NRT M-factor delivery document 26 May 2008

Klaus Bramstedt, ife Bremen

26 May 2008

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: 20 May 2008– 26 May 2008
- Prediction: 27 May 2008– 02 Jun 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
c9490ff87158da7ff6ea5014208d42c6	SCI_MF1_AXNIFE20080526_215354_20080520_181642_20080522_181642
8e4b6f0ed157b5224e8d7a119d31e56d	SCI_MF1_AXNIFE20080526_215354_20080521_192541_20080523_192541
5584c2dfc30169708ea189754ba6eb65	SCI_MF1_AXNIFE20080526_215354_20080522_185404_20080524_185404
c88c9a2a4fa6db0e51031c327aa98bda	SCI_MF1_AXNIFE20080526_215354_20080523_182227_20080525_182227
3c3a48edac52c44214f616b553d4b57b	SCI_MF1_AXNIFE20080526_215354_20080524_193126_20080526_193126
11eeb03045b1de3f1f397998aa1aa226	SCI_MF1_AXNIFE20080526_215354_20080525_185949_20080527_185949
3ab1c66eca7305bff701713fc2416d57	SCI_MF1_AXNIFE20080526_215354_20080526_182812_20080528_182812
bb1459904d9cf5a4d7079c480553638f	SCI_MF1_AXNIFE20080526_215354_20080527_193711_20080529_193711
f1b1b4a1fb7e04217ff7edf644484666	SCI_MF1_AXNIFE20080526_215354_20080528_190534_20080530_190534
6e3fc32f6d6b81f2adc5089cff2f2675	SCI_MF1_AXNIFE20080526_215354_20080529_183357_20080531_183357
0e3775e3cb56c6361d556d3ea229e5b5	SCI_MF1_AXNIFE20080526_215354_20080530_194256_20080601_194256
6d5fd3dffe4af88f59f917d8935a7958	SCI_MF1_AXNIFE20080526_215354_20080531_191119_20080602_191119
8f0f2d24be9ade2e80047cf606d4db78	SCI_MF1_AXNIFE20080526_215354_20080601_183942_20080603_183942
15f6b8bc722108837434df21315262b3	SCI_MF1_AXNIFE20080526_215354_20080602_194841_20080630_194841

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

validity identifier	M_CAL	M_DL	M_DN
20080520_181642_20080522_181642	meas.	meas.	interp.
20080521_192541_20080523_192541	meas.	meas.	interp.
20080522_185404_20080524_185404	meas.	meas.	interp.
20080523_182227_20080525_182227	meas.	meas.	meas.
20080524_193126_20080526_193126	meas.	meas.	pred.
20080525_185949_20080527_185949	meas.	meas.	pred.
20080526_182812_20080528_182812	pred.	pred.	pred.
20080527_193711_20080529_193711	pred.	pred.	pred.
20080528_190534_20080530_190534	pred.	pred.	pred.
20080529_183357_20080531_183357	pred.	pred.	pred.
20080530_194256_20080601_194256	pred.	pred.	pred.
20080531_191119_20080602_191119	pred.	pred.	pred.
20080601_183942_20080603_183942	pred.	pred.	pred.
20080602_194841_20080630_194841	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	1.0066	1.0157	1.0127	1.0016	1.0059	1.0026	1.0400	OK
2	1.0021	1.0076	1.0044	1.0009	1.0030	1.0010	1.0200	OK
3	1.0008	1.0021	1.0012	1.0003	1.0008	1.0001	1.0100	OK
4	1.0008	1.0009	1.0007	1.0003	1.0003	0.9999	1.0100	OK
5	1.0008	1.0017	1.0014	1.0002	1.0011	0.9994	1.0120	OK
6	1.0021	1.0034	1.0015	1.0003	1.0019	0.9992	1.0100	OK
7	0.9980	0.9986	0.9986	–	–	–	1.0070	OK
8	0.9994	0.9994	0.9992	–	–	–	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 19 May 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080519_215538_20080519_184819_20080521_184819` .

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

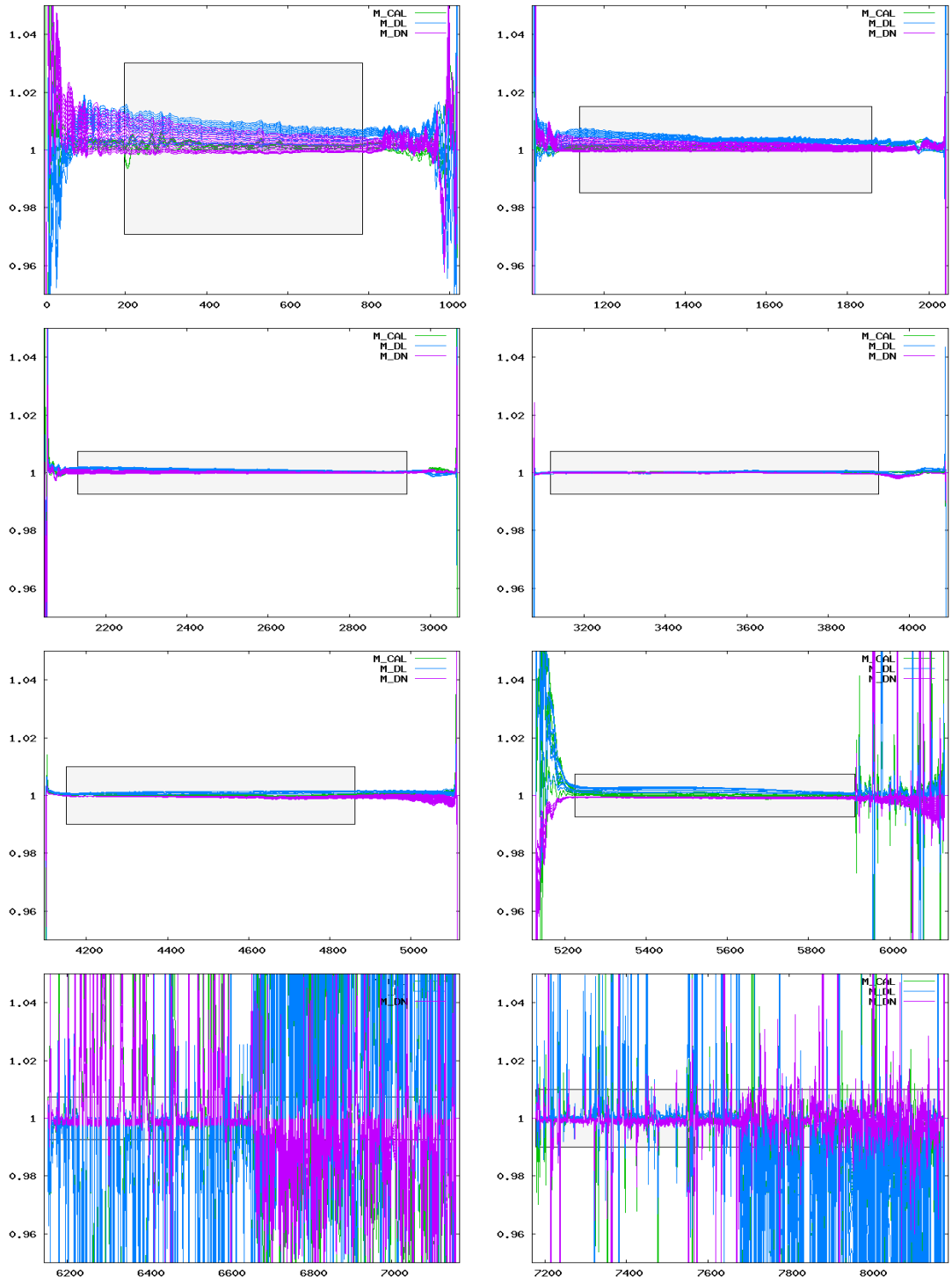

Figure 1: Ratio of delivered m-factors (20 May 2008– 02 Jun 2008) to the corresponding m-factor of the previous delivery day (19 May 2008). The grey boxes visualize the maximum ratio allowed.