NRT M-factor delivery document 07 Jun 2010

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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 07.01.

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 Jun 2010– 07 Jun 2010
- Prediction: 08 Jun 2010– 14 Jun 2010

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
73d9d9cdc8db9d897090850ae66a0c57	SCI_MF1_AXNIFE20100608_034232_20100601_193710_20100603_193710
29f03d4968fc8e45ed50f5d9e85f04a8	SCI_MF1_AXNIFE20100608_034232_20100602_190533_20100604_190533
8f957b2c663a3ba955900b2dcf332ffd	SCI_MF1_AXNIFE20100608_034232_20100603_183356_20100605_183356
89b10a7697d0944b095cbf0171db442c	SCI_MF1_AXNIFE20100608_034232_20100604_194255_20100606_194255
00786f15f7aef64a69482cdcfa1efa4b	SCI_MF1_AXNIFE20100608_034232_20100605_191118_20100607_191118
faade4b2678f62a377ee5516f3552ea6	SCI_MF1_AXNIFE20100608_034232_20100606_183941_20100608_183941
ec8133440c129a7b4a5ce5887215cc4e	SCI_MF1_AXNIFE20100608_034232_20100607_194839_20100609_194839
cdd2fbc495dea26a3204a1611ad643dc	SCI_MF1_AXNIFE20100608_034232_20100608_191702_20100610_191702
3721a0cd4d155f76f102c440d77da9ab	SCI_MF1_AXNIFE20100608_034232_20100609_184525_20100611_184525
97e262ca810b25ca8d4af8cc2207f1d1	SCI_MF1_AXNIFE20100608_034232_20100610_181348_20100612_181348
348a490a1b77c1de3538d76f59740c0b	SCI_MF1_AXNIFE20100608_034232_20100611_192247_20100613_192247
7b0d8a7259ef50880e4b7b1bf807232d	SCI_MF1_AXNIFE20100608_034232_20100612_185110_20100614_185110
ba054aa826cf2b94b74b5670d6f25a92	SCI_MF1_AXNIFE20100608_034232_20100613_181933_20100615_181933
0af8b7c61734cb64ddf659e184738a53	SCI_MF1_AXNIFE20100608_034232_20100614_192832_20100712_192832

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

validity identifier	M_CAL	M_DL	M_DN
20100601_193710_20100603_193710	meas.	meas.	interp.
20100602_190533_20100604_190533	meas.	meas.	meas.
20100603_183356_20100605_183356	meas.	meas.	interp.
20100604_194255_20100606_194255	meas.	meas.	interp.
20100605_191118_20100607_191118	meas.	meas.	meas.
20100606_183941_20100608_183941	meas.	meas.	pred.
20100607_194839_20100609_194839	meas.	meas.	pred.
20100608_191702_20100610_191702	pred.	pred.	pred.
20100609_184525_20100611_184525	pred.	pred.	pred.
20100610_181348_20100612_181348	pred.	pred.	pred.
20100611_192247_20100613_192247	pred.	pred.	pred.
20100612_185110_20100614_185110	pred.	pred.	pred.
20100613_181933_20100615_181933	pred.	pred.	pred.
20100614_192832_20100712_192832	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	1.0053	1.0204	1.0223	1.0012	1.0061	1.0075	1.0400	OK
2	1.0018	1.0071	1.0094	1.0009	1.0027	1.0035	1.0200	OK
3	1.0008	1.0033	1.0031	1.0003	1.0006	1.0011	1.0100	OK
4	1.0018	1.0011	1.0016	1.0004	1.0002	1.0006	1.0100	OK
5	1.0009	1.0018	1.0011	1.0005	0.9994	1.0005	1.0120	OK
6	1.0023	1.0016	1.0019	1.0011	0.9991	1.0007	1.0100	OK
7	1.0023	1.0007	1.0010	–	–	–	1.0070	OK
8	1.0022	1.0009	1.0007	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 31 May 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100601_034252_20100531_182811_20100602_182811` .

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

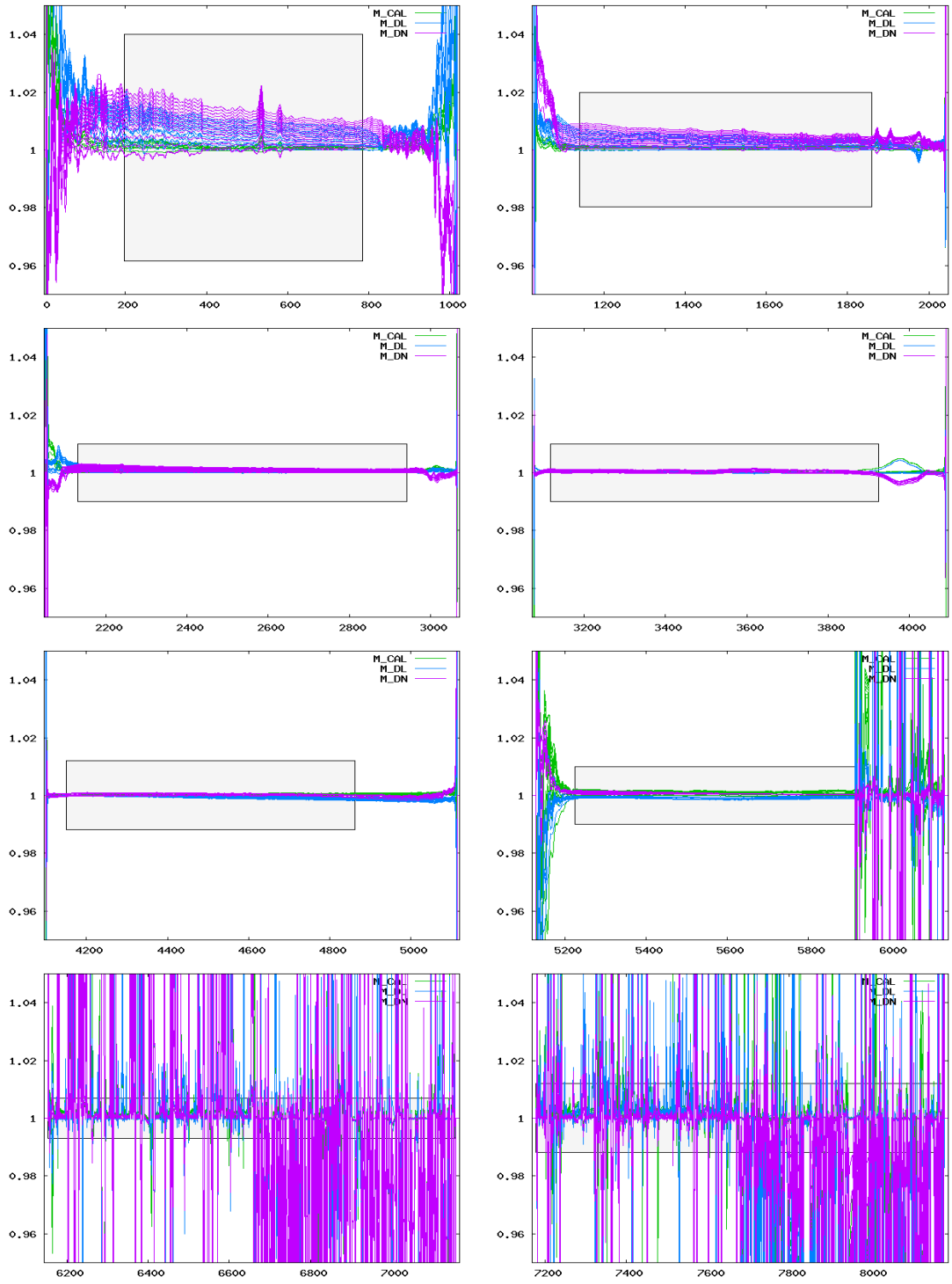

Figure 1: Ratio of delivered m-factors (01 Jun 2010– 14 Jun 2010) to the corresponding m-factor of the previous delivery day (31 May 2010). The grey boxes visualize the maximum ratio allowed.