NRT M-factor delivery document 16 Jan 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: 10 Jan 2012– 16 Jan 2012
- Prediction: 17 Jan 2012– 23 Jan 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
f54d81632db1d59cdb20fc488d644823	SCI_MF1_AXNIFE20120117_081614_20120110_193325_20120112_193325
e5d711ee6ff1165c3c1cd73aa6753088	SCI_MF1_AXNIFE20120117_081614_20120111_185639_20120113_185639
e3a29c1791c5db28ec982993937c681e	SCI_MF1_AXNIFE20120117_081614_20120112_181954_20120114_181954
cea4245ab3ad671dbec09776d7f8cc60	SCI_MF1_AXNIFE20120117_081614_20120113_192322_20120115_192322
6f175c994e8e8e2a8d7a20a6bbfbe076	SCI_MF1_AXNIFE20120117_081614_20120114_184637_20120116_184637
3b7d68e0a78208d6623271cfde5e142f	SCI_MF1_AXNIFE20120117_081614_20120115_180951_20120117_180951
c3179391060ffd5c74d8d8502fd61eb5	SCI_MF1_AXNIFE20120117_081614_20120116_191320_20120118_191320
0243d13d838169080dde1736a63a28f0	SCI_MF1_AXNIFE20120117_081614_20120117_183634_20120119_183634
a8c3d94ac71f4419747b962fc4fdab7e	SCI_MF1_AXNIFE20120117_081614_20120118_194003_20120120_194003
4246a74d2bf1045b5765719392bf9d43	SCI_MF1_AXNIFE20120117_081614_20120119_190317_20120121_190317
c2248336bb8f2e22544fdd417c950aad	SCI_MF1_AXNIFE20120117_081614_20120120_182632_20120122_182632
0a077856a826056803d67780175e66cd	SCI_MF1_AXNIFE20120117_081614_20120121_193000_20120123_193000
0ad3df53a911059abb4109b845685b4b	SCI_MF1_AXNIFE20120117_081614_20120122_185315_20120124_185315
0a64c499f52a2060dec1ea2d87bd26a1	SCI_MF1_AXNIFE20120117_081614_20120123_181629_20120220_181629

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

validity identifier	M_CAL	M_DL	M_DN
20120110_193325_20120112_193325	meas.	meas.	meas.
20120111_185639_20120113_185639	meas.	meas.	meas.
20120112_181954_20120114_181954	meas.	meas.	meas.
20120113_192322_20120115_192322	meas.	meas.	meas.
20120114_184637_20120116_184637	meas.	meas.	interp.
20120115_180951_20120117_180951	meas.	meas.	meas.
20120116_191320_20120118_191320	pred.	meas.	pred.
20120117_183634_20120119_183634	pred.	pred.	pred.
20120118_194003_20120120_194003	pred.	pred.	pred.
20120119_190317_20120121_190317	pred.	pred.	pred.
20120120_182632_20120122_182632	pred.	pred.	pred.
20120121_193000_20120123_193000	pred.	pred.	pred.
20120122_185315_20120124_185315	pred.	pred.	pred.
20120123_181629_20120220_181629	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	1.0065	1.0574	1.0517	0.9998	0.9834	0.9856	1.0600	OK
2	1.0015	1.0188	1.0145	1.0004	0.9948	0.9950	1.0200	OK
3	1.0010	1.0074	1.0079	0.9995	0.9983	0.9971	1.0100	OK
4	1.0011	1.0016	1.0044	0.9998	0.9994	0.9978	1.0100	OK
5	1.0020	1.0027	1.0031	1.0005	1.0006	0.9989	1.0120	OK
6	1.0011	1.0019	1.0019	1.0004	1.0004	0.9994	1.0100	OK
7	1.0007	1.0005	1.0026	–	–	–	1.0070	OK
8	1.0053	1.0049	1.0034	–	–	–	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 09 Jan 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120110_081910_20120109_182956_20120111_182956` .

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

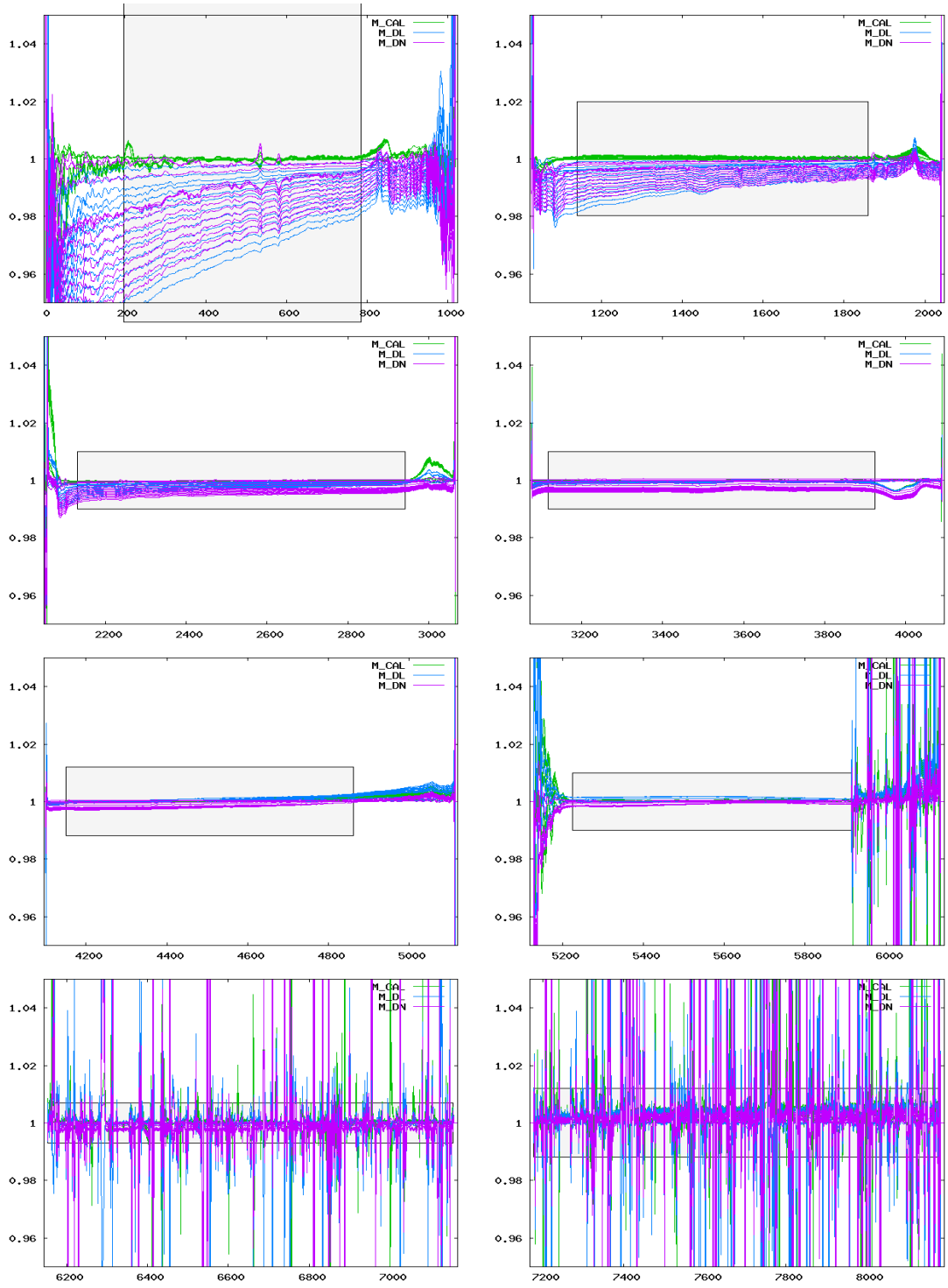

Figure 1: Ratio of delivered m-factors (10 Jan 2012– 23 Jan 2012) to the corresponding m-factor of the previous delivery day (09 Jan 2012). The grey boxes visualize the maximum ratio allowed.