NRT M-factor delivery document 10 Aug 2009

Klaus Bramstedt, ife Bremen

10 Aug 2009

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: 04 Aug 2009– 10 Aug 2009
- Prediction: 11 Aug 2009– 17 Aug 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
94bdc3f5c71c1cfa4bdb897b82dee0ee	SCI_MF1_AXNIFE20090810_215408_20090804_185656_20090806_185656
3d5d1a83332e539de68162b556977e39	SCI_MF1_AXNIFE20090810_215408_20090805_182519_20090807_182519
3350ffa8ad43520a0d13220dc0aafb88	SCI_MF1_AXNIFE20090810_215408_20090806_193418_20090808_193418
fb8d96490e3dbaa971eae108f8ccab29	SCI_MF1_AXNIFE20090810_215408_20090807_190241_20090809_190241
d313de955baf82dcdce55e7030656491	SCI_MF1_AXNIFE20090810_215408_20090808_183104_20090810_183104
df0b7723ce847b476addffcecddc52f1	SCI_MF1_AXNIFE20090810_215408_20090809_194003_20090811_194003
db34537e1ed410c7c6b6977d3d5cbc53	SCI_MF1_AXNIFE20090810_215408_20090810_190826_20090812_190826
58d48c0aaf12db27f71c6bd0703ab7ea	SCI_MF1_AXNIFE20090810_215408_20090811_183649_20090813_183649
928364fc416eb43086873ee5dc840a34	SCI_MF1_AXNIFE20090810_215408_20090812_194548_20090814_194548
f2d54aa514566aa6e44f69c3b2699da4	SCI_MF1_AXNIFE20090810_215408_20090813_191411_20090815_191411
13d0f3a12710ab58ec27e59ec0dddd61	SCI_MF1_AXNIFE20090810_215408_20090814_184234_20090816_184234
8a86a43ddeb848db6b1a5a88e29c8985	SCI_MF1_AXNIFE20090810_215408_20090815_181057_20090817_181057
d5dcf63ab922a72a2b8a246beae836dd	SCI_MF1_AXNIFE20090810_215408_20090816_191956_20090818_191956
3bf23bbdcecd17e0a9941d0eec89a3d4	SCI_MF1_AXNIFE20090810_215408_20090817_184819_20090914_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090804_185656_20090806_185656	meas.	meas.	interp.
20090805_182519_20090807_182519	meas.	meas.	meas.
20090806_193418_20090808_193418	meas.	meas.	pred.
20090807_190241_20090809_190241	meas.	meas.	pred.
20090808_183104_20090810_183104	meas.	meas.	pred.
20090809_194003_20090811_194003	pred.	meas.	pred.
20090810_190826_20090812_190826	pred.	pred.	pred.
20090811_183649_20090813_183649	pred.	pred.	pred.
20090812_194548_20090814_194548	pred.	pred.	pred.
20090813_191411_20090815_191411	pred.	pred.	pred.
20090814_184234_20090816_184234	pred.	pred.	pred.
20090815_181057_20090817_181057	pred.	pred.	pred.
20090816_191956_20090818_191956	pred.	pred.	pred.
20090817_184819_20090914_184819	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	1.0148	1.0205	1.0068	1.0025	1.0079	1.0006	1.0400	OK
2	1.0040	1.0099	1.0027	1.0018	1.0038	1.0005	1.0200	OK
3	1.0010	1.0027	1.0010	1.0004	1.0009	1.0003	1.0100	OK
4	1.0010	1.0014	1.0014	1.0003	1.0005	1.0010	1.0100	OK
5	1.0011	1.0025	1.0035	1.0004	1.0011	1.0013	1.0120	OK
6	1.0036	1.0028	1.0028	1.0004	1.0014	1.0012	1.0100	OK
7	1.0007	1.0017	1.0023	–	–	–	1.0070	OK
8	1.0036	1.0016	1.0037	–	–	–	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 03 Aug 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090803_215417_20090803_192833_20090805_192833` .

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

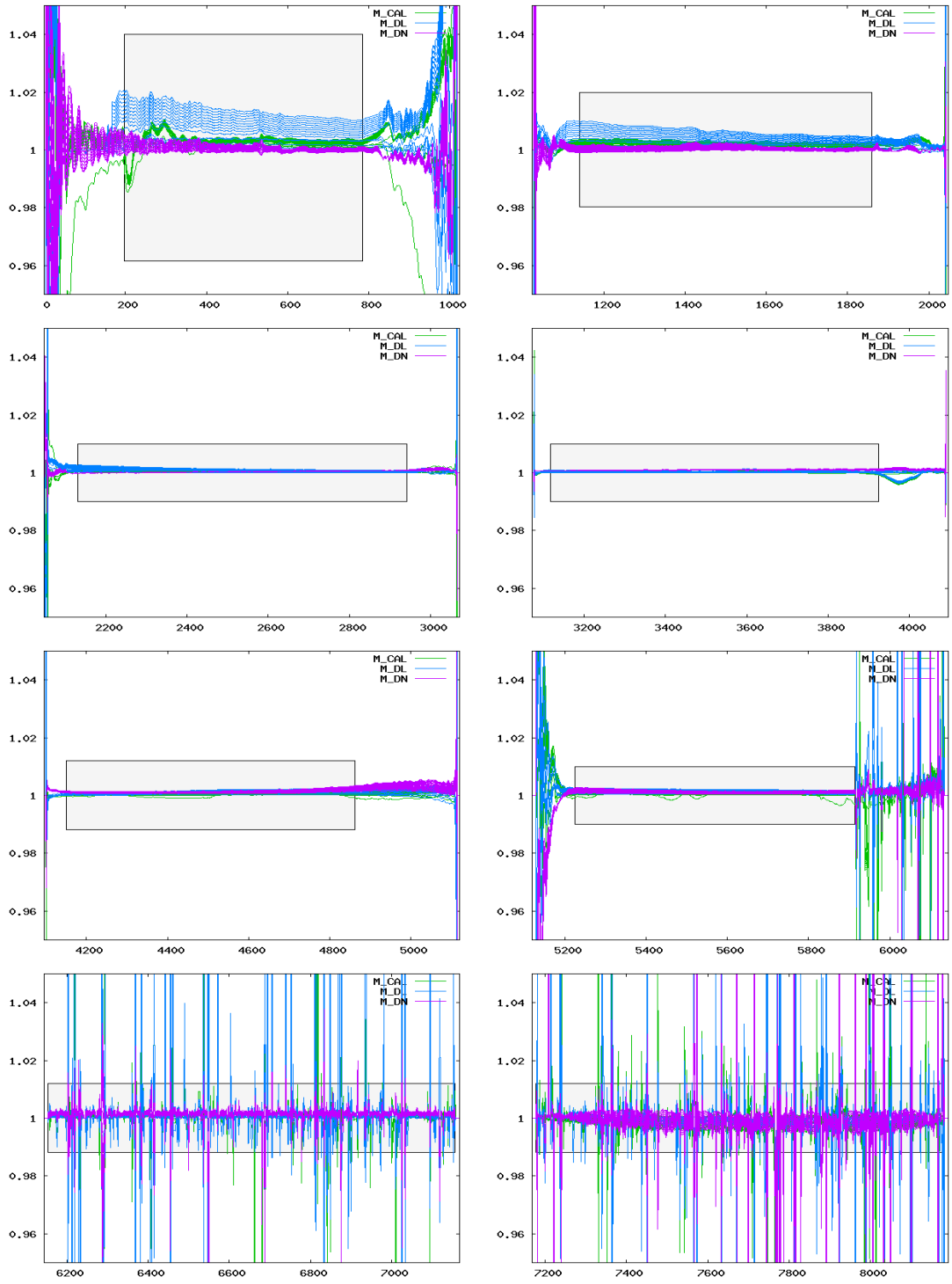

Figure 1: Ratio of delivered m-factors (04 Aug 2009– 17 Aug 2009) to the corresponding m-factor of the previous delivery day (03 Aug 2009). The grey boxes visualize the maximum ratio allowed.