NRT M-factor delivery document 22 Feb 2010

Klaus Bramstedt, ife Bremen

22 Feb 2010

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: 16 Feb 2010– 22 Feb 2010
- Prediction: 23 Feb 2010– 01 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
54fe4e3ae095537d9e3ed0e34147bec2	SCI_MF1_AXNIFE20100408_100422_20100216_193710_20100218_193710
d5e3bc0fed7ae6d1ecd93b5ba661e55a	SCI_MF1_AXNIFE20100408_100422_20100217_190533_20100219_190533
e5a6ba98ad161a87f336bed597afc1a3	SCI_MF1_AXNIFE20100408_100422_20100218_183356_20100220_183356
d22e4986baf40319e149cc3156be0892	SCI_MF1_AXNIFE20100408_100422_20100219_194255_20100221_194255
09f266f496f0cfa87942aca7ef228df1	SCI_MF1_AXNIFE20100408_100422_20100220_191118_20100222_191118
47dd0ded5ebf3089fa54c54db3c45be8	SCI_MF1_AXNIFE20100408_100422_20100221_183941_20100223_183941
838131689101fff0f277efdc6196eaff	SCI_MF1_AXNIFE20100408_100422_20100222_194840_20100224_194840
70e72bd56768137c779f92015e4a2381	SCI_MF1_AXNIFE20100408_100422_20100223_191703_20100225_191703
49d2395287e23704db7caf5a8eb8e1f1	SCI_MF1_AXNIFE20100408_100422_20100224_184526_20100226_184526
13acc47663a5d7ec9e60f98936f30bbc	SCI_MF1_AXNIFE20100408_100422_20100225_181349_20100227_181349
53e81f2c568a1814a48b215724a410c5	SCI_MF1_AXNIFE20100408_100422_20100226_192248_20100228_192248
cd0fc033c174417782ade74abbd9e811	SCI_MF1_AXNIFE20100408_100422_20100227_185111_20100301_185111
57cd0e864165c0821f7915d9a73e0977	SCI_MF1_AXNIFE20100408_100422_20100228_181934_20100302_181934
a98cb5cf1bcfba55b0643dd2976d96d5	SCI_MF1_AXNIFE20100408_100422_20100301_192832_20100329_192832

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

validity identifier	M_CAL	M_DL	M_DN
20100216_193710_20100218_193710	meas.	meas.	interp.
20100217_190533_20100219_190533	meas.	meas.	meas.
20100218_183356_20100220_183356	meas.	meas.	interp.
20100219_194255_20100221_194255	meas.	meas.	interp.
20100220_191118_20100222_191118	meas.	meas.	interp.
20100221_183941_20100223_183941	meas.	meas.	meas.
20100222_194840_20100224_194840	pred.	pred.	pred.
20100223_191703_20100225_191703	pred.	pred.	pred.
20100224_184526_20100226_184526	pred.	pred.	pred.
20100225_181349_20100227_181349	pred.	pred.	pred.
20100226_192248_20100228_192248	pred.	pred.	pred.
20100227_185111_20100301_185111	pred.	pred.	pred.
20100228_181934_20100302_181934	pred.	pred.	pred.
20100301_192832_20100329_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	1.0140	1.0085	1.0165	0.9981	1.0027	1.0069	1.0400	OK
2	1.0011	1.0068	1.0099	1.0002	1.0022	1.0033	1.0200	OK
3	1.0007	1.0015	1.0047	0.9997	1.0002	0.9986	1.0100	OK
4	1.0014	1.0005	1.0053	0.9993	1.0000	0.9974	1.0100	OK
5	1.0017	1.0008	1.0046	0.9989	0.9999	0.9979	1.0120	OK
6	1.0023	1.0013	1.0048	0.9992	0.9997	0.9986	1.0100	OK
7	1.0013	1.0012	1.0045	–	–	–	1.0070	OK
8	1.0016	1.0014	1.0023	–	–	–	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 15 Feb 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_095958_20100215_182811_20100217_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

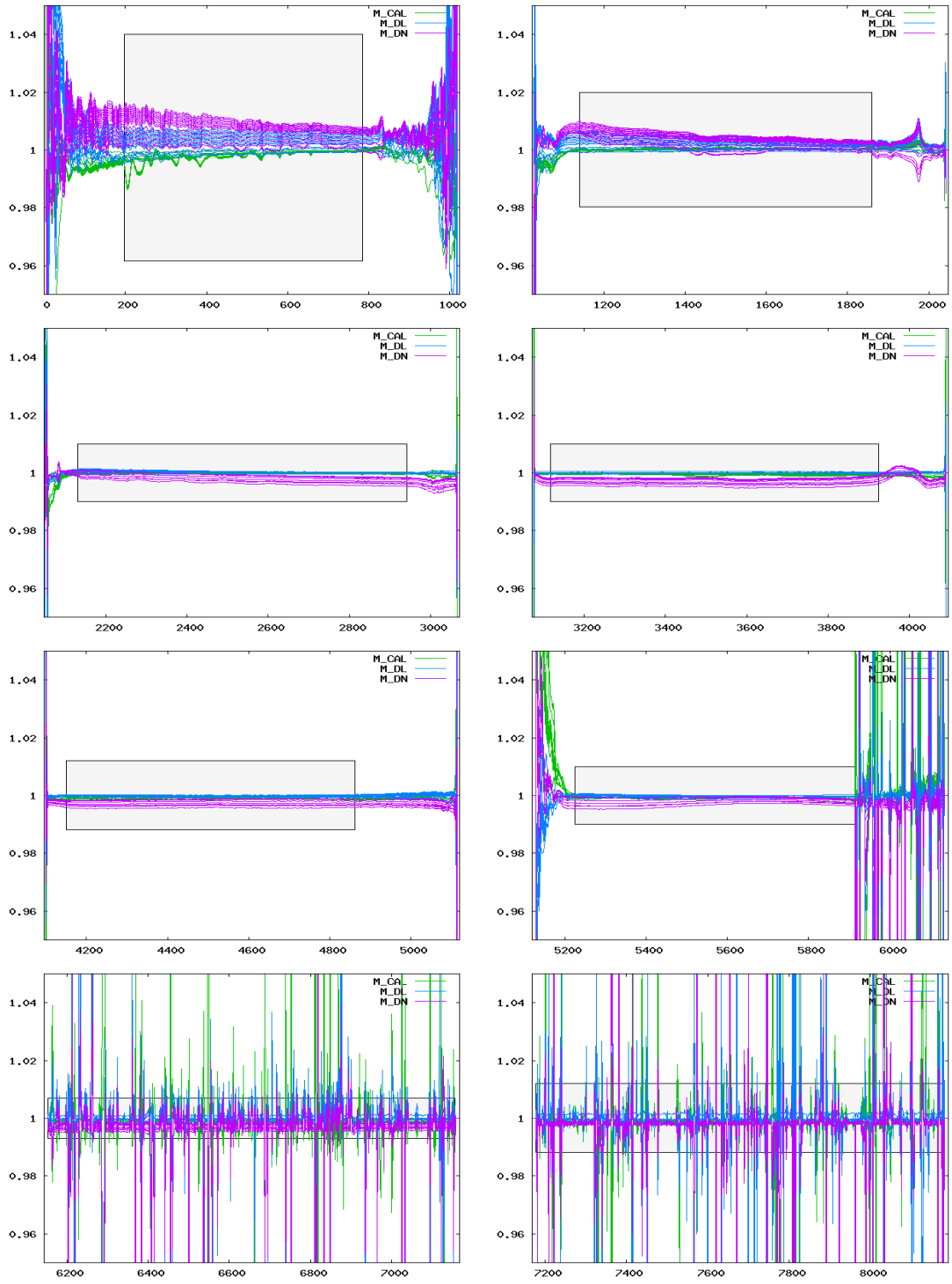

Figure 1: Ratio of delivered m-factors (16 Feb 2010– 01 Mar 2010) to the corresponding m-factor of the previous delivery day (15 Feb 2010). The grey boxes visualize the maximum ratio allowed.