NRT M-factor delivery document 29 Mar 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: 23 Mar 2010– 29 Mar 2010
- Prediction: 30 Mar 2010– 05 Apr 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
71550471203e82f4c5d758be53a76e9d	SCI_MF1_AXNIFE20100408_104527_20100323_193710_20100325_193710
7f1f35ba67fd8ad6e54a8887d891e229	SCI_MF1_AXNIFE20100408_104527_20100324_190533_20100326_190533
ba4bebff400701f0e34b10a5194db224	SCI_MF1_AXNIFE20100408_104527_20100325_183356_20100327_183356
47f79228a7417f4139dde3af04dae17f	SCI_MF1_AXNIFE20100408_104527_20100326_194255_20100328_194255
21cf1bbefe47926cff5dfcc510676896	SCI_MF1_AXNIFE20100408_104527_20100327_191118_20100329_191118
e827866ae8953ac663d85e0fb9f75b44	SCI_MF1_AXNIFE20100408_104527_20100328_183941_20100330_183941
8395af2239f561fc1e771cafe8ee8b45	SCI_MF1_AXNIFE20100408_104527_20100329_194840_20100331_194840
2fa595db9bad7ac19cdc86af995959a8	SCI_MF1_AXNIFE20100408_104527_20100330_191703_20100401_191703
252384880c79f2a5caefd695e3273632	SCI_MF1_AXNIFE20100408_104527_20100331_184526_20100402_184526
68ce93ca57cbdeff1447852f8c676d5a	SCI_MF1_AXNIFE20100408_104527_20100401_181349_20100403_181349
ca459e8cbbd154e552a7212fed2e9c9e	SCI_MF1_AXNIFE20100408_104527_20100402_192248_20100404_192248
389b74010939e0e129f1c6150776498c	SCI_MF1_AXNIFE20100408_104527_20100403_185111_20100405_185111
af2b56c48e327a19db28b7ec135abf6c	SCI_MF1_AXNIFE20100408_104527_20100404_181933_20100406_181933
a9346f64b7b9a694d153c05e94ce996c	SCI_MF1_AXNIFE20100408_104527_20100405_192832_20100503_192832

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

validity identifier	M_CAL	M_DL	M_DN
20100323_193710_20100325_193710	meas.	meas.	interp.
20100324_190533_20100326_190533	meas.	meas.	interp.
20100325_183356_20100327_183356	meas.	meas.	interp.
20100326_194255_20100328_194255	meas.	meas.	meas.
20100327_191118_20100329_191118	meas.	meas.	interp.
20100328_183941_20100330_183941	meas.	meas.	meas.
20100329_194840_20100331_194840	meas.	meas.	pred.
20100330_191703_20100401_191703	pred.	pred.	pred.
20100331_184526_20100402_184526	pred.	pred.	pred.
20100401_181349_20100403_181349	pred.	pred.	pred.
20100402_192248_20100404_192248	pred.	pred.	pred.
20100403_185111_20100405_185111	pred.	pred.	pred.
20100404_181933_20100406_181933	pred.	pred.	pred.
20100405_192832_20100503_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	1.0106	1.0129	1.0277	0.9993	1.0062	1.0107	1.0400	OK
2	1.0011	1.0085	1.0148	1.0003	1.0035	1.0053	1.0200	OK
3	1.0008	1.0032	1.0060	1.0004	1.0011	1.0017	1.0100	OK
4	1.0011	1.0017	1.0019	1.0003	1.0005	1.0007	1.0100	OK
5	1.0012	1.0025	1.0023	0.9997	0.9996	0.9998	1.0120	OK
6	1.0025	1.0014	1.0013	1.0008	0.9999	0.9997	1.0100	OK
7	1.0027	1.0009	1.0007	–	–	–	1.0070	OK
8	1.0012	1.0053	1.0046	–	–	–	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 22 Mar 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_103956_20100322_182811_20100324_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

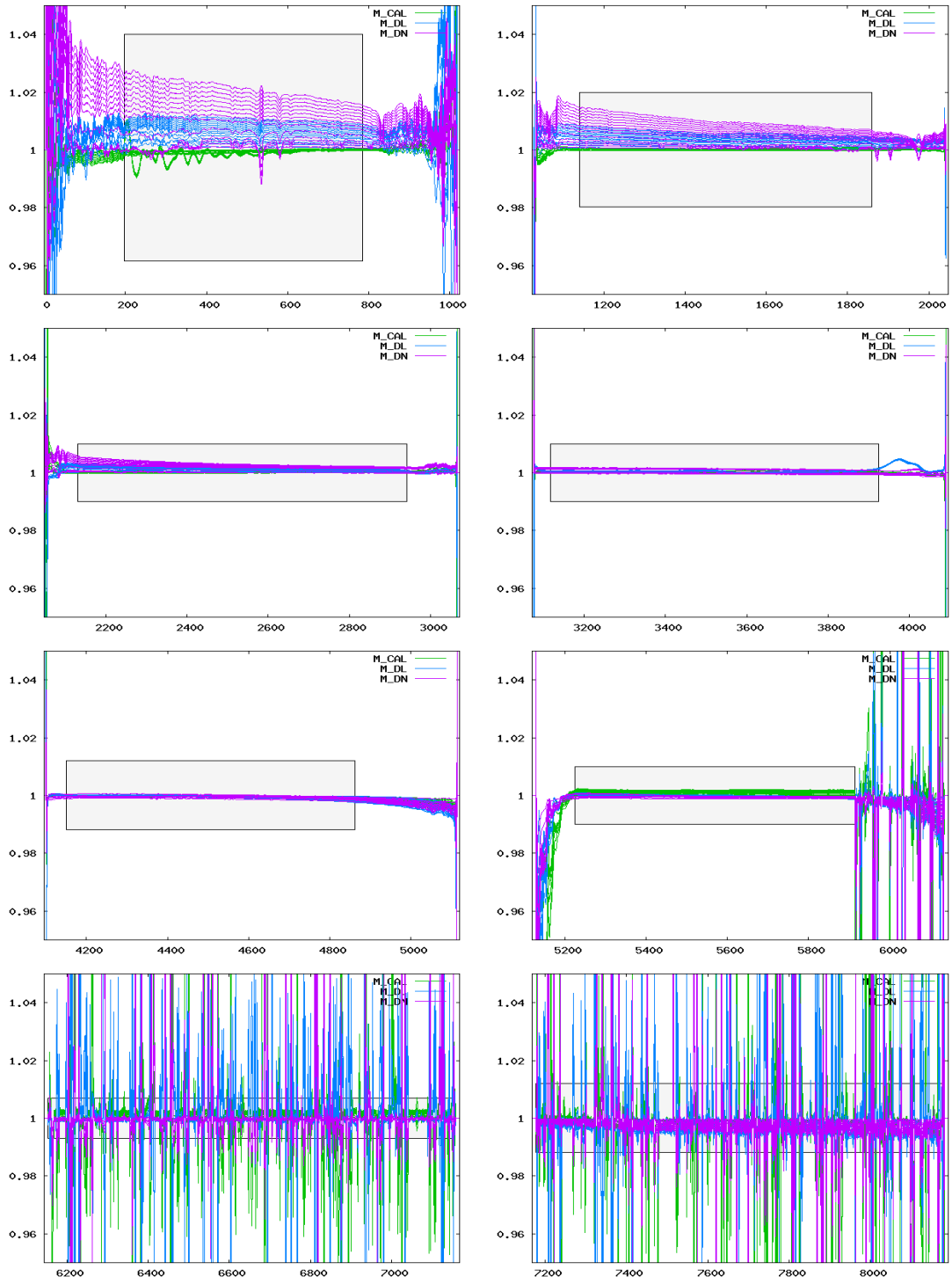

Figure 1: Ratio of delivered m-factors (23 Mar 2010– 05 Apr 2010) to the corresponding m-factor of the previous delivery day (22 Mar 2010). The grey boxes visualize the maximum ratio allowed.