NRT M-factor delivery document 20 Dec 2010

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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: 14 Dec 2010– 20 Dec 2010
- Prediction: 21 Dec 2010– 27 Dec 2010

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
5cec54d5b3ca0def5dbf63c2e4f0e271	SCI_MF1_AXNIFE20101221_044258_20101214_190904_20101216_190904
6a02fa8931857ecbafee95d3a163dc0d	SCI_MF1_AXNIFE20101221_044258_20101215_183219_20101217_183219
b9784cfd920a26f117fa204f28770e6c	SCI_MF1_AXNIFE20101221_044258_20101216_193547_20101218_193547
c1ce529b1ca4e545d10ff1ac63de09a6	SCI_MF1_AXNIFE20101221_044258_20101217_185902_20101219_185902
95961f95ab076de2f997265868ba3888	SCI_MF1_AXNIFE20101221_044258_20101218_182216_20101220_182216
7bd05a4604af377a1cb8809e814d2e94	SCI_MF1_AXNIFE20101221_044258_20101219_192545_20101221_192545
230d6e3c4ed93ae06dd87e85a711b586	SCI_MF1_AXNIFE20101221_044258_20101220_184859_20101222_184859
5be6470ed2632c3b7c58b5244a7df31f	SCI_MF1_AXNIFE20101221_044258_20101221_181214_20101223_181214
300e2046739399deb1e2228bc150c521	SCI_MF1_AXNIFE20101221_044258_20101222_191542_20101224_191542
dc93ced8e3edb03980fcbe4e88639829	SCI_MF1_AXNIFE20101221_044258_20101223_183857_20101225_183857
bbd0df4e51e36282b801d5b4360c2990	SCI_MF1_AXNIFE20101221_044258_20101224_194225_20101226_194225
78e6598f7636344c19d47108d97859a1	SCI_MF1_AXNIFE20101221_044258_20101225_190540_20101227_190540
2c991792a6c1d4e5613344da02cb46e8	SCI_MF1_AXNIFE20101221_044258_20101226_182854_20101228_182854
fafe29912e71b93e5b86886620df982e	SCI_MF1_AXNIFE20101221_044258_20101227_193223_20110124_193223

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

validity identifier	M_CAL	M_DL	M_DN
20101214_190904_20101216_190904	interp.	meas.	interp.
20101215_183219_20101217_183219	meas.	meas.	interp.
20101216_193547_20101218_193547	meas.	meas.	interp.
20101217_185902_20101219_185902	meas.	meas.	interp.
20101218_182216_20101220_182216	meas.	meas.	meas.
20101219_192545_20101221_192545	meas.	meas.	interp.
20101220_184859_20101222_184859	meas.	meas.	meas.
20101221_181214_20101223_181214	pred.	pred.	pred.
20101222_191542_20101224_191542	pred.	pred.	pred.
20101223_183857_20101225_183857	pred.	pred.	pred.
20101224_194225_20101226_194225	pred.	pred.	pred.
20101225_190540_20101227_190540	pred.	pred.	pred.
20101226_182854_20101228_182854	pred.	pred.	pred.
20101227_193223_20110124_193223	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	1.0087	1.0091	1.0155	0.9999	1.0029	0.9959	1.0400	OK
2	1.0013	1.0065	1.0035	1.0001	1.0020	0.9988	1.0200	OK
3	1.0010	1.0013	1.0037	0.9993	1.0000	0.9975	1.0100	OK
4	1.0012	1.0004	1.0036	0.9994	0.9999	0.9973	1.0100	OK
5	1.0010	1.0018	1.0023	0.9999	1.0004	0.9990	1.0120	OK
6	1.0022	1.0011	1.0012	0.9994	1.0001	1.0003	1.0100	OK
7	1.0020	1.0006	1.0013	–	–	–	1.0070	OK
8	1.0019	1.0018	1.0021	–	–	–	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 13 Dec 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101214_044257_20101213_194550_20101215_194550` .

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

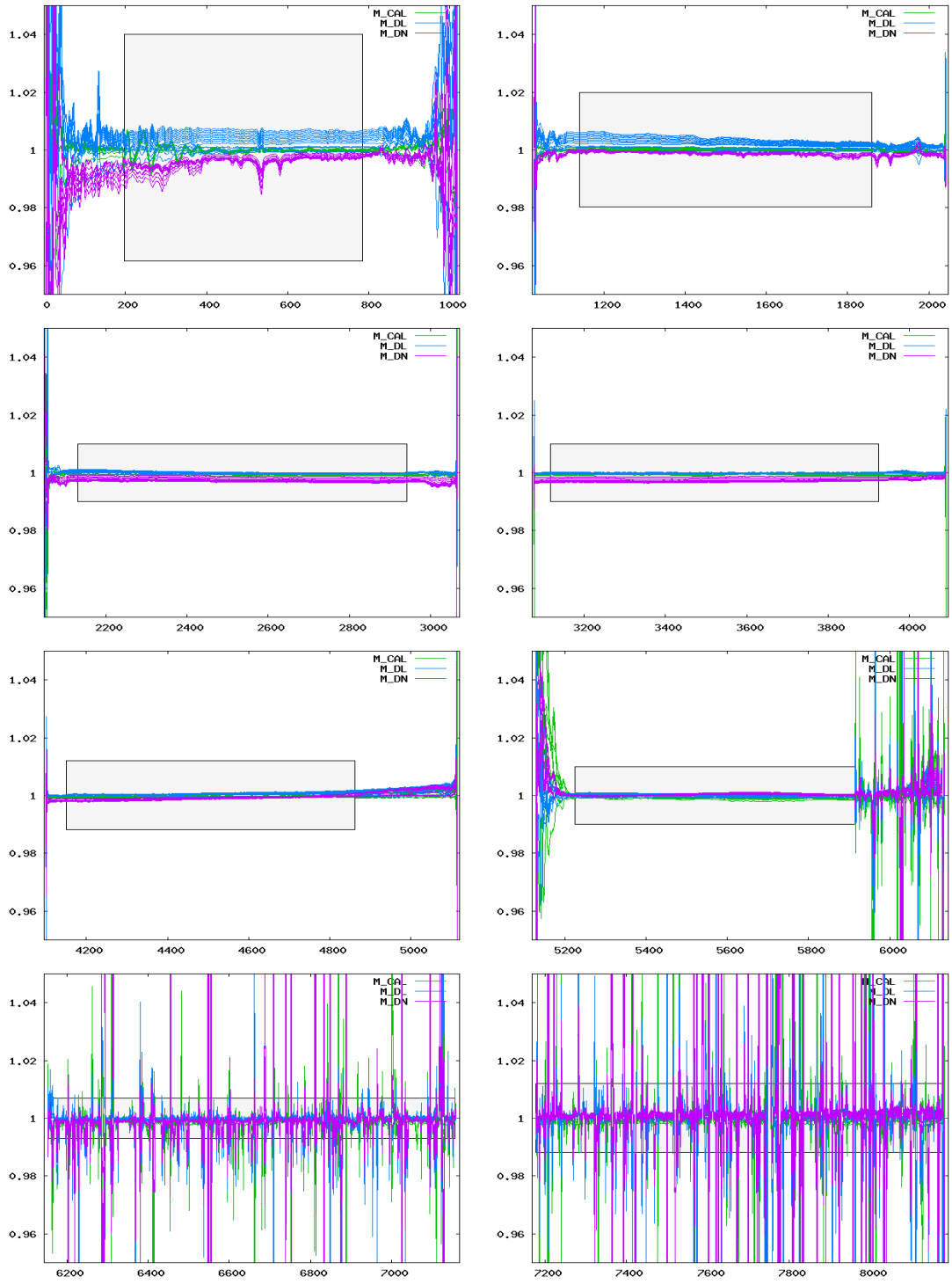

Figure 1: Ratio of delivered m-factors (14 Dec 2010– 27 Dec 2010) to the corresponding m-factor of the previous delivery day (13 Dec 2010). The grey boxes visualize the maximum ratio allowed.