCI_MF1_AXNIFE20111011_073646_20111016_184710_20111018_184710
f666e52053571d717d7af999f3608984	SCI_MF1_AXNIFE20111011_073646_20111017_181024_20111114_181024

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

validity identifier	M_CAL	M_DL	M_DN
20111004_192720_20111006_192720	meas.	meas.	interp.
20111005_185034_20111007_185034	meas.	meas.	interp.
20111006_181349_20111008_181349	meas.	meas.	meas.
20111007_191717_20111009_191717	meas.	meas.	pred.
20111008_184032_20111010_184032	meas.	meas.	pred.
20111009_180346_20111011_180346	meas.	meas.	pred.
20111010_190715_20111012_190715	meas.	meas.	pred.
20111011_183029_20111013_183029	pred.	pred.	pred.
20111012_193358_20111014_193358	pred.	pred.	pred.
20111013_185712_20111015_185712	pred.	pred.	pred.
20111014_182027_20111016_182027	pred.	pred.	pred.
20111015_192355_20111017_192355	pred.	pred.	pred.
20111016_184710_20111018_184710	pred.	pred.	pred.
20111017_181024_20111114_181024	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	1.0133	1.0658	1.0567	0.9997	0.9726	0.9800	1.0700	OK
2	1.0016	1.0344	1.0230	1.0005	0.9892	0.9917	1.0400	OK
3	1.0005	1.0106	1.0075	1.0002	0.9978	0.9972	1.0200	OK
4	1.0008	1.0014	1.0023	1.0002	0.9997	0.9983	1.0100	OK
5	1.0014	1.0014	1.0018	1.0002	1.0001	0.9986	1.0120	OK
6	1.0015	1.0020	1.0015	1.0003	1.0006	0.9996	1.0100	OK
7	1.0004	1.0016	1.0009	–	–	–	1.0070	OK
8	1.0030	1.0047	1.0016	–	–	–	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 03 Oct 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111004_073842_20111003_182351_20111005_182351` .

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
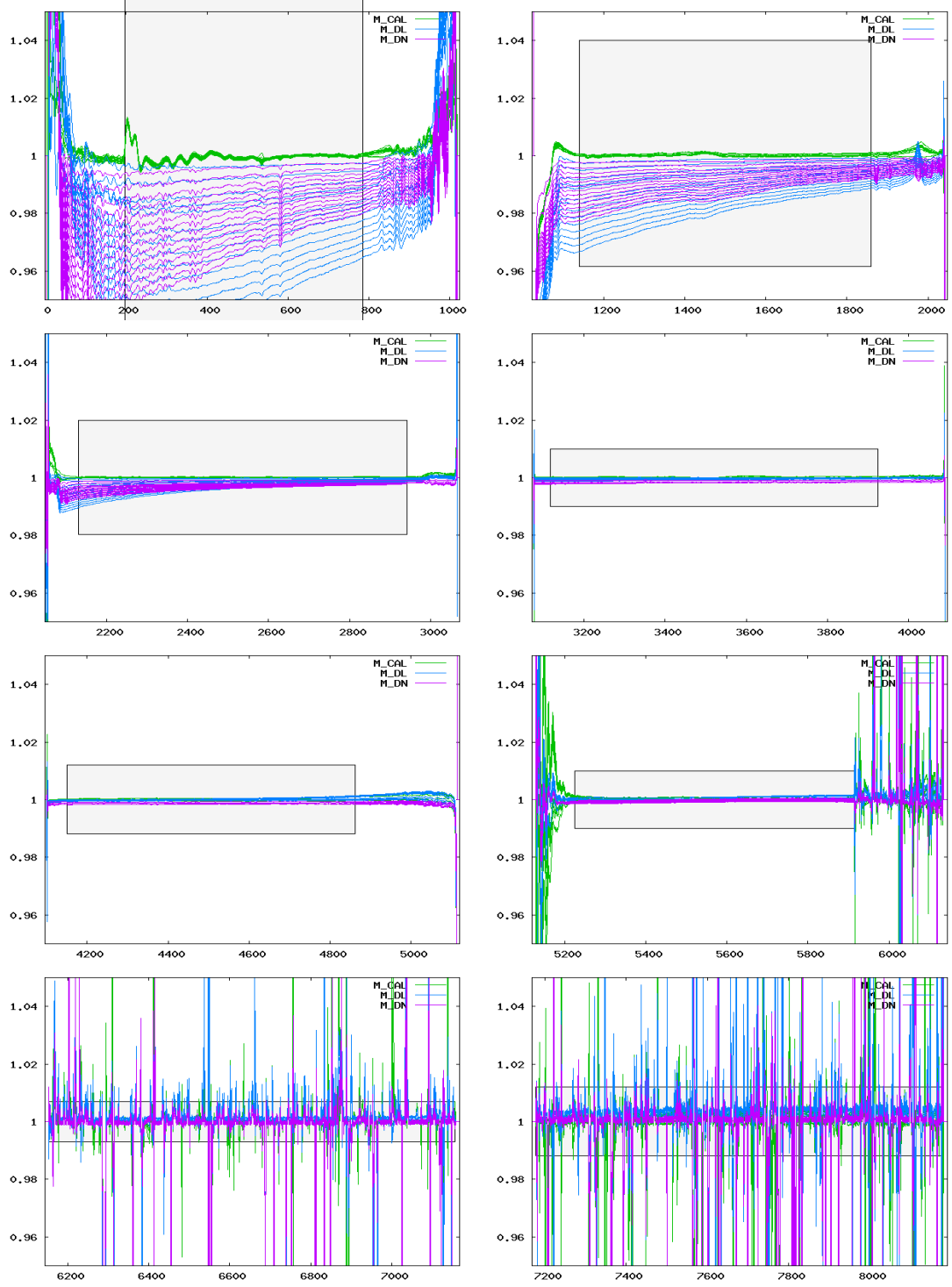
Figure 1: Ratio of delivered m-factors (04 Oct 2011– 17 Oct 2011) to the corresponding m-factor of the previous delivery day (03 Oct 2011). The grey boxes visualize the maximum ratio allowed.