NRT M-factor delivery document 24 Aug 2009

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24 Aug 2009

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: 18 Aug 2009– 24 Aug 2009
- Prediction: 25 Aug 2009– 31 Aug 2009

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
4c1eab576e33f5b196385483f59d4dbf	SCI_MF1_AXNIFE20090825_075712_20090818_181642_20090820_181642
0da4b8626e9145487359e99acd000ec7	SCI_MF1_AXNIFE20090825_075712_20090819_192540_20090821_192540
11cef5e3936d35f747232759a69ecb5a	SCI_MF1_AXNIFE20090825_075712_20090820_185403_20090822_185403
6d1909aad557d549fd925359e37a52b3	SCI_MF1_AXNIFE20090825_075712_20090821_182226_20090823_182226
ba0caedef402c9758d1a3a0581ab89b9	SCI_MF1_AXNIFE20090825_075712_20090822_193125_20090824_193125
be8dddc2803b7e8a2add8e88f0f7d3b8	SCI_MF1_AXNIFE20090825_075712_20090823_185948_20090825_185948
dc4a97a9a463d8943d2d687d9216680e	SCI_MF1_AXNIFE20090825_075712_20090824_182811_20090826_182811
3009ef640fb08865b8941d3229646d25	SCI_MF1_AXNIFE20090825_075712_20090825_193710_20090827_193710
521afab8cd4e447b3aa581493b61520d	SCI_MF1_AXNIFE20090825_075712_20090826_190533_20090828_190533
5b8add656302ed5e883466edc9ed096d	SCI_MF1_AXNIFE20090825_075712_20090827_183356_20090829_183356
91d6655d86962872a1b8a7216a1f4414	SCI_MF1_AXNIFE20090825_075712_20090828_194255_20090830_194255
89f3139881d91f68055cc93a3fd4cce4	SCI_MF1_AXNIFE20090825_075712_20090829_191118_20090831_191118
65411a80f12ffab95908d8b931458c71	SCI_MF1_AXNIFE20090825_075712_20090830_183941_20090901_183941
4c7a0559fb0a7056cdc184d2872cfe0a	SCI_MF1_AXNIFE20090825_075712_20090831_194840_20090928_194840

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

validity identifier	M_CAL	M_DL	M_DN
20090818_181642_20090820_181642	meas.	meas.	interp.
20090819_192540_20090821_192540	meas.	meas.	interp.
20090820_185403_20090822_185403	meas.	meas.	interp.
20090821_182226_20090823_182226	meas.	meas.	meas.
20090822_193125_20090824_193125	meas.	meas.	pred.
20090823_185948_20090825_185948	meas.	meas.	pred.
20090824_182811_20090826_182811	pred.	pred.	pred.
20090825_193710_20090827_193710	pred.	pred.	pred.
20090826_190533_20090828_190533	pred.	pred.	pred.
20090827_183356_20090829_183356	pred.	pred.	pred.
20090828_194255_20090830_194255	pred.	pred.	pred.
20090829_191118_20090831_191118	pred.	pred.	pred.
20090830_183941_20090901_183941	pred.	pred.	pred.
20090831_194840_20090928_194840	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	1.0179	1.0109	1.0145	1.0016	1.0042	1.0041	1.0400	OK
2	1.0030	1.0083	1.0046	1.0013	1.0030	1.0019	1.0200	OK
3	1.0008	1.0021	1.0011	1.0003	1.0005	1.0002	1.0100	OK
4	1.0004	1.0007	1.0014	1.0001	1.0003	1.0001	1.0100	OK
5	1.0010	1.0018	1.0011	1.0001	1.0006	1.0001	1.0120	OK
6	1.0035	1.0023	1.0017	0.9997	1.0010	1.0006	1.0100	OK
7	1.0007	1.0017	1.0015	–	–	–	1.0070	OK
8	1.0141	1.0139	1.0187	–	–	–	1.0500	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 17 Aug 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090818_081224_20090817_184819_20090819_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

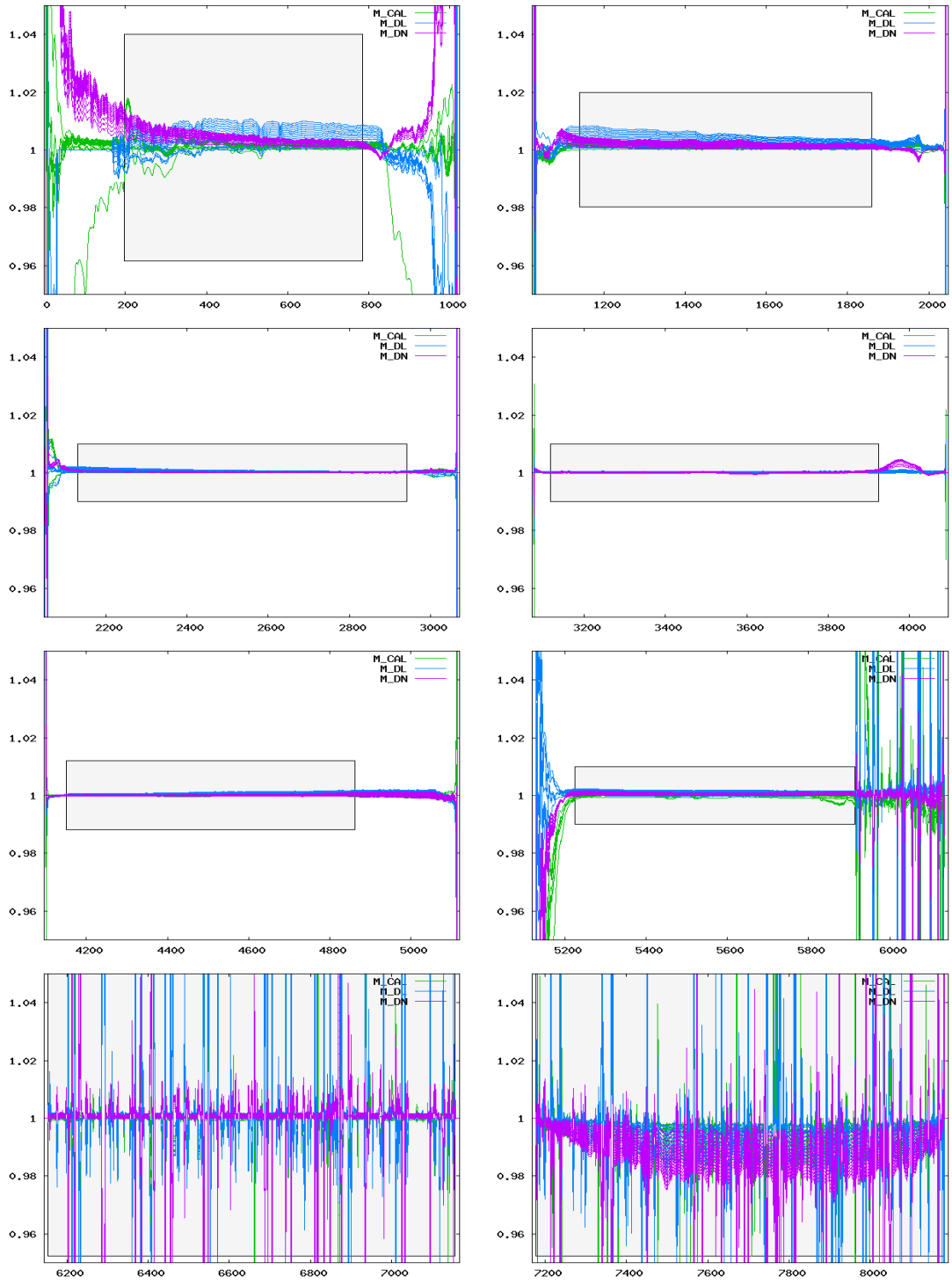

Figure 1: Ratio of delivered m-factors (18 Aug 2009– 31 Aug 2009) to the corresponding m-factor of the previous delivery day (17 Aug 2009). The grey boxes visualize the maximum ratio allowed.