NRT M-factor delivery document 08 Mar 2010

Klaus Bramstedt, ife Bremen

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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: 02 Mar 2010– 08 Mar 2010
- Prediction: 09 Mar 2010– 15 Mar 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
9b21ff0fcdc8635233d9616b69a7d6bb	SCI_MF1_AXNIFE20100408_102043_20100302_185655_20100304_185655
e2b0bfdb79788f5d95740640e8eff675	SCI_MF1_AXNIFE20100408_102043_20100303_182518_20100305_182518
04229c464b0bbe52490bc7175301d7bf	SCI_MF1_AXNIFE20100408_102043_20100304_193417_20100306_193417
297b74be10b2c664d00e4d412f64d6a3	SCI_MF1_AXNIFE20100408_102043_20100305_190240_20100307_190240
ae80ec384fe56415a7c45b7b2023bdc9	SCI_MF1_AXNIFE20100408_102043_20100306_183103_20100308_183103
4fac2977d2319eb5b4680ffc0cfcb4fd	SCI_MF1_AXNIFE20100408_102043_20100307_194002_20100309_194002
f4a1038aa53bd8434433ac63379a6780	SCI_MF1_AXNIFE20100408_102043_20100308_190825_20100310_190825
1334f83bf605bfa3edf47f81b09cb8b5	SCI_MF1_AXNIFE20100408_102043_20100309_183648_20100311_183648
77e52ecc149f6201d1702ad9e7453722	SCI_MF1_AXNIFE20100408_102043_20100310_194547_20100312_194547
25a59dda05e92ec52176bf6e6e560423	SCI_MF1_AXNIFE20100408_102043_20100311_191410_20100313_191410
1a190d9a6c741d1845e7bdc92fafd883	SCI_MF1_AXNIFE20100408_102043_20100312_184233_20100314_184233
e38b93f4d62ac447f802b41e034edec3	SCI_MF1_AXNIFE20100408_102043_20100313_181056_20100315_181056
d878eeb7916e39fc56b0d2b8d68bed11	SCI_MF1_AXNIFE20100408_102043_20100314_191955_20100316_191955
ba79a14c7020fc1437041684a37474e3	SCI_MF1_AXNIFE20100408_102043_20100315_184818_20100412_184818

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

validity identifier	M_CAL	M_DL	M_DN
20100302_185655_20100304_185655	meas.	meas.	meas.
20100303_182518_20100305_182518	meas.	meas.	interp.
20100304_193417_20100306_193417	interp.	interp.	interp.
20100305_190240_20100307_190240	interp.	interp.	interp.
20100306_183103_20100308_183103	meas.	meas.	meas.
20100307_194002_20100309_194002	meas.	meas.	pred.
20100308_190825_20100310_190825	meas.	meas.	pred.
20100309_183648_20100311_183648	pred.	pred.	pred.
20100310_194547_20100312_194547	pred.	pred.	pred.
20100311_191410_20100313_191410	pred.	pred.	pred.
20100312_184233_20100314_184233	pred.	pred.	pred.
20100313_181056_20100315_181056	pred.	pred.	pred.
20100314_191955_20100316_191955	pred.	pred.	pred.
20100315_184818_20100412_184818	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	1.0081	1.0387	1.0283	0.9982	1.0002	1.0097	1.0400	OK
2	1.0007	1.0063	1.0116	1.0001	1.0024	1.0045	1.0200	OK
3	1.0008	1.0019	1.0030	1.0002	1.0006	1.0006	1.0100	OK
4	1.0014	1.0012	1.0020	1.0005	1.0002	0.9996	1.0100	OK
5	1.0009	1.0015	1.0023	1.0003	0.9998	0.9993	1.0120	OK
6	1.0036	1.0013	1.0011	1.0015	1.0002	1.0001	1.0100	OK
7	1.0037	1.0006	1.0010	–	–	–	1.0070	OK
8	1.0031	1.0046	1.0010	–	–	–	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 01 Mar 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_101531_20100301_192832_20100303_192832` .

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

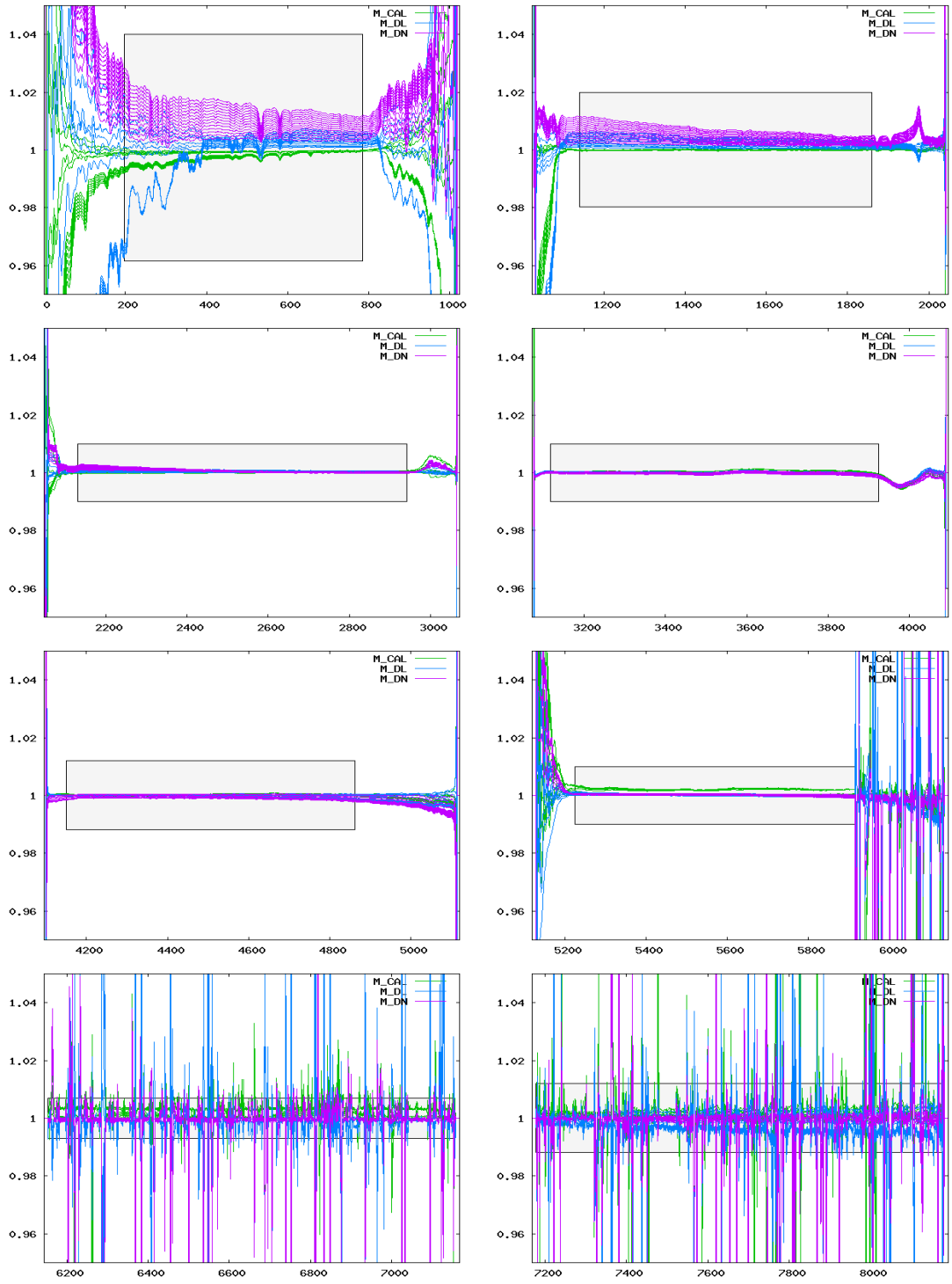

Figure 1: Ratio of delivered m-factors (02 Mar 2010– 15 Mar 2010) to the corresponding m-factor of the previous delivery day (01 Mar 2010). The grey boxes visualize the maximum ratio allowed.