NRT M-factor delivery document 30 Mar 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: 24 Mar 2009– 30 Mar 2009
- Prediction: 31 Mar 2009– 06 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
bbdf51abe21d6bcfac904d2f6bf8c4a2	SCI_MF1_AXNIFE20090330_215836_20090324_183649_20090326_183649
b8ca1677dc3231b476a5bccd129bd92c	SCI_MF1_AXNIFE20090330_215836_20090325_194548_20090327_194548
2a3d699ee80b81500ac929c1d39e7291	SCI_MF1_AXNIFE20090330_215836_20090326_191411_20090328_191411
9f7685d794d43fe17230365126902bdd	SCI_MF1_AXNIFE20090330_215836_20090327_184234_20090329_184234
8830fd327a7031808cc0a4cfb6888366	SCI_MF1_AXNIFE20090330_215836_20090328_181057_20090330_181057
6d9bcc78797ee222fe42a14dec788efd	SCI_MF1_AXNIFE20090330_215836_20090329_191956_20090331_191956
880bf7705ea47698d1226b3c605a1e28	SCI_MF1_AXNIFE20090330_215836_20090330_184819_20090401_184819
815f961c48eddb8e09370922e1985a40	SCI_MF1_AXNIFE20090330_215836_20090331_181642_20090402_181642
b4aab4635c2b31f4d7c40890c450636f	SCI_MF1_AXNIFE20090330_215836_20090401_192541_20090403_192541
32e5d7df6f1196fd54dfdf5d9ae1916b	SCI_MF1_AXNIFE20090330_215836_20090402_185404_20090404_185404
8acd72c6832dab1f200c91051bac0f29	SCI_MF1_AXNIFE20090330_215836_20090403_182227_20090405_182227
b9a110d1bbf7c4299fe0deae2b9b2e07	SCI_MF1_AXNIFE20090330_215836_20090404_193126_20090406_193126
10ad3441145b5623fdfb0a9bcd893867	SCI_MF1_AXNIFE20090330_215836_20090405_185949_20090407_185949
ac6c659b5c648ad4d966fc492661d284	SCI_MF1_AXNIFE20090330_215836_20090406_182812_20090504_182812

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

validity identifier	M_CAL	M_DL	M_DN
20090324_183649_20090326_183649	meas.	meas.	interp.
20090325_194548_20090327_194548	meas.	meas.	meas.
20090326_191411_20090328_191411	meas.	meas.	interp.
20090327_184234_20090329_184234	meas.	meas.	interp.
20090328_181057_20090330_181057	meas.	meas.	interp.
20090329_191956_20090331_191956	meas.	meas.	meas.
20090330_184819_20090401_184819	pred.	pred.	pred.
20090331_181642_20090402_181642	pred.	pred.	pred.
20090401_192541_20090403_192541	pred.	pred.	pred.
20090402_185404_20090404_185404	pred.	pred.	pred.
20090403_182227_20090405_182227	pred.	pred.	pred.
20090404_193126_20090406_193126	pred.	pred.	pred.
20090405_185949_20090407_185949	pred.	pred.	pred.
20090406_182812_20090504_182812	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	1.0144	1.0131	1.0277	1.0006	1.0049	1.0100	1.0400	OK
2	1.0035	1.0096	1.0115	1.0012	1.0036	1.0046	1.0200	OK
3	1.0012	1.0031	1.0048	1.0005	1.0010	1.0022	1.0100	OK
4	1.0007	1.0008	1.0034	1.0003	1.0004	1.0019	1.0100	OK
5	1.0010	1.0016	1.0017	0.9997	0.9998	1.0002	1.0120	OK
6	1.0035	1.0016	1.0016	1.0010	1.0001	0.9995	1.0100	OK
7	1.0020	1.0007	1.0007	–	–	–	1.0070	OK
8	1.0075	1.0040	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 23 Mar 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090323_225519_20090323_190826_20090325_190826` .

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

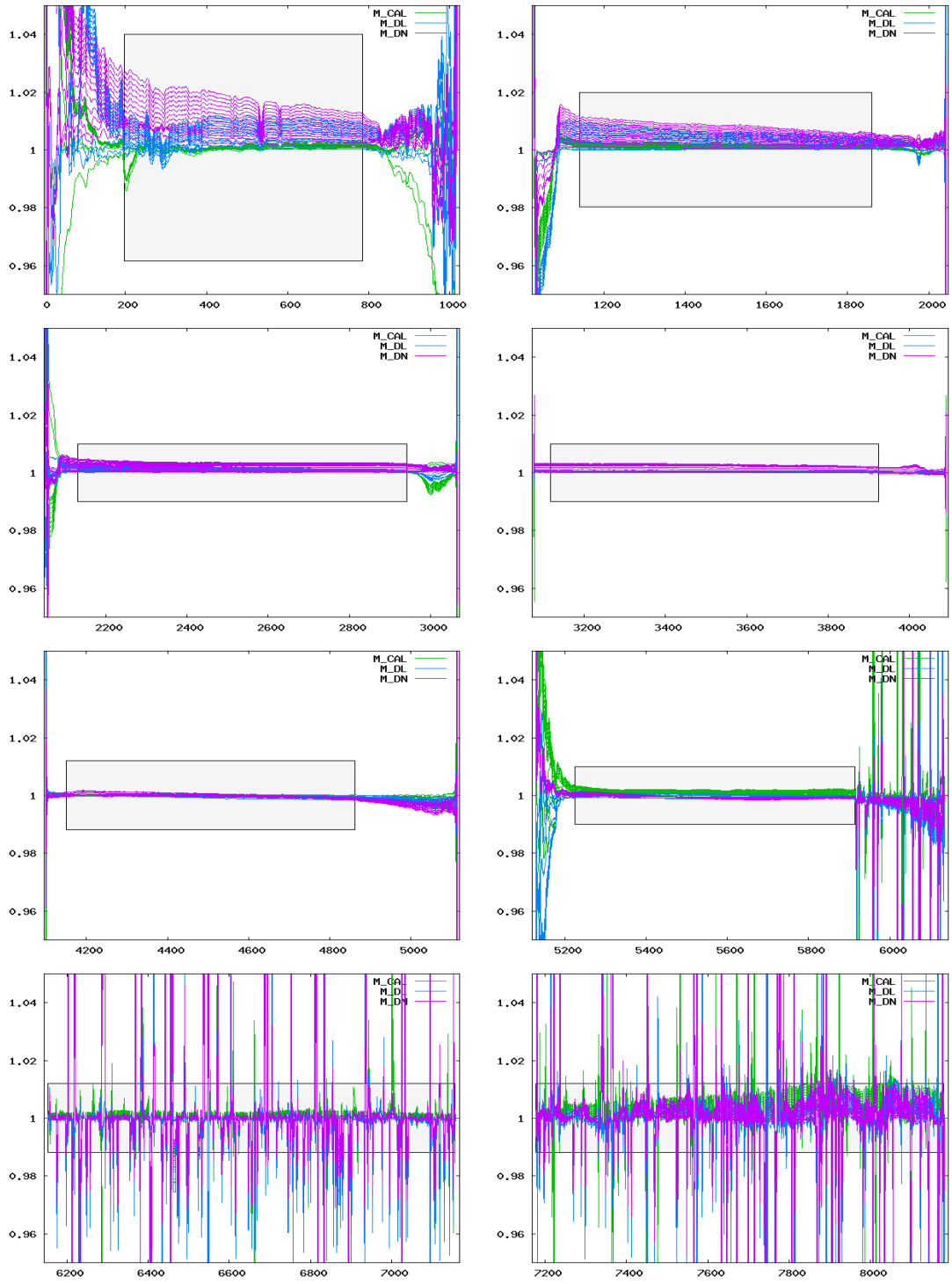

Figure 1: Ratio of delivered m-factors (24 Mar 2009– 06 Apr 2009) to the corresponding m-factor of the previous delivery day (23 Mar 2009). The grey boxes visualize the maximum ratio allowed.