NRT M-factor delivery document 28 Apr 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: 22 Apr 2008– 28 Apr 2008
- Prediction: 29 Apr 2008– 05 May 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
e5c4d24f67482fdd05f430516f195ff4	SCI_MF1_AXNIFE20080428_220446_20080422_193711_20080424_193711
9fde8e87ab40a0d2dabe0c2706dc2f78	SCI_MF1_AXNIFE20080428_220446_20080423_190534_20080425_190534
96fe3d1f095d704e7c2745fd502e81c4	SCI_MF1_AXNIFE20080428_220446_20080424_183357_20080426_183357
3c99d9f542da0fd75c0c9b69b973a821	SCI_MF1_AXNIFE20080428_220446_20080425_194256_20080427_194256
5c6142956ffcbe491dfcb9fb87b4fb4a	SCI_MF1_AXNIFE20080428_220446_20080426_191119_20080428_191119
3639d193cc6326cfa8a41d95267b6823	SCI_MF1_AXNIFE20080428_220446_20080427_183942_20080429_183942
185da1e76359871ec88a5164f2781002	SCI_MF1_AXNIFE20080428_220446_20080428_194841_20080430_194841
cd32763ac6a4b0bcc1ffc123fa406ea0	SCI_MF1_AXNIFE20080428_220446_20080429_191704_20080501_191704
08a7bee9f72d02dab3df1b3f1d7828da	SCI_MF1_AXNIFE20080428_220446_20080430_184527_20080502_184527
c55050ce403f8a1280fb13a5afe1085b	SCI_MF1_AXNIFE20080428_220446_20080501_181350_20080503_181350
328f03fbd6fd4fe16859a93dff927d91	SCI_MF1_AXNIFE20080428_220446_20080502_192249_20080504_192249
d359b6101b8f3ad15fd199abef95e967	SCI_MF1_AXNIFE20080428_220446_20080503_185112_20080505_185112
a5ba8de2bb1fd43016b3f4a1e8e5b4ba	SCI_MF1_AXNIFE20080428_220446_20080504_181935_20080506_181935
ac168c3f114b51a345c7e63931fc8efb	SCI_MF1_AXNIFE20080428_220446_20080505_192834_20080602_192834

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

validity identifier	M_CAL	M_DL	M_DN
20080422_193711_20080424_193711	meas.	meas.	meas.
20080423_190534_20080425_190534	meas.	meas.	interp.
20080424_183357_20080426_183357	meas.	meas.	interp.
20080425_194256_20080427_194256	meas.	meas.	interp.
20080426_191119_20080428_191119	meas.	meas.	meas.
20080427_183942_20080429_183942	pred.	meas.	pred.
20080428_194841_20080430_194841	pred.	pred.	pred.
20080429_191704_20080501_191704	pred.	pred.	pred.
20080430_184527_20080502_184527	pred.	pred.	pred.
20080501_181350_20080503_181350	pred.	pred.	pred.
20080502_192249_20080504_192249	pred.	pred.	pred.
20080503_185112_20080505_185112	pred.	pred.	pred.
20080504_181935_20080506_181935	pred.	pred.	pred.
20080505_192834_20080602_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	1.0048	1.0085	1.0132	0.9997	1.0026	1.0034	1.0400	OK
2	1.0008	1.0028	1.0061	1.0003	1.0011	1.0016	1.0200	OK
3	1.0006	1.0017	1.0019	1.0003	1.0004	1.0001	1.0100	OK
4	1.0034	1.0007	1.0012	1.0003	1.0001	0.9995	1.0100	OK
5	1.0055	1.0028	1.0021	1.0000	0.9991	0.9990	1.0120	OK
6	1.0101	1.0020	1.0013	1.0008	0.9993	0.9995	1.0100	Not OK
7	0.9998	0.9987	0.9987	–	–	–	1.0070	OK
8	0.9988	0.9982	0.9979	–	–	–	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 21 Apr 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080422_092436_20080421_182812_20080423_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 exceeds the limits. Additional checks are necessary.

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

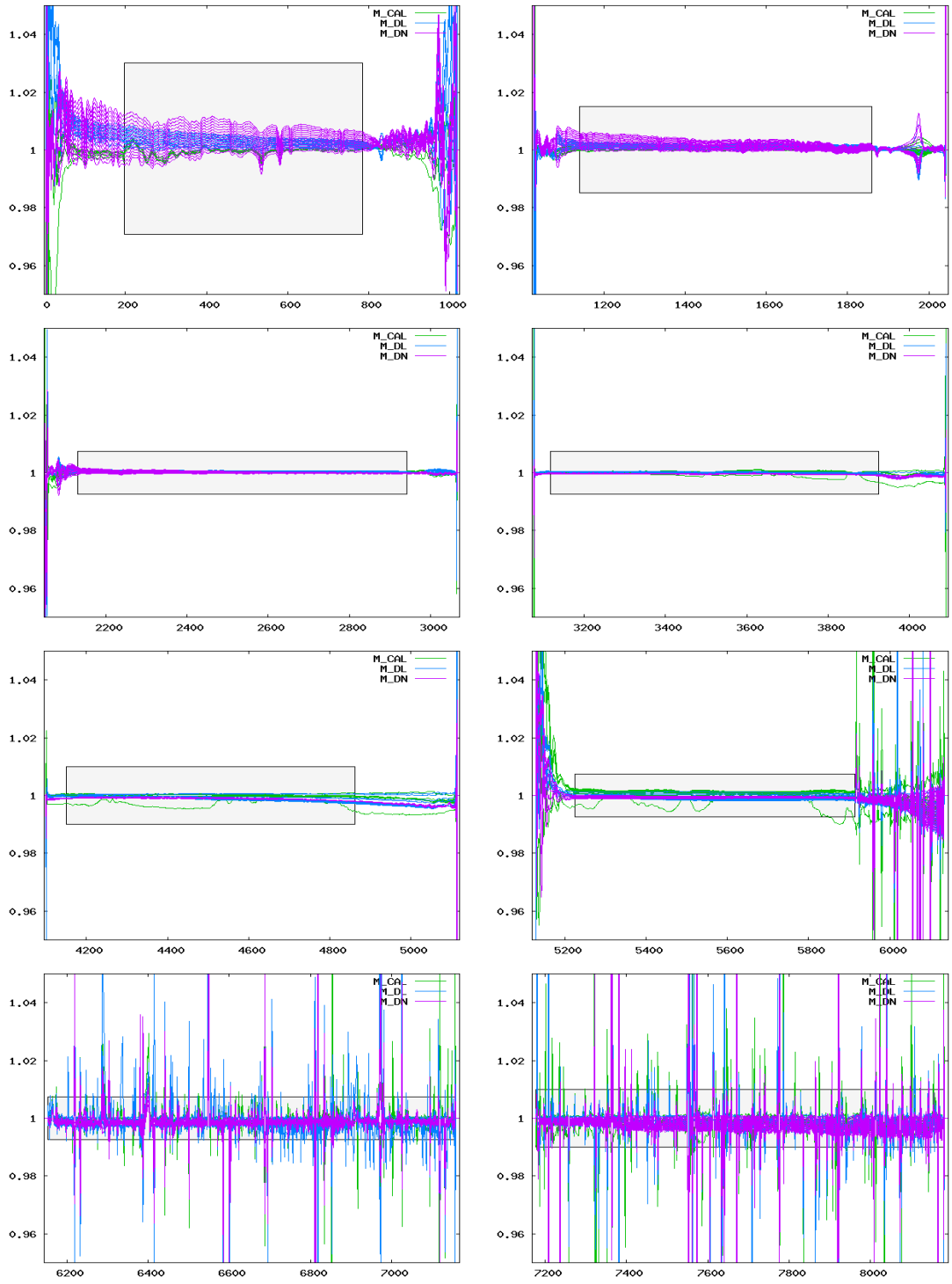

Figure 1: Ratio of delivered m-factors (22 Apr 2008– 05 May 2008) to the corresponding m-factor of the previous delivery day (21 Apr 2008). The grey boxes visualize the maximum ratio allowed.