NRT M-factor delivery document 13 Apr 2009

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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: 07 Apr 2009– 13 Apr 2009
- Prediction: 14 Apr 2009– 20 Apr 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
646b892f8206d84df3725d1f70a5f3b8	SCI_MF1_AXNIFE20090413_215451_20090407_193711_20090409_193711
1c07fb352ce59255581d1e9ea3194179	SCI_MF1_AXNIFE20090413_215451_20090408_190534_20090410_190534
13239b9e755f40e9ab4689c169dd1235	SCI_MF1_AXNIFE20090413_215451_20090409_183357_20090411_183357
d663bb5216eb9fdb25bfc8077fd5a619	SCI_MF1_AXNIFE20090413_215451_20090410_194255_20090412_194255
4f58d4d629f235d244dcc3e5766a0649	SCI_MF1_AXNIFE20090413_215451_20090411_191118_20090413_191118
72884386b25a2cd17abd7fa528949768	SCI_MF1_AXNIFE20090413_215451_20090412_183941_20090414_183941
11bb19a478f2075e4b4f4db116efefea	SCI_MF1_AXNIFE20090413_215451_20090413_194840_20090415_194840
65bd6808cca4c1ce5ef84b5174922948	SCI_MF1_AXNIFE20090413_215451_20090414_191703_20090416_191703
75a5420ea7391064799e399ed0df2934	SCI_MF1_AXNIFE20090413_215451_20090415_184526_20090417_184526
2aad02e89515d9931c121c2bb40ec632	SCI_MF1_AXNIFE20090413_215451_20090416_181349_20090418_181349
7293b174794cccc29a87476ada08f848	SCI_MF1_AXNIFE20090413_215451_20090417_192248_20090419_192248
618a896cb2ab606af964a13792618e13	SCI_MF1_AXNIFE20090413_215451_20090418_185111_20090420_185111
28d4aba788f7dfad9920901898ee289f	SCI_MF1_AXNIFE20090413_215451_20090419_181934_20090421_181934
43ad1e3533e9b48e5452033223c97aa1	SCI_MF1_AXNIFE20090413_215451_20090420_192833_20090518_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090407_193711_20090409_193711	meas.	meas.	meas.
20090408_190534_20090410_190534	meas.	meas.	interp.
20090409_183357_20090411_183357	meas.	meas.	interp.
20090410_194255_20090412_194255	meas.	meas.	interp.
20090411_191118_20090413_191118	meas.	meas.	meas.
20090412_183941_20090414_183941	meas.	meas.	pred.
20090413_194840_20090415_194840	meas.	pred.	pred.
20090414_191703_20090416_191703	pred.	pred.	pred.
20090415_184526_20090417_184526	pred.	pred.	pred.
20090416_181349_20090418_181349	pred.	pred.	pred.
20090417_192248_20090419_192248	pred.	pred.	pred.
20090418_185111_20090420_185111	pred.	pred.	pred.
20090419_181934_20090421_181934	pred.	pred.	pred.
20090420_192833_20090518_192833	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	1.0033	1.0151	1.0344	1.0011	1.0061	1.0118	1.0400	OK
2	1.0029	1.0083	1.0140	1.0010	1.0030	1.0046	1.0200	OK
3	1.0007	1.0025	1.0038	1.0002	1.0007	1.0006	1.0100	OK
4	1.0009	1.0012	1.0013	1.0001	1.0002	0.9998	1.0100	OK
5	1.0024	1.0033	1.0032	0.9995	0.9994	0.9994	1.0120	OK
6	1.0026	1.0016	1.0020	1.0009	1.0002	0.9998	1.0100	OK
7	1.0016	1.0012	1.0013	–	–	–	1.0070	OK
8	1.0089	1.0048	1.0049	–	–	–	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 06 Apr 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090406_215442_20090406_182812_20090408_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

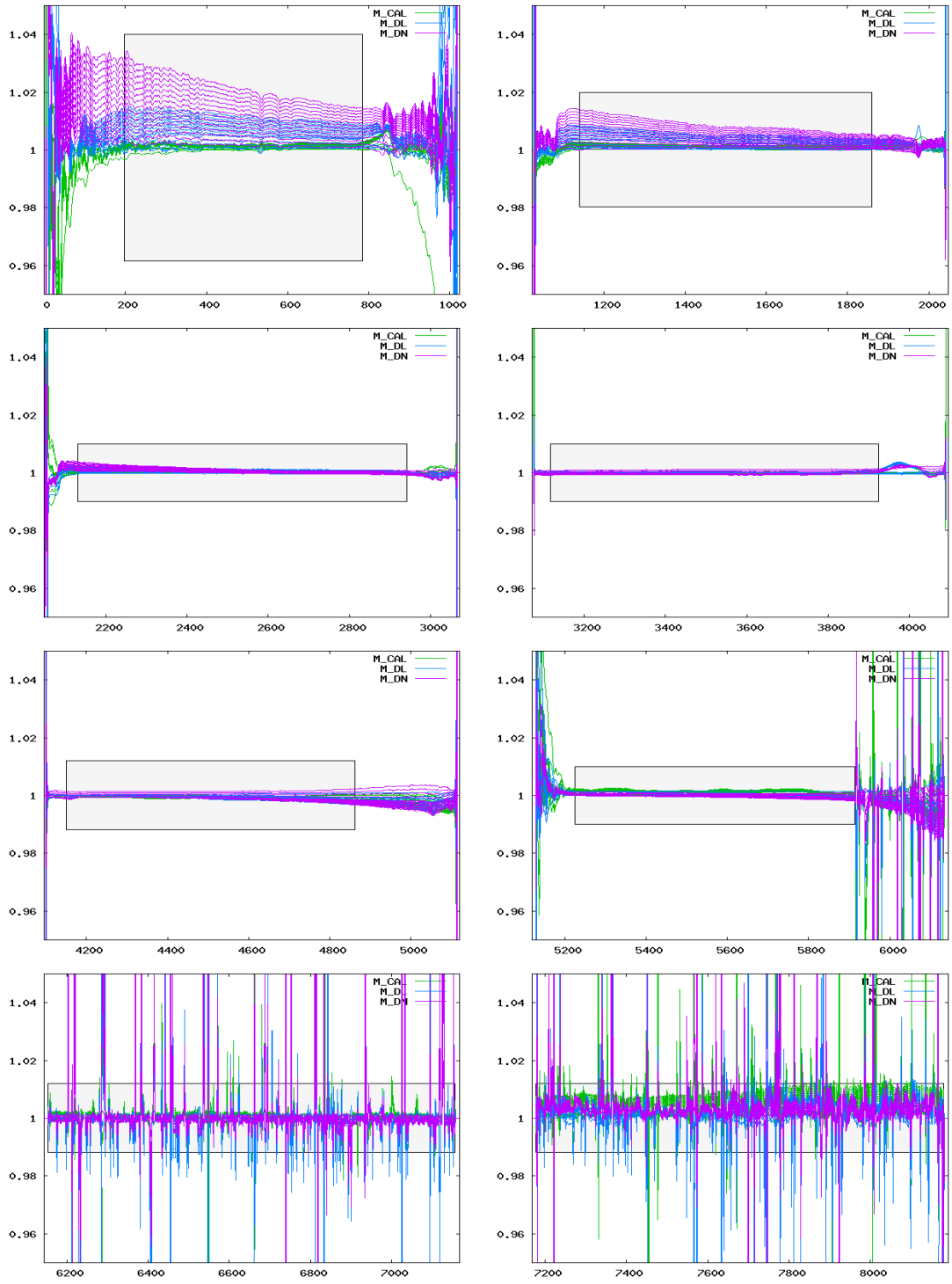

Figure 1: Ratio of delivered m-factors (07 Apr 2009– 20 Apr 2009) to the corresponding m-factor of the previous delivery day (06 Apr 2009). The grey boxes visualize the maximum ratio allowed.