NRT M-factor delivery document 09 Apr 2012

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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: 03 Apr 2012– 09 Apr 2012
- Prediction: 10 Apr 2012– 16 Apr 2012

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
42a8a3b150a6f9d1ca7e55b7de459c41	SCI_MF1_AXNIFE20120410_034227_20120403_181243_20120405_181243
0a5fdd156144e887a6d7d5e24d567bc7	SCI_MF1_AXNIFE20120410_034227_20120404_191611_20120406_191611
1f911dae9c27e7a686a954d158527fae	SCI_MF1_AXNIFE20120410_034227_20120405_183926_20120407_183926
a0a14d814e0af25d43fd7b090e3230d4	SCI_MF1_AXNIFE20120410_034227_20120406_180240_20120408_180240
0a085298ffaf5f7ed808a3f87cba67d7	SCI_MF1_AXNIFE20120410_034227_20120407_190609_20120409_190609
32a1b52b48a39a4471cf399959205546	SCI_MF1_AXNIFE20120410_034227_20120408_182923_20120410_182923
f2e74626e2018730e98422845ed995fc	SCI_MF1_AXNIFE20120410_034227_20120409_193252_20120411_193252
0c3f75ac47ec95e44df8b8e6ce45f3c3	SCI_MF1_AXNIFE20120410_034227_20120410_185606_20120412_185606
5ebec9885419234fca61ed9ed941edc5	SCI_MF1_AXNIFE20120410_034227_20120411_181921_20120413_181921
5e82174e8fca9bba076a3135bec7b3b7	SCI_MF1_AXNIFE20120410_034227_20120412_192249_20120414_192249
699074d8729b3619366651bb33e648f6	SCI_MF1_AXNIFE20120410_034227_20120413_184604_20120415_184604
5e2cf0bd0e1cab1a43a38de7206a34fc	SCI_MF1_AXNIFE20120410_034227_20120414_180918_20120416_180918
b2ceb8dcfed33aab4dc9624a289f6b0a	SCI_MF1_AXNIFE20120410_034227_20120415_191247_20120417_191247
87c4fcaca2a499719ba89bba96c1bf4d	SCI_MF1_AXNIFE20120410_034227_20120416_183601_20120514_183601

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

validity identifier	M_CAL	M_DL	M_DN
20120403_181243_20120405_181243	meas.	meas.	meas.
20120404_191611_20120406_191611	meas.	meas.	meas.
20120405_183926_20120407_183926	meas.	meas.	meas.
20120406_180240_20120408_180240	meas.	meas.	meas.
20120407_190609_20120409_190609	meas.	meas.	meas.
20120408_182923_20120410_182923	pred.	meas.	pred.
20120409_193252_20120411_193252	pred.	pred.	pred.
20120410_185606_20120412_185606	pred.	pred.	pred.
20120411_181921_20120413_181921	pred.	pred.	pred.
20120412_192249_20120414_192249	pred.	pred.	pred.
20120413_184604_20120415_184604	pred.	pred.	pred.
20120414_180918_20120416_180918	pred.	pred.	pred.
20120415_191247_20120417_191247	pred.	pred.	pred.
20120416_183601_20120514_183601	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	1.0058	1.0399	1.0302	0.9999	0.9866	0.9941	1.0400	OK
2	1.0012	1.0148	1.0097	0.9999	0.9951	0.9972	1.0200	OK
3	1.0003	1.0049	1.0031	1.0000	0.9988	0.9991	1.0100	OK
4	1.0003	1.0013	1.0024	1.0000	0.9995	0.9999	1.0100	OK
5	1.0020	1.0034	1.0024	0.9994	0.9986	0.9995	1.0120	OK
6	1.0017	1.0022	1.0028	1.0007	0.9990	0.9995	1.0100	OK
7	1.0009	1.0024	1.0025	–	–	–	1.0070	OK
8	1.0008	1.0042	1.0030	–	–	–	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 02 Apr 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120403_064600_20120402_184928_20120404_184928` .

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

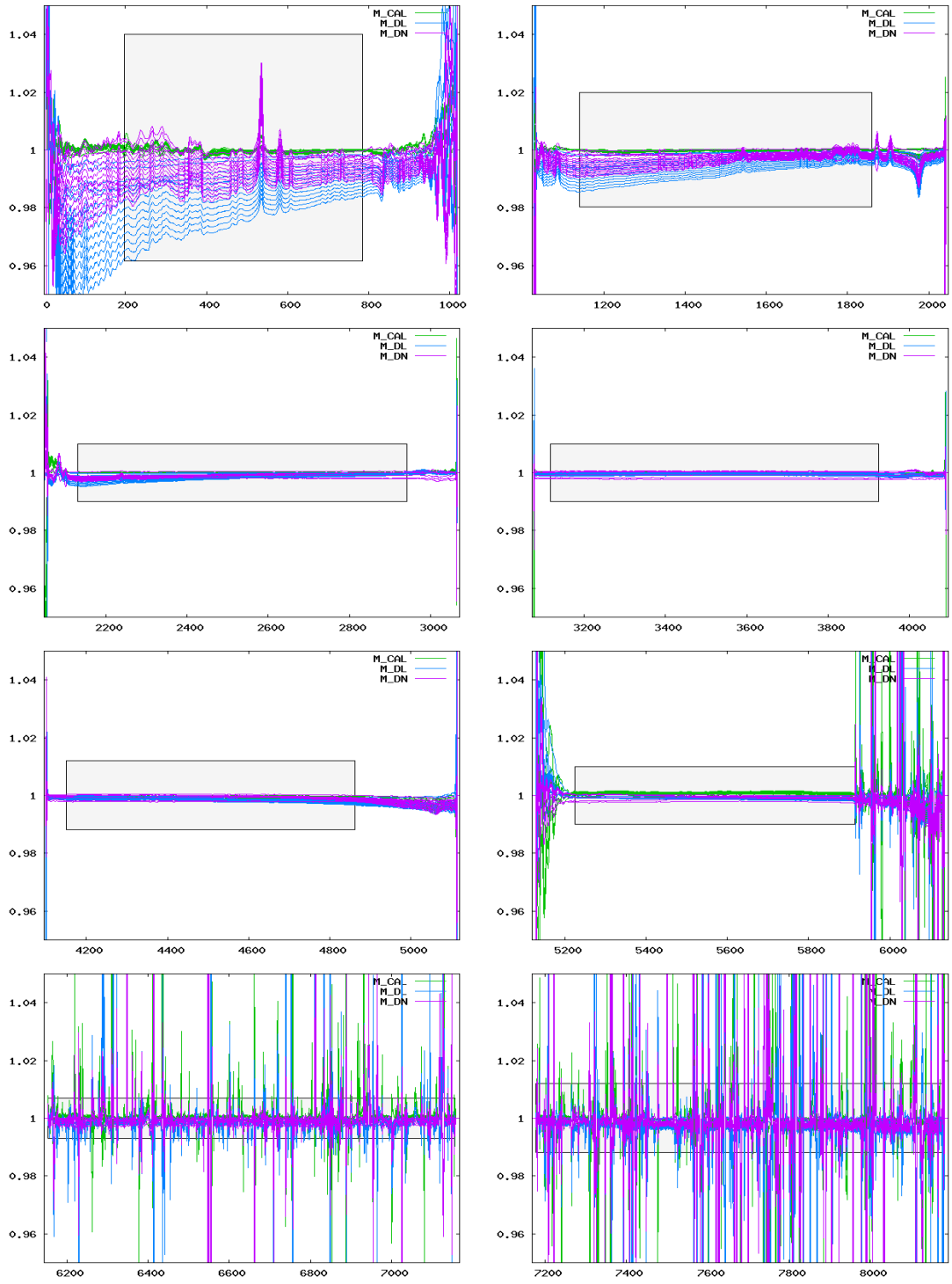

Figure 1: Ratio of delivered m-factors (03 Apr 2012– 16 Apr 2012) to the corresponding m-factor of the previous delivery day (02 Apr 2012). The grey boxes visualize the maximum ratio allowed.