NRT M-factor delivery document 11 Aug 2008

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11 Aug 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: 05 Aug 2008– 11 Aug 2008
- Prediction: 12 Aug 2008– 18 Aug 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
e07cb95c19493638735e5d778d2d63c0	SCI_MF1_AXNIFE20080812_080515_20080805_193711_20080807_193711
805ba5a519913cf0f293b28fffc9fe65	SCI_MF1_AXNIFE20080812_080515_20080806_190534_20080808_190534
a0a81fdef228754d3b4256ee3a7d4a62	SCI_MF1_AXNIFE20080812_080515_20080807_183357_20080809_183357
22a3929649332650f2ee2a6058bd0376	SCI_MF1_AXNIFE20080812_080515_20080808_194256_20080810_194256
bb5f8dab45d2b1762f65b1704a1fec96	SCI_MF1_AXNIFE20080812_080515_20080809_191119_20080811_191119
dec93b8308e3f8d9a4a7324e9f580beb	SCI_MF1_AXNIFE20080812_080515_20080810_183942_20080812_183942
6bdbde6b33a54206dded519c2cf3e30d	SCI_MF1_AXNIFE20080812_080515_20080811_194841_20080813_194841
12fa603d42895dc06a63d860352be142	SCI_MF1_AXNIFE20080812_080515_20080812_191704_20080814_191704
ddf56aa879ffc7294cd90df1259c1a0b	SCI_MF1_AXNIFE20080812_080515_20080813_184527_20080815_184527
e4cfedd20ace24dd38c0f36903fd5999	SCI_MF1_AXNIFE20080812_080515_20080814_181350_20080816_181350
2f3ecd574e5c384ef61f6b22f69bf2e8	SCI_MF1_AXNIFE20080812_080515_20080815_192249_20080817_192249
1dad00d274ed692831f34bbefd0bc8cc	SCI_MF1_AXNIFE20080812_080515_20080816_185112_20080818_185112
6d42c63d0e94e90491cf7a6139e0c925	SCI_MF1_AXNIFE20080812_080515_20080817_181935_20080819_181935
3ec6d0d7261e702004bed141eb69e835	SCI_MF1_AXNIFE20080812_080515_20080818_192834_20080915_192834

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

validity identifier	M_CAL	M_DL	M_DN
20080805_193711_20080807_193711	meas.	meas.	interp.
20080806_190534_20080808_190534	meas.	meas.	meas.
20080807_183357_20080809_183357	meas.	meas.	interp.
20080808_194256_20080810_194256	meas.	meas.	interp.
20080809_191119_20080811_191119	interp.	meas.	interp.
20080810_183942_20080812_183942	meas.	meas.	meas.
20080811_194841_20080813_194841	meas.	meas.	pred.
20080812_191704_20080814_191704	pred.	pred.	pred.
20080813_184527_20080815_184527	pred.	pred.	pred.
20080814_181350_20080816_181350	pred.	pred.	pred.
20080815_192249_20080817_192249	pred.	pred.	pred.
20080816_185112_20080818_185112	pred.	pred.	pred.
20080817_181935_20080819_181935	pred.	pred.	pred.
20080818_192834_20080915_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	1.0069	1.0190	1.0022	1.0021	1.0063	1.0001	1.0400	OK
2	1.0026	1.0051	1.0016	1.0010	1.0021	1.0003	1.0200	OK
3	1.0006	1.0014	1.0006	1.0001	1.0003	1.0001	1.0100	OK
4	1.0003	1.0005	1.0009	1.0000	1.0002	1.0003	1.0100	OK
5	1.0009	1.0013	1.0018	1.0003	1.0007	1.0005	1.0120	OK
6	1.0010	1.0020	1.0021	1.0003	1.0012	1.0011	1.0100	OK
7	0.9996	1.0006	1.0003	–	–	–	1.0070	OK
8	1.0012	1.0020	1.0021	–	–	–	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 04 Aug 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080804_215634_20080804_182812_20080806_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

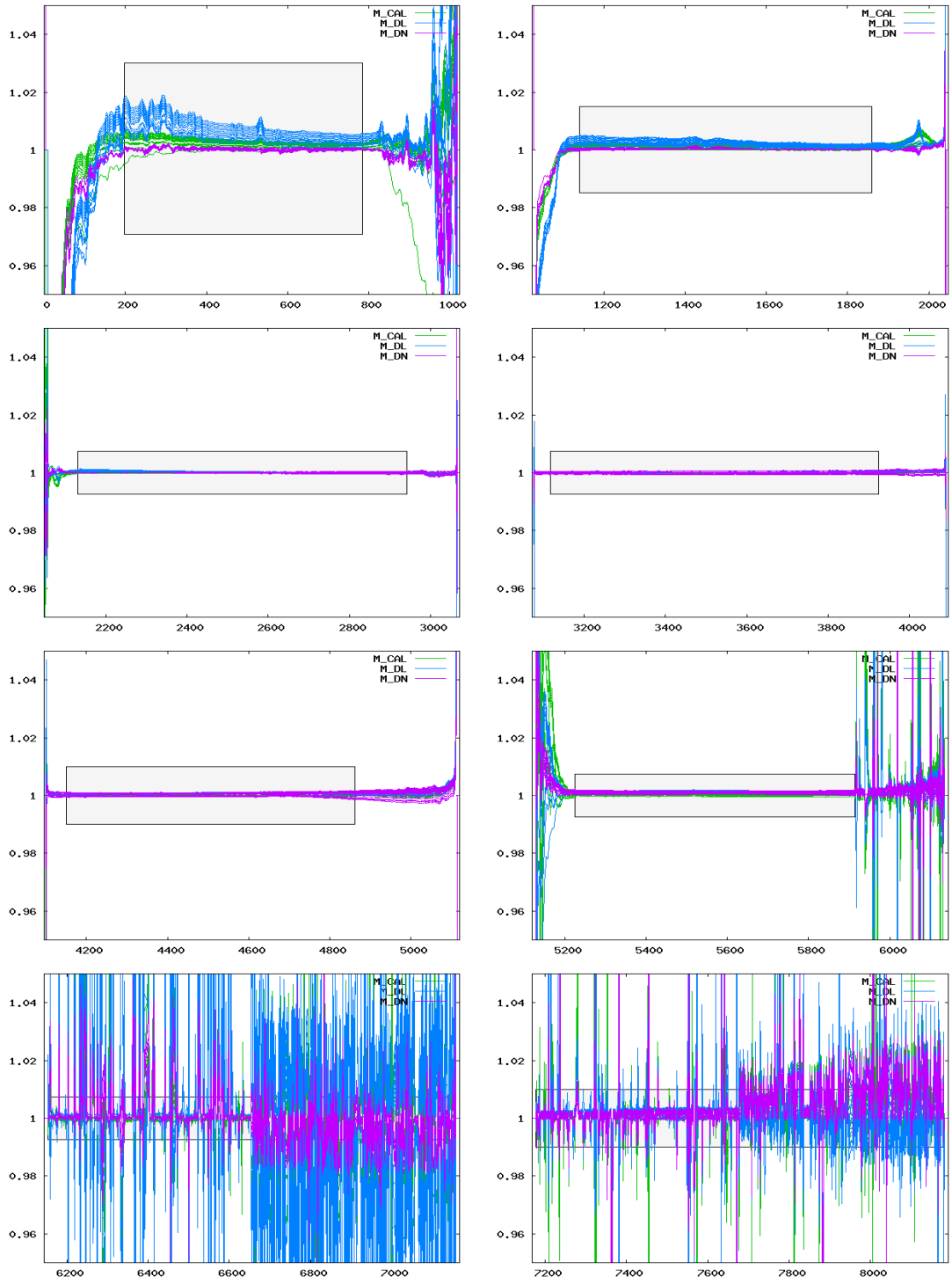

Figure 1: Ratio of delivered m-factors (05 Aug 2008– 18 Aug 2008) to the corresponding m-factor of the previous delivery day (04 Aug 2008). The grey boxes visualize the maximum ratio allowed.