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: 19 Apr 2011– 25 Apr 2011
- Prediction: 26 Apr 2011– 02 May 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
bda9673863e1de422b5d17400a03e461	SCI_MF1_AXNIFE20110426_034239_20110419_184815_20110421_184815
088ae46bcf929b7f1aba0dc4dcc38e05	SCI_MF1_AXNIFE20110426_034239_20110420_181130_20110422_181130
706b5ad93c8d7f4e072241f77e42719d	SCI_MF1_AXNIFE20110426_034239_20110421_191458_20110423_191458
d30759830575deaa69dbf4d7349518ba	SCI_MF1_AXNIFE20110426_034239_20110422_183813_20110424_183813
19c8e4976e21f3f022adb66a5f4867c5	SCI_MF1_AXNIFE20110426_034239_20110423_194141_20110425_194141
4d0f65a458fb1df113d7a75bf926f794	SCI_MF1_AXNIFE20110426_034239_20110424_190456_20110426_190456
ca0b2ff710200c04d241c495500e96cf	SCI_MF1_AXNIFE20110426_034239_20110425_182810_20110427_182810
d001f51cdf15949cd4bea9301310a84e	SCI_MF1_AXNIFE20110426_034239_20110426_193139_20110428_193139
1ca3bc304c47dba5af5ef0d4f4a4aba3	SCI_MF1_AXNIFE20110426_034239_20110427_185453_20110429_185453
c14b2e8b70983a5a31a11f48f04cd084	SCI_MF1_AXNIFE20110426_034239_20110428_181808_20110430_181808
6276da5c8986398c3572cb9dfd6a3f7f	SCI_MF1_AXNIFE20110426_034239_20110429_192136_20110501_192136
c0ea4dd98e36113fa0877cc0c8774405	SCI_MF1_AXNIFE20110426_034239_20110430_184451_20110502_184451
d6e87c7430b0313cd6313ca35f22f76f	SCI_MF1_AXNIFE20110426_034239_20110501_180805_20110503_180805
dc47ff8186a47ef02bc5a19e203f5bf7	SCI_MF1_AXNIFE20110426_034239_20110502_191134_20110530_191134

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

validity identifier	M_CAL	M_DL	M_DN
20110419_184815_20110421_184815	meas.	meas.	interp.
20110420_181130_20110422_181130	meas.	meas.	meas.
20110421_191458_20110423_191458	meas.	meas.	interp.
20110422_183813_20110424_183813	meas.	meas.	interp.
20110423_194141_20110425_194141	meas.	meas.	interp.
20110424_190456_20110426_190456	meas.	meas.	meas.
20110425_182810_20110427_182810	meas.	meas.	pred.
20110426_193139_20110428_193139	pred.	pred.	pred.
20110427_185453_20110429_185453	pred.	pred.	pred.
20110428_181808_20110430_181808	pred.	pred.	pred.
20110429_192136_20110501_192136	pred.	pred.	pred.
20110430_184451_20110502_184451	pred.	pred.	pred.
20110501_180805_20110503_180805	pred.	pred.	pred.
20110502_191134_20110530_191134	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	1.0129	1.0339	1.0261	0.9960	0.9870	0.9933	1.0400	OK
2	1.0032	1.0187	1.0103	0.9989	0.9943	0.9971	1.0200	OK
3	1.0011	1.0055	1.0022	0.9998	0.9991	1.0008	1.0100	OK
4	1.0016	1.0008	1.0026	0.9996	0.9998	1.0016	1.0100	OK
5	1.0048	1.0023	1.0017	0.9987	0.9997	1.0006	1.0120	OK
6	1.0059	1.0022	1.0016	0.9996	1.0011	1.0007	1.0100	OK
7	1.0005	1.0013	1.0019	–	–	–	1.0070	OK
8	1.0032	1.0028	1.0029	–	–	–	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 18 Apr 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110419_133029_20110418_192501_20110420_192501` .

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

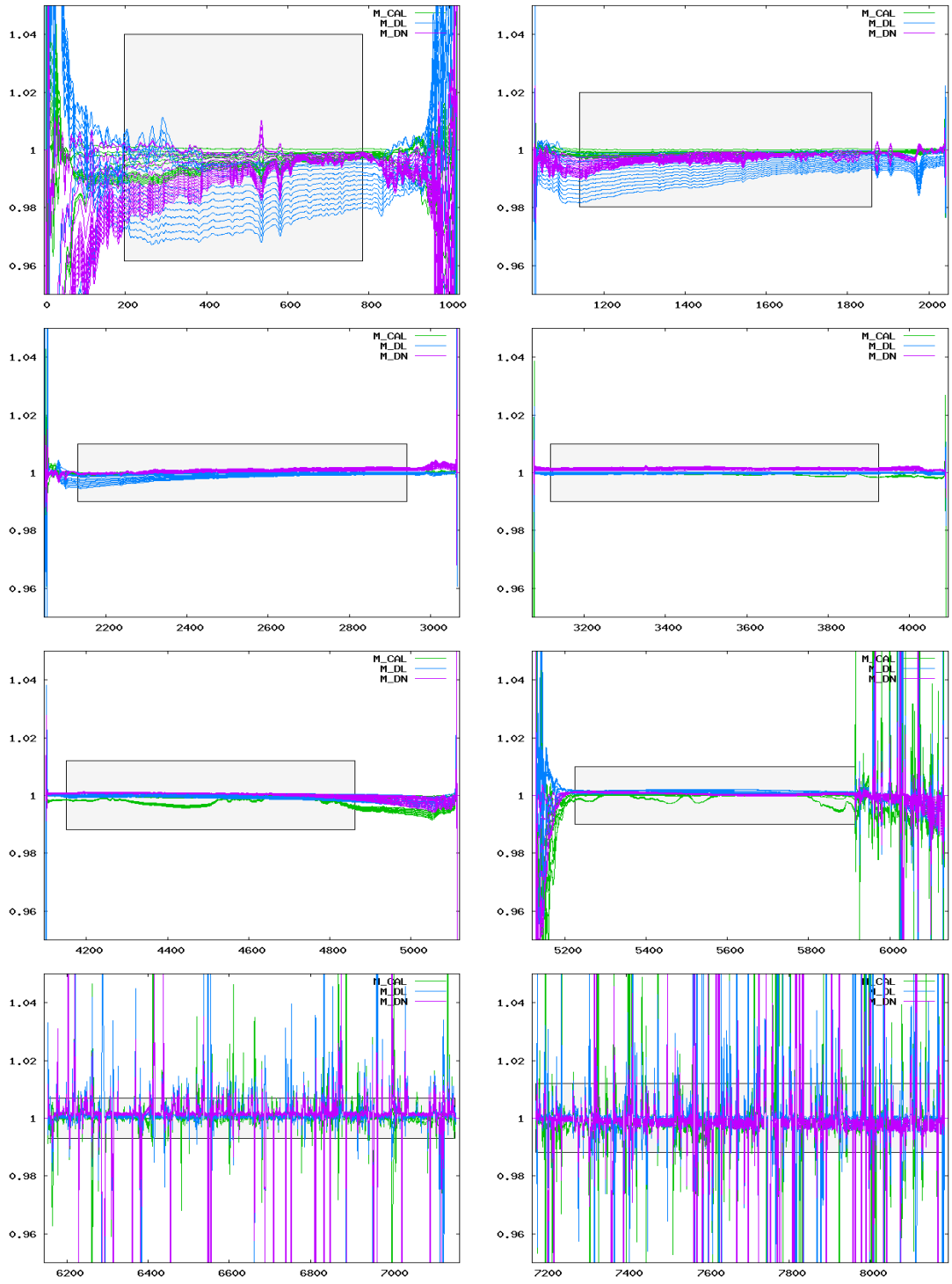

Figure 1: Ratio of delivered m-factors (19 Apr 2011– 02 May 2011) to the corresponding m-factor of the previous delivery day (18 Apr 2011). The grey boxes visualize the maximum ratio allowed.