NRT M-factor delivery document 28 Feb 2011

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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: 22 Feb 2011– 28 Feb 2011
- Prediction: 01 Mar 2011– 07 Mar 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
8db73473030522e3bbd3fbdf0e7604b4	SCI_MF1_AXNIFE20110301_093050_20110222_194203_20110224_194203
1314566c49a835062fd98cee7bc95b1d	SCI_MF1_AXNIFE20110301_093050_20110223_190518_20110225_190518
5c7b5db27946a1dbbdcd8430a9fa2c8f	SCI_MF1_AXNIFE20110301_093050_20110224_182832_20110226_182832
ad8b266ec69939f73e4a720d2b6d37d9	SCI_MF1_AXNIFE20110301_093050_20110225_193201_20110227_193201
f03fd53d3c07b5c7ddda8f6cb9334394	SCI_MF1_AXNIFE20110301_093050_20110226_185515_20110228_185515
e01ed2c1ab6fc7dda0934e35ad48d2d3	SCI_MF1_AXNIFE20110301_093050_20110227_181830_20110301_181830
c54dd25d2491fad8dd06b5dc6fe00452	SCI_MF1_AXNIFE20110301_093050_20110228_192158_20110302_192158
fd4ded2bb638a25f56d2e48fda6f0193	SCI_MF1_AXNIFE20110301_093050_20110301_184513_20110303_184513
441012e57e6ff070b8e93115bf0aa034	SCI_MF1_AXNIFE20110301_093050_20110302_180827_20110304_180827
21f7466b0fba805cf720bc4f4511460b	SCI_MF1_AXNIFE20110301_093050_20110303_191156_20110305_191156
1d4565a172a303005ce6183f35b7be19	SCI_MF1_AXNIFE20110301_093050_20110304_183510_20110306_183510
5e79c63f6363fdad1913272125bee3ad	SCI_MF1_AXNIFE20110301_093050_20110305_193839_20110307_193839
eebdbb4f7fe208be1a1dd41b6bf3b217	SCI_MF1_AXNIFE20110301_093050_20110306_190153_20110308_190153
0341518af7bd3bedd66bf15a7ecdbef7	SCI_MF1_AXNIFE20110301_093050_20110307_182508_20110404_182508

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

validity identifier	M_CAL	M_DL	M_DN
20110222_194203_20110224_194203	meas.	meas.	interp.
20110223_190518_20110225_190518	meas.	meas.	interp.
20110224_182832_20110226_182832	meas.	meas.	meas.
20110225_193201_20110227_193201	meas.	meas.	interp.
20110226_185515_20110228_185515	meas.	meas.	interp.
20110227_181830_20110301_181830	meas.	meas.	interp.
20110228_192158_20110302_192158	meas.	meas.	meas.
20110301_184513_20110303_184513	pred.	pred.	pred.
20110302_180827_20110304_180827	pred.	pred.	pred.
20110303_191156_20110305_191156	pred.	pred.	pred.
20110304_183510_20110306_183510	pred.	pred.	pred.
20110305_193839_20110307_193839	pred.	pred.	pred.
20110306_190153_20110308_190153	pred.	pred.	pred.
20110307_182508_20110404_182508	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	1.0096	1.0072	1.0081	1.0002	1.0032	1.0032	1.0400	OK
2	1.0014	1.0050	1.0062	1.0006	1.0022	1.0028	1.0200	OK
3	1.0008	1.0013	1.0027	1.0003	1.0004	1.0012	1.0100	OK
4	1.0027	1.0013	1.0016	1.0008	1.0001	1.0006	1.0100	OK
5	1.0020	1.0012	1.0018	1.0010	1.0001	0.9998	1.0120	OK
6	1.0035	1.0016	1.0007	1.0018	1.0004	0.9999	1.0100	OK
7	1.0036	1.0004	1.0005	–	–	–	1.0070	OK
8	1.0028	1.0016	1.0011	–	–	–	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 21 Feb 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110222_044351_20110221_183835_20110223_183835` .

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

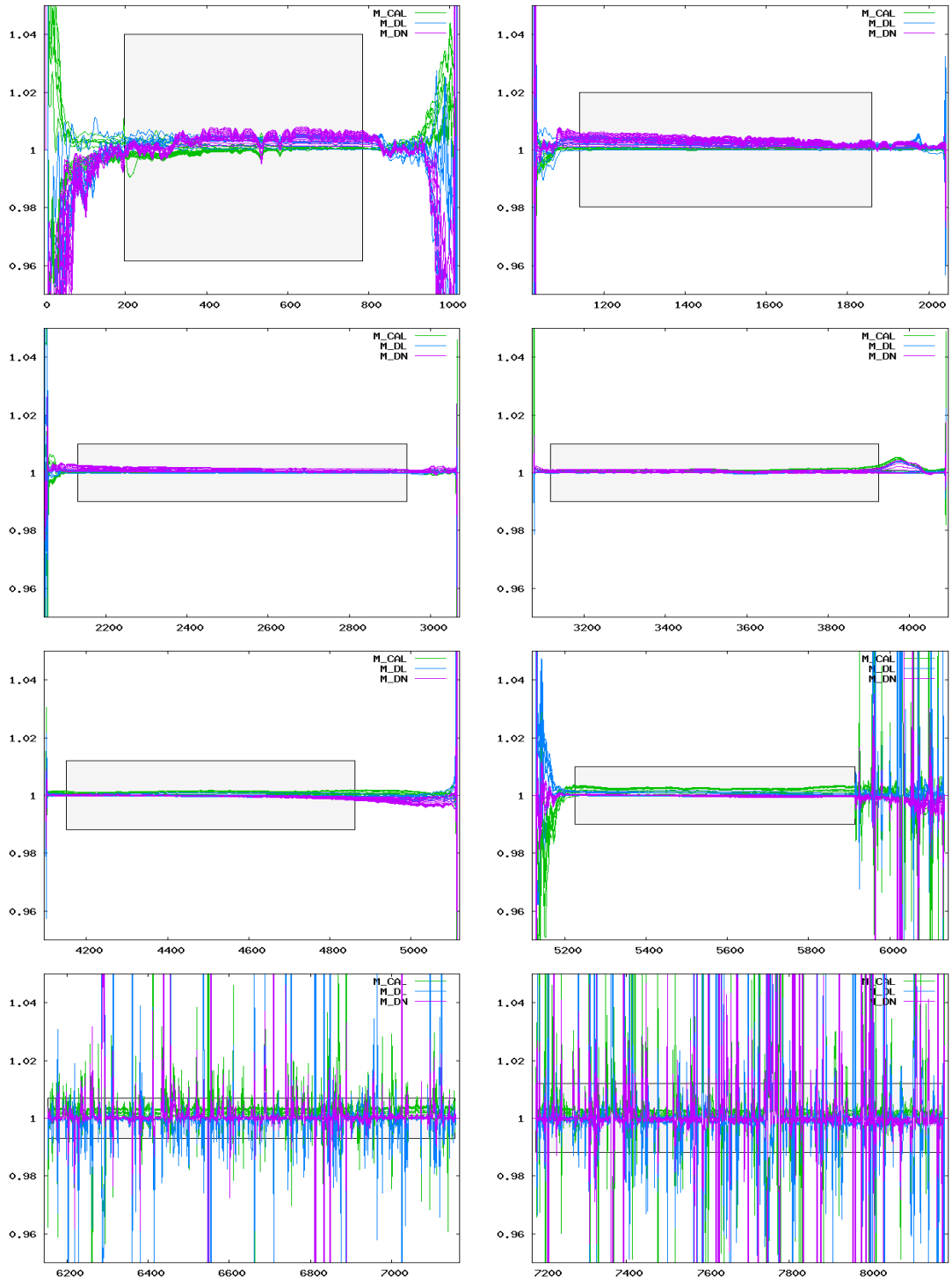

Figure 1: Ratio of delivered m-factors (22 Feb 2011– 07 Mar 2011) to the corresponding m-factor of the previous delivery day (21 Feb 2011). The grey boxes visualize the maximum ratio allowed.