NRT M-factor delivery document 14 Jul 2008

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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 06.01.

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: 08 Jul 2008– 14 Jul 2008
- Prediction: 15 Jul 2008– 21 Jul 2008

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
1df609e1ffcbd2da48858c8c0ff190a6	SCI_MF1_AXNIFE20080714_215713_20080708_191704_20080710_191704
2b05673baf80156088a7d53967109259	SCI_MF1_AXNIFE20080714_215713_20080709_184527_20080711_184527
575618449f674e7355fa985b646a17d1	SCI_MF1_AXNIFE20080714_215713_20080710_181350_20080712_181350
d80601b04d9ed6284933f4ddee15f543	SCI_MF1_AXNIFE20080714_215713_20080711_192249_20080713_192249
df157c5e4dc2b35dd1b859965415b30b	SCI_MF1_AXNIFE20080714_215713_20080712_185112_20080714_185112
d77d09814b03c7cb5e77251130f199e6	SCI_MF1_AXNIFE20080714_215713_20080713_181935_20080715_181935
fba8d87cd660279462828323117277c8	SCI_MF1_AXNIFE20080714_215713_20080714_192834_20080716_192834
bb27c90e9360298dcbc2346804b0e2ce	SCI_MF1_AXNIFE20080714_215713_20080715_185657_20080717_185657
4ddd500ac8a087ceeccb812c93172e51	SCI_MF1_AXNIFE20080714_215713_20080716_182520_20080718_182520
a3350754dc5ea37a26797c00f1e8e393	SCI_MF1_AXNIFE20080714_215713_20080717_193419_20080719_193419
f3d7a8bbb961d3e14763b0ed8245f119	SCI_MF1_AXNIFE20080714_215713_20080718_190242_20080720_190242
c8d65857b43bbda7901aea3a1f88613d	SCI_MF1_AXNIFE20080714_215713_20080719_183105_20080721_183105
699c3ad42174d54c49a6d4eb67185b71	SCI_MF1_AXNIFE20080714_215713_20080720_194004_20080722_194004
6441092535427a518bc8ed3cbd15821c	SCI_MF1_AXNIFE20080714_215713_20080721_190827_20080818_190827

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

validity identifier	M_CAL	M_DL	M_DN
20080708_191704_20080710_191704	meas.	meas.	meas.
20080709_184527_20080711_184527	meas.	meas.	interp.
20080710_181350_20080712_181350	meas.	meas.	interp.
20080711_192249_20080713_192249	meas.	meas.	interp.
20080712_185112_20080714_185112	meas.	meas.	meas.
20080713_181935_20080715_181935	meas.	meas.	pred.
20080714_192834_20080716_192834	pred.	pred.	pred.
20080715_185657_20080717_185657	pred.	pred.	pred.
20080716_182520_20080718_182520	pred.	pred.	pred.
20080717_193419_20080719_193419	pred.	pred.	pred.
20080718_190242_20080720_190242	pred.	pred.	pred.
20080719_183105_20080721_183105	pred.	pred.	pred.
20080720_194004_20080722_194004	pred.	pred.	pred.
20080721_190827_20080818_190827	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	1.0044	1.0092	1.0036	1.0017	1.0030	1.0002	1.0400	OK
2	1.0026	1.0055	1.0029	1.0010	1.0017	1.0004	1.0200	OK
3	1.0008	1.0017	1.0022	1.0002	1.0004	1.0012	1.0100	OK
4	1.0008	1.0007	1.0024	1.0002	1.0002	1.0018	1.0100	OK
5	1.0021	1.0022	1.0027	1.0007	1.0004	1.0019	1.0120	OK
6	1.0019	1.0015	1.0032	1.0008	1.0001	1.0022	1.0100	OK
7	1.0001	0.9997	1.0011	–	–	–	1.0070	OK
8	1.0010	1.0011	1.0023	–	–	–	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 07 Jul 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080707_215635_20080707_194841_20080709_194841` .

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

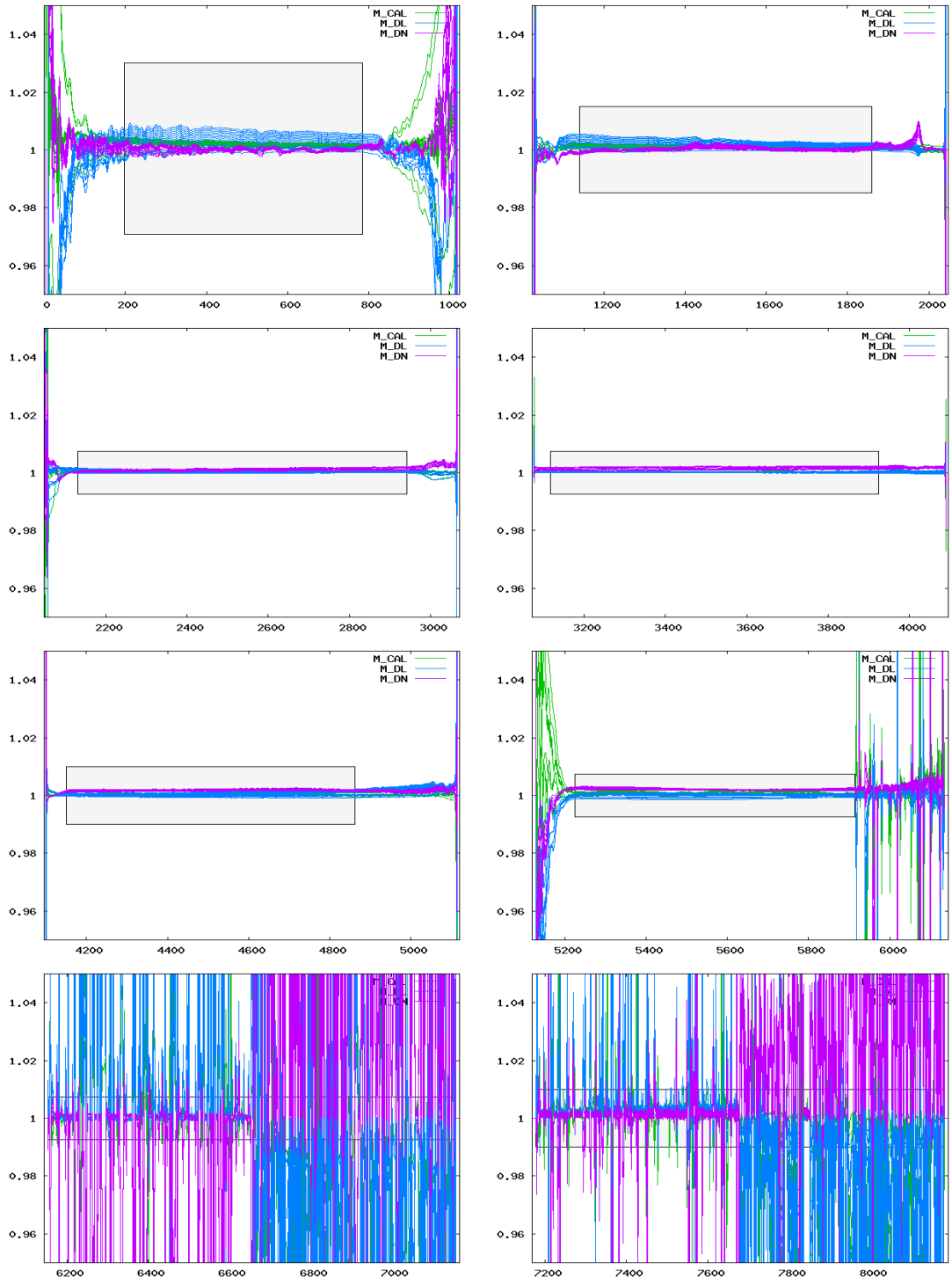

Figure 1: Ratio of delivered m-factors (08 Jul 2008– 21 Jul 2008) to the corresponding m-factor of the previous delivery day (07 Jul 2008). The grey boxes visualize the maximum ratio allowed.