NRT M-factor delivery document 07 Mar 2011

Klaus Bramstedt, ife Bremen

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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: 01 Mar 2011– 07 Mar 2011
- Prediction: 08 Mar 2011– 14 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
5576dfec40ad960993b5997d34d776e7	SCI_MF1_AXNIFE20110308_044320_20110301_184513_20110303_184513
74751cce3d12c22627177e186cfa79de	SCI_MF1_AXNIFE20110308_044320_20110302_180827_20110304_180827
48468059834f1a7d73b4d4d62549ca53	SCI_MF1_AXNIFE20110308_044320_20110303_191156_20110305_191156
2bb9f7da9081a84cd69f646d592a7671	SCI_MF1_AXNIFE20110308_044320_20110304_183510_20110306_183510
b635dacaea1fea3776f822035be3efd2	SCI_MF1_AXNIFE20110308_044320_20110305_193839_20110307_193839
c028585c3a5782a89e2c801642ab23b5	SCI_MF1_AXNIFE20110308_044320_20110306_190153_20110308_190153
30e26f5e265fba1275d0272ddbf73f3a	SCI_MF1_AXNIFE20110308_044320_20110307_182508_20110309_182508
a7f730ecc1c5b37ff807739e98807cdc	SCI_MF1_AXNIFE20110308_044320_20110308_192836_20110310_192836
b0148160eb80f645027fea6ad91b4774	SCI_MF1_AXNIFE20110308_044320_20110309_185151_20110311_185151
52355b5ac34795d78d51e835c821ea4f	SCI_MF1_AXNIFE20110308_044320_20110310_181505_20110312_181505
98004ba2f2abc4b5f9bf7ec3d929fbe6	SCI_MF1_AXNIFE20110308_044320_20110311_191834_20110313_191834
723d9e439f6af0cb1f94d8a54a9dfa87	SCI_MF1_AXNIFE20110308_044320_20110312_184148_20110314_184148
873070da9e7d1ce7b0c356886c13fc0d	SCI_MF1_AXNIFE20110308_044320_20110313_194517_20110315_194517
5dbf94a7fb35be2c65c91d17a7368504	SCI_MF1_AXNIFE20110308_044320_20110314_190831_20110411_190831

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

validity identifier	M_CAL	M_DL	M_DN
20110301_184513_20110303_184513	meas.	meas.	interp.
20110302_180827_20110304_180827	meas.	meas.	interp.
20110303_191156_20110305_191156	meas.	meas.	interp.
20110304_183510_20110306_183510	meas.	meas.	meas.
20110305_193839_20110307_193839	meas.	meas.	pred.
20110306_190153_20110308_190153	meas.	meas.	pred.
20110307_182508_20110309_182508	meas.	meas.	pred.
20110308_192836_20110310_192836	pred.	pred.	pred.
20110309_185151_20110311_185151	pred.	pred.	pred.
20110310_181505_20110312_181505	pred.	pred.	pred.
20110311_191834_20110313_191834	pred.	pred.	pred.
20110312_184148_20110314_184148	pred.	pred.	pred.
20110313_194517_20110315_194517	pred.	pred.	pred.
20110314_190831_20110411_190831	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	1.0191	1.0194	1.0182	0.9961	0.9936	1.0056	1.0400	OK
2	1.0016	1.0039	1.0062	0.9996	0.9986	1.0022	1.0200	OK
3	1.0007	1.0009	1.0014	1.0002	1.0000	1.0002	1.0100	OK
4	1.0009	1.0004	1.0005	1.0003	1.0002	0.9998	1.0100	OK
5	1.0008	1.0021	1.0006	1.0002	0.9992	1.0001	1.0120	OK
6	1.0025	1.0015	1.0008	1.0010	0.9991	1.0001	1.0100	OK
7	1.0013	1.0011	1.0012	–	–	–	1.0070	OK
8	1.0012	1.0024	1.0016	–	–	–	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 28 Feb 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110301_093050_20110228_192158_20110302_192158` .

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

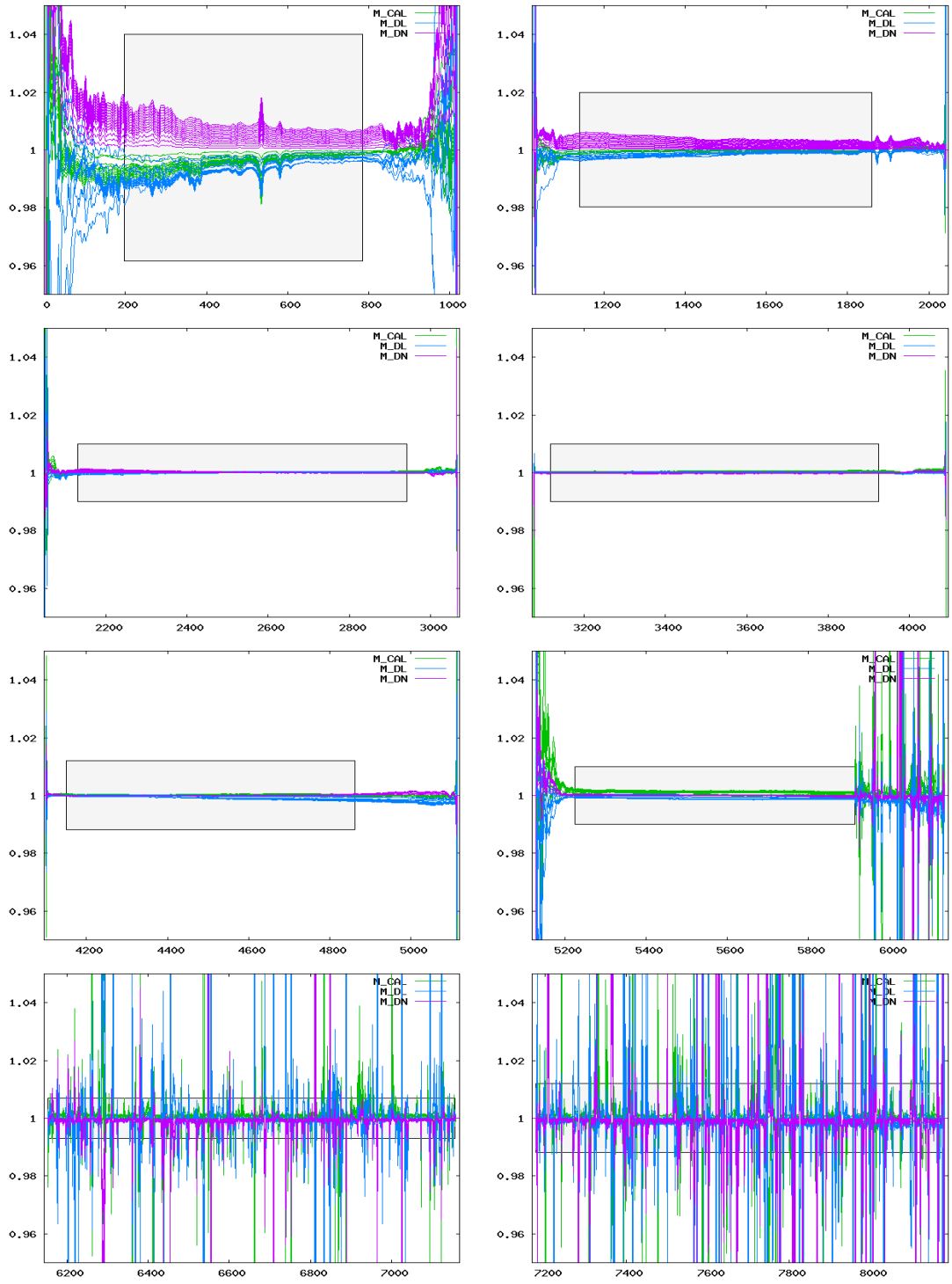

Figure 1: Ratio of delivered m-factors (01 Mar 2011– 14 Mar 2011) to the corresponding m-factor of the previous delivery day (28 Feb 2011). The grey boxes visualize the maximum ratio allowed.