NRT M-factor delivery document 07 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: 01 Jul 2008– 07 Jul 2008
- Prediction: 08 Jul 2008– 14 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
a7d2c766ef53cc6db44591b5437d8f32	SCI_MF1_AXNIFE20080707_215635_20080701_193711_20080703_193711
42f66e1916b0f90e6e1e2d482e99c562	SCI_MF1_AXNIFE20080707_215635_20080702_190534_20080704_190534
210fb8ad49a63f41f26809f71c0ef859	SCI_MF1_AXNIFE20080707_215635_20080703_183357_20080705_183357
71ce2f900c91381261fd3894bd424340	SCI_MF1_AXNIFE20080707_215635_20080704_194256_20080706_194256
87a0027d9acc7e1a73a1b4c32dd66a43	SCI_MF1_AXNIFE20080707_215635_20080705_191119_20080707_191119
43f66e2a819e6a781adfb4f13d3ba7cf	SCI_MF1_AXNIFE20080707_215635_20080706_183942_20080708_183942
03ef9199c37374b4aa67e1abf254ef3e	SCI_MF1_AXNIFE20080707_215635_20080707_194841_20080709_194841
67aa32dc6a0e92d811ce0e983b7324ef	SCI_MF1_AXNIFE20080707_215635_20080708_191704_20080710_191704
8897a22d0b119477a1d49976e79e73f8	SCI_MF1_AXNIFE20080707_215635_20080709_184527_20080711_184527
2e778587097c6990d4c7698db23e229b	SCI_MF1_AXNIFE20080707_215635_20080710_181350_20080712_181350
9a4b2e40f630d60ead0a1fdd501fb2ea	SCI_MF1_AXNIFE20080707_215635_20080711_192249_20080713_192249
f296f2421fb9d86e73e22b268327a13a	SCI_MF1_AXNIFE20080707_215635_20080712_185112_20080714_185112
f663ee9ae3e9f2e3fe13e414ae84fd5b	SCI_MF1_AXNIFE20080707_215635_20080713_181935_20080715_181935
a0e11a8e62ea28b96d37d424b2c49690	SCI_MF1_AXNIFE20080707_215635_20080714_192834_20080811_192834

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

validity identifier	M_CAL	M_DL	M_DN
20080701_193711_20080703_193711	meas.	meas.	interp.
20080702_190534_20080704_190534	meas.	meas.	interp.
20080703_183357_20080705_183357	meas.	meas.	interp.
20080704_194256_20080706_194256	meas.	meas.	meas.
20080705_191119_20080707_191119	meas.	meas.	pred.
20080706_183942_20080708_183942	meas.	meas.	pred.
20080707_194841_20080709_194841	pred.	pred.	pred.
20080708_191704_20080710_191704	pred.	pred.	pred.
20080709_184527_20080711_184527	pred.	pred.	pred.
20080710_181350_20080712_181350	pred.	pred.	pred.
20080711_192249_20080713_192249	pred.	pred.	pred.
20080712_185112_20080714_185112	pred.	pred.	pred.
20080713_181935_20080715_181935	pred.	pred.	pred.
20080714_192834_20080811_192834	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	1.0047	1.0120	1.0058	1.0003	1.0031	0.9992	1.0400	OK
2	1.0018	1.0050	1.0035	1.0006	1.0016	1.0004	1.0200	OK
3	1.0005	1.0016	1.0020	0.9999	1.0004	0.9988	1.0100	OK
4	1.0004	1.0007	1.0025	1.0000	1.0003	0.9982	1.0100	OK
5	1.0008	1.0011	1.0023	1.0001	1.0003	0.9982	1.0120	OK
6	1.0009	1.0012	1.0020	0.9997	1.0002	0.9985	1.0100	OK
7	0.9993	0.9996	0.9985	–	–	–	1.0070	OK
8	1.0009	1.0021	0.9999	–	–	–	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 30 Jun 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080630_215549_20080630_182812_20080702_182812` .

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

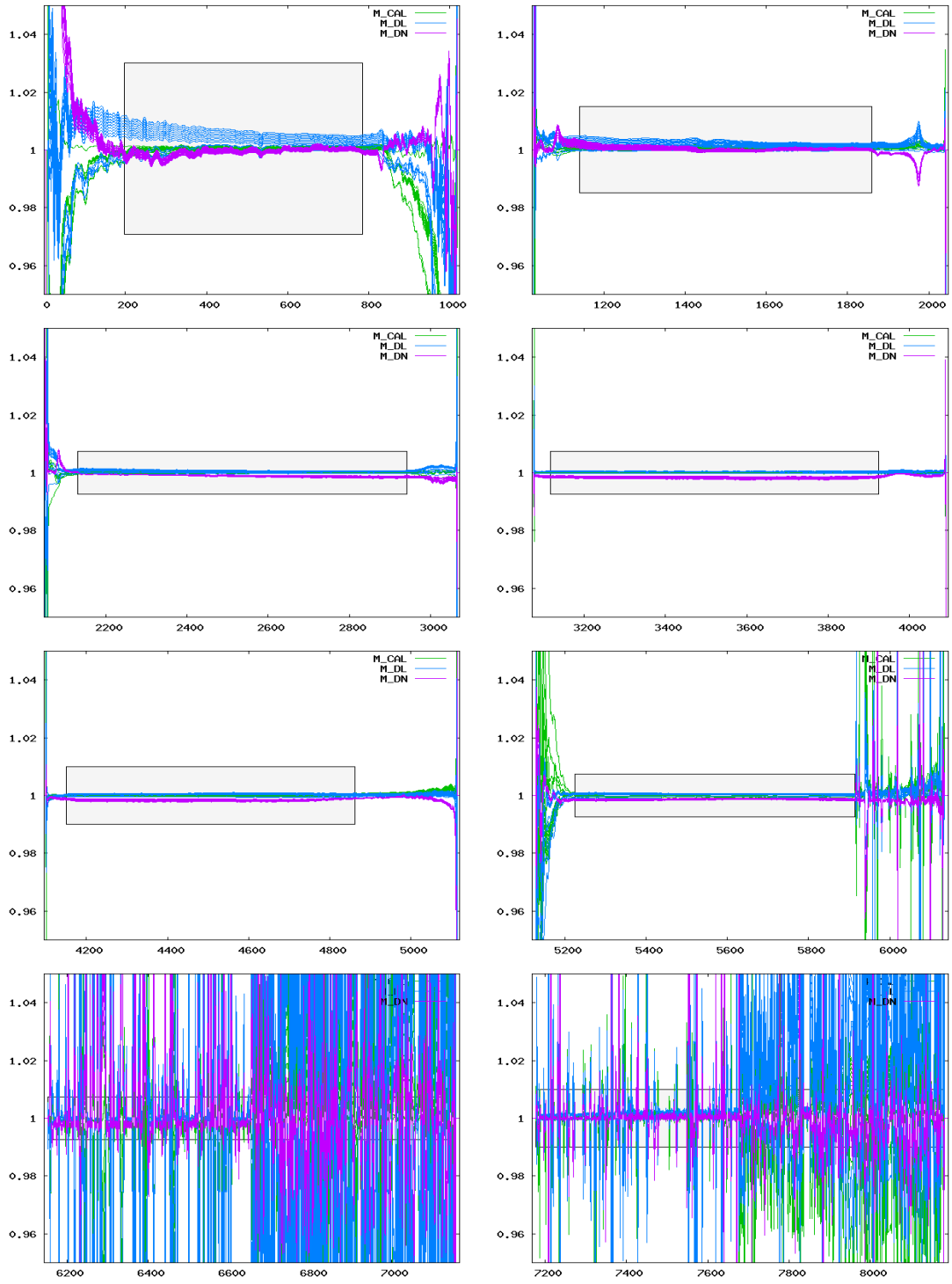

Figure 1: Ratio of delivered m-factors (01 Jul 2008– 14 Jul 2008) to the corresponding m-factor of the previous delivery day (30 Jun 2008). The grey boxes visualize the maximum ratio allowed.