NRT M-factor delivery document 21 Nov 2011

Klaus Bramstedt, ife Bremen

21 Nov 2011

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: 15 Nov 2011– 21 Nov 2011
- Prediction: 22 Nov 2011– 28 Nov 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
96226cd38b95d7950b3d674c81ac1de5	SCI_MF1_AXNIFE20111122_075953_20111115_184659_20111117_184659
d0eaae7d36467f997f14c21e6a781624	SCI_MF1_AXNIFE20111122_075953_20111116_181013_20111118_181013
b6dd64afe686ca6d09b89aa539c9345e	SCI_MF1_AXNIFE20111122_075953_20111117_191342_20111119_191342
285ff1b25403a98896d46bc17f689474	SCI_MF1_AXNIFE20111122_075953_20111118_183656_20111120_183656
7865b9d70e727cb4cfe65afe24bb4113	SCI_MF1_AXNIFE20111122_075953_20111119_194025_20111121_194025
cd30ef6bc864e55db04e598e999e25d1	SCI_MF1_AXNIFE20111122_075953_20111120_190339_20111122_190339
3dbd9ecc2007c6c6f34f77606b2904c3	SCI_MF1_AXNIFE20111122_075953_20111121_182654_20111123_182654
9426d2e671ea635e860a2f59deccda07	SCI_MF1_AXNIFE20111122_075953_20111122_193022_20111124_193022
df7247ba83ab90600c57986755582b67	SCI_MF1_AXNIFE20111122_075953_20111123_185337_20111125_185337
df9762eb75c454daf5ca5ddbd8ed9fe3	SCI_MF1_AXNIFE20111122_075953_20111124_181651_20111126_181651
d479b57944034b696c046febb7e08cf0	SCI_MF1_AXNIFE20111122_075953_20111125_192020_20111127_192020
e542fc8a5fbed82dae4aae152d66b1a8	SCI_MF1_AXNIFE20111122_075953_20111126_184334_20111128_184334
60e639c095cf99cb79b9065eb0221339	SCI_MF1_AXNIFE20111122_075953_20111127_180649_20111129_180649
aa64ceaff9347c8f0afcc8b6cfd79399	SCI_MF1_AXNIFE20111122_075953_20111128_191017_20111226_191017

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

validity identifier	M_CAL	M_DL	M_DN
20111115_184659_20111117_184659	meas.	meas.	interp.
20111116_181013_20111118_181013	meas.	meas.	interp.
20111117_191342_20111119_191342	meas.	meas.	interp.
20111118_183656_20111120_183656	meas.	meas.	meas.
20111119_194025_20111121_194025	meas.	meas.	pred.
20111120_190339_20111122_190339	meas.	meas.	pred.
20111121_182654_20111123_182654	pred.	meas.	pred.
20111122_193022_20111124_193022	pred.	pred.	pred.
20111123_185337_20111125_185337	pred.	pred.	pred.
20111124_181651_20111126_181651	pred.	pred.	pred.
20111125_192020_20111127_192020	pred.	pred.	pred.
20111126_184334_20111128_184334	pred.	pred.	pred.
20111127_180649_20111129_180649	pred.	pred.	pred.
20111128_191017_20111226_191017	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	1.0111	1.1835	1.1643	0.9986	0.9393	0.9568	1.1900	OK
2	1.0014	1.0696	1.0518	0.9998	0.9784	0.9847	1.0700	OK
3	1.0006	1.0192	1.0138	0.9999	0.9956	0.9964	1.0200	OK
4	1.0004	1.0032	1.0030	0.9999	0.9988	0.9986	1.0100	OK
5	1.0005	1.0019	1.0016	0.9999	0.9993	0.9994	1.0120	OK
6	1.0014	1.0014	1.0022	1.0004	1.0003	1.0011	1.0100	OK
7	1.0004	1.0011	1.0006	–	–	–	1.0070	OK
8	1.0013	1.0022	1.0014	–	–	–	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 14 Nov 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111115_083639_20111114_192344_20111116_192344` .

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

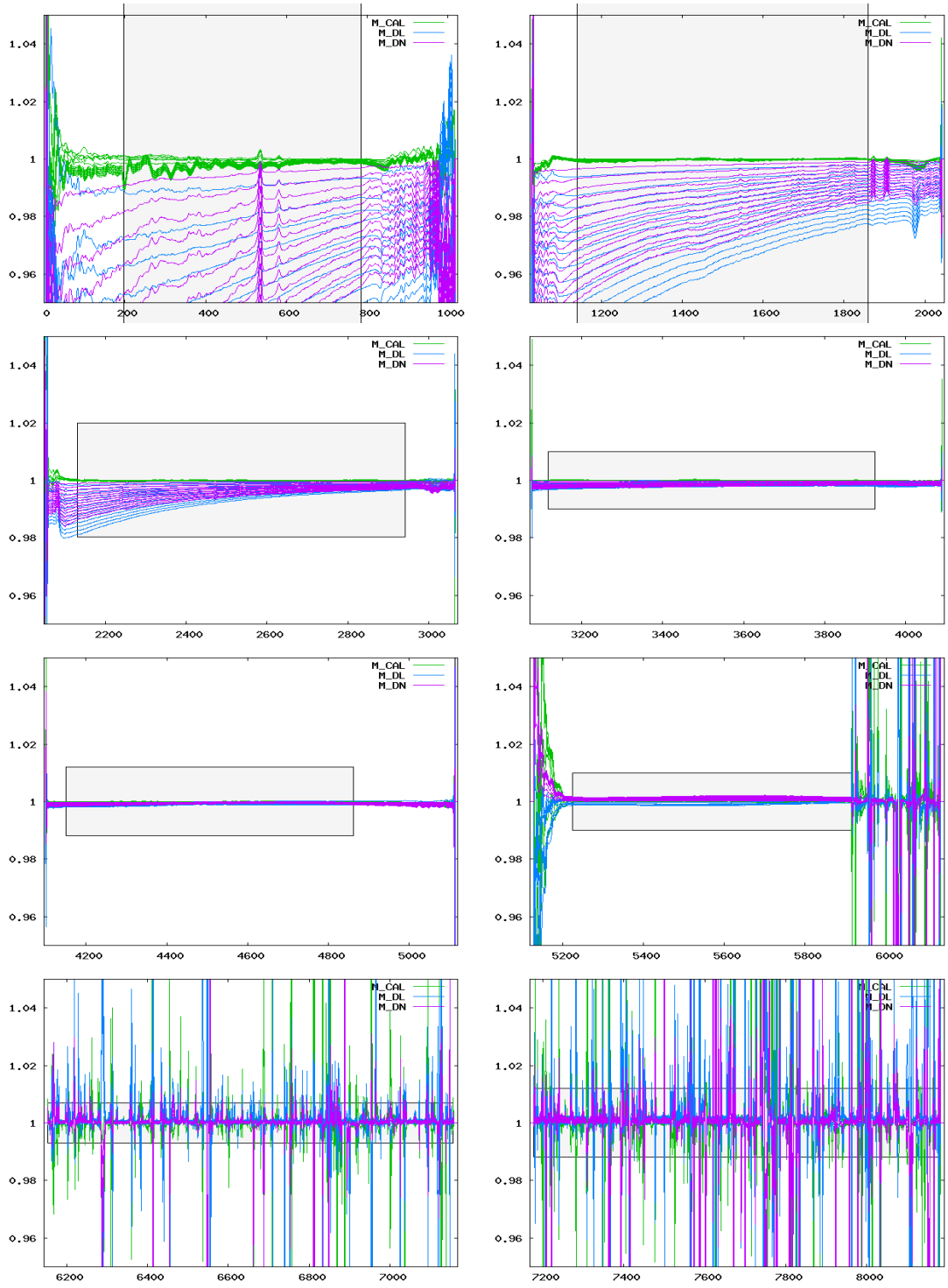

Figure 1: Ratio of delivered m-factors (15 Nov 2011– 28 Nov 2011) to the corresponding m-factor of the previous delivery day (14 Nov 2011). The grey boxes visualize the maximum ratio allowed.