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: 05 Apr 2011– 11 Apr 2011
- Prediction: 12 Apr 2011– 18 Apr 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
fe6371ee9aa631d373217f039d3a7202	SCI_MF1_AXNIFE20110412_075215_20110405_190142_20110407_190142
daf11df221ae4906694fb5da55bab954	SCI_MF1_AXNIFE20110412_075215_20110406_182457_20110408_182457
7c8869d6d30ba0139257c0fed59477be	SCI_MF1_AXNIFE20110412_075215_20110407_192825_20110409_192825
ed2515c7247733bcf2d7014bbe57b240	SCI_MF1_AXNIFE20110412_075215_20110408_185140_20110410_185140
41e7faaafee561a4ee90f8ee9f5fb0f4	SCI_MF1_AXNIFE20110412_075215_20110409_181454_20110411_181454
9da6d8234d87d8b56ddbfd6309197778	SCI_MF1_AXNIFE20110412_075215_20110410_191823_20110412_191823
21f53e3bb8cc0bf0aa4b7e4290ff3445	SCI_MF1_AXNIFE20110412_075215_20110411_184137_20110413_184137
3ea2f9db717655e93dac3545545ccb13	SCI_MF1_AXNIFE20110412_075215_20110412_194506_20110414_194506
e8f2c37bc470a7d1908412761e809e03	SCI_MF1_AXNIFE20110412_075215_20110413_190820_20110415_190820
938ed591aec5a2ea9e787d4f7b7f3eb8	SCI_MF1_AXNIFE20110412_075215_20110414_183135_20110416_183135
281a968a3032b25c6428086104309eed	SCI_MF1_AXNIFE20110412_075215_20110415_193503_20110417_193503
b3967f637c6f11b8c455ce1baaed5dd5	SCI_MF1_AXNIFE20110412_075215_20110416_185818_20110418_185818
912b184e02e59c3bd017d397a7948130	SCI_MF1_AXNIFE20110412_075215_20110417_182132_20110419_182132
c13e29ee94e99b405f8023ef0f614fa1	SCI_MF1_AXNIFE20110412_075215_20110418_192501_20110516_192501

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

validity identifier	M_CAL	M_DL	M_DN
20110405_190142_20110407_190142	interp.	interp.	interp.
20110406_182457_20110408_182457	interp.	interp.	interp.
20110407_192825_20110409_192825	meas.	meas.	meas.
20110408_185140_20110410_185140	meas.	meas.	interp.
20110409_181454_20110411_181454	meas.	meas.	interp.
20110410_191823_20110412_191823	meas.	meas.	interp.
20110411_184137_20110413_184137	meas.	meas.	meas.
20110412_194506_20110414_194506	pred.	pred.	pred.
20110413_190820_20110415_190820	pred.	pred.	pred.
20110414_183135_20110416_183135	pred.	pred.	pred.
20110415_193503_20110417_193503	pred.	pred.	pred.
20110416_185818_20110418_185818	pred.	pred.	pred.
20110417_182132_20110419_182132	pred.	pred.	pred.
20110418_192501_20110516_192501	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	1.0065	1.0304	1.0211	0.9983	0.9848	0.9945	1.0400	OK
2	1.0018	1.0191	1.0091	0.9997	0.9925	0.9957	1.0200	OK
3	1.0006	1.0056	1.0028	1.0001	0.9985	0.9988	1.0100	OK
4	1.0009	1.0008	1.0013	1.0000	0.9996	0.9994	1.0100	OK
5	1.0030	1.0027	1.0027	0.9995	0.9996	0.9995	1.0120	OK
6	1.0023	1.0013	1.0025	1.0006	1.0000	0.9989	1.0100	OK
7	1.0014	1.0014	1.0020	–	–	–	1.0070	OK
8	1.0052	1.0045	1.0045	–	–	–	1.0120	OK

certain limit l:

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

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 04 Apr 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110405_074016_20110404_193828_20110406_193828` .

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

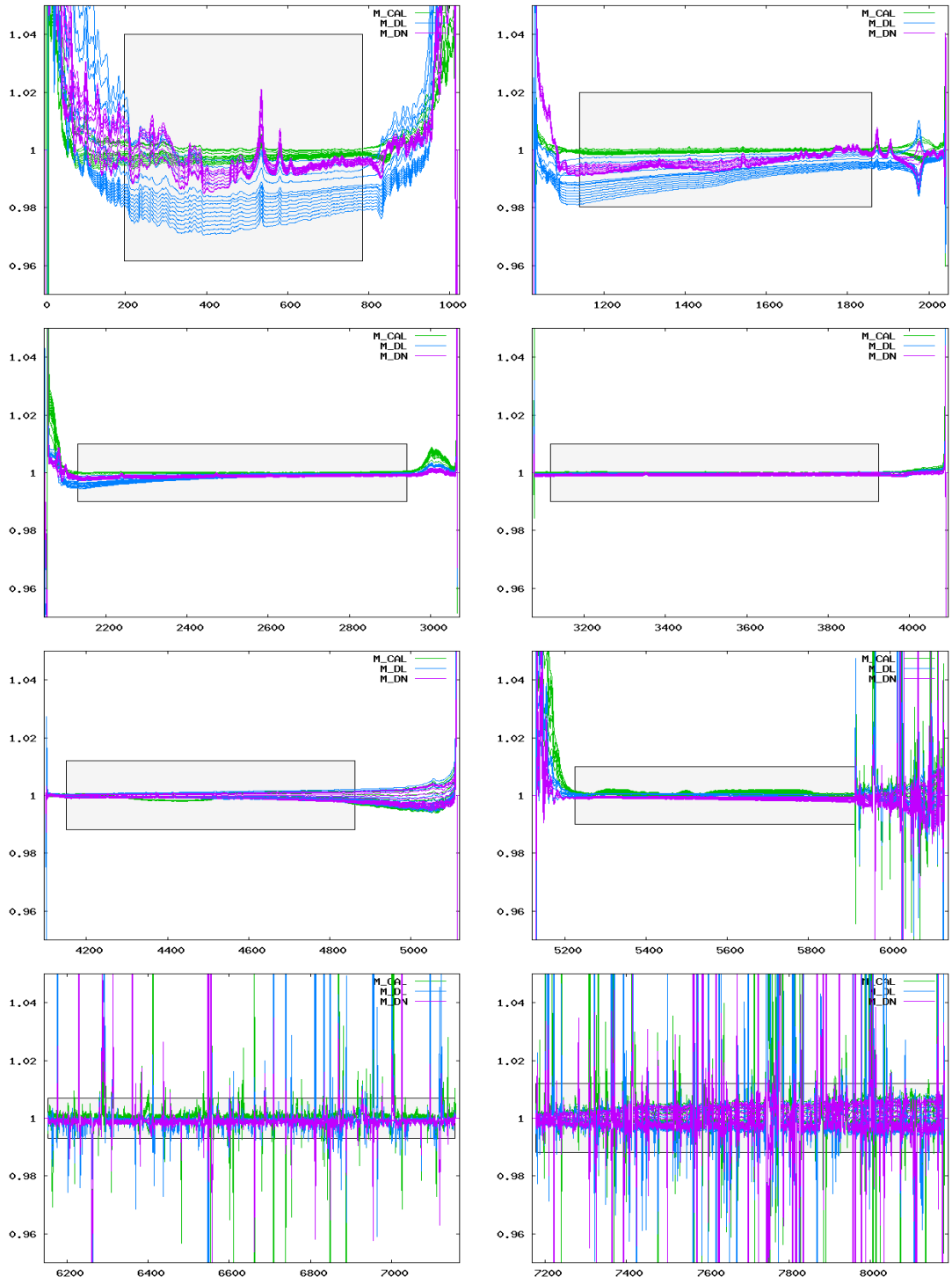

Figure 1: Ratio of delivered m-factors (05 Apr 2011– 18 Apr 2011) to the corresponding m-factor of the previous delivery day (04 Apr 2011). The grey boxes visualize the maximum ratio allowed.