NRT M-factor delivery document 30 Jun 2008

Klaus Bramstedt, ife Bremen

30 Jun 2008

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 Jun 2008– 30 Jun 2008
- Prediction: 01 Jul 2008– 07 Jul 2008

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
d456deb141f5a361a75a5d33ffde95be	SCI_MF1_AXNIFE20080630_215549_20080624_181642_20080626_181642
408860a78ef68279ceef4d7b6381a9b5	SCI_MF1_AXNIFE20080630_215549_20080625_192541_20080627_192541
42fd451427c898ea29639ac3ecfc8400	SCI_MF1_AXNIFE20080630_215549_20080626_185404_20080628_185404
a4df72e2638f93f1d1a3f6af0674dbf0	SCI_MF1_AXNIFE20080630_215549_20080627_182227_20080629_182227
f385566b0de0edaf4544689375bfb036	SCI_MF1_AXNIFE20080630_215549_20080628_193126_20080630_193126
5753ce51dcb1b0b921fc87a0a6df43ee	SCI_MF1_AXNIFE20080630_215549_20080629_185949_20080701_185949
ba525cd504cfbcb990e375ea9283e401	SCI_MF1_AXNIFE20080630_215549_20080630_182812_20080702_182812
0604a120185b583f1a723393ddd6b2c7	SCI_MF1_AXNIFE20080630_215549_20080701_193711_20080703_193711
68f247bee0bb2a935484b74534e00016	SCI_MF1_AXNIFE20080630_215549_20080702_190534_20080704_190534
21928caa2d66e490d180fbb5c4f581ff	SCI_MF1_AXNIFE20080630_215549_20080703_183357_20080705_183357
50edcdb433108b1d52847d3e6118917d	SCI_MF1_AXNIFE20080630_215549_20080704_194256_20080706_194256
69a0c6ddcc3fe86c9dad5b5eca96e6ab	SCI_MF1_AXNIFE20080630_215549_20080705_191119_20080707_191119
eb862d4b9352af35c28621a295f985d8	SCI_MF1_AXNIFE20080630_215549_20080706_183942_20080708_183942
ba631398a643df52588497a6c680a033	SCI_MF1_AXNIFE20080630_215549_20080707_194841_20080804_194841

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

validity identifier	M_CAL	M_DL	M_DN
20080624_181642_20080626_181642	meas.	meas.	interp.
20080625_192541_20080627_192541	meas.	meas.	interp.
20080626_185404_20080628_185404	meas.	meas.	meas.
20080627_182227_20080629_182227	meas.	meas.	pred.
20080628_193126_20080630_193126	meas.	meas.	pred.
20080629_185949_20080701_185949	meas.	meas.	pred.
20080630_182812_20080702_182812	pred.	pred.	pred.
20080701_193711_20080703_193711	pred.	pred.	pred.
20080702_190534_20080704_190534	pred.	pred.	pred.
20080703_183357_20080705_183357	pred.	pred.	pred.
20080704_194256_20080706_194256	pred.	pred.	pred.
20080705_191119_20080707_191119	pred.	pred.	pred.
20080706_183942_20080708_183942	pred.	pred.	pred.
20080707_194841_20080804_194841	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	1.0043	1.0151	1.0113	1.0016	1.0048	1.0028	1.0400	OK
2	1.0027	1.0054	1.0038	1.0011	1.0018	1.0013	1.0200	OK
3	1.0008	1.0016	1.0020	1.0003	1.0004	1.0012	1.0100	OK
4	1.0013	1.0012	1.0022	1.0003	1.0003	1.0015	1.0100	OK
5	1.0020	1.0019	1.0022	1.0009	1.0007	1.0013	1.0120	OK
6	1.0012	1.0013	1.0017	1.0005	1.0004	1.0007	1.0100	OK
7	1.0000	0.9996	1.0007	–	–	–	1.0070	OK
8	1.0028	1.0016	1.0027	–	–	–	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 Jun 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080623_215551_20080623_184819_20080625_184819` .

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

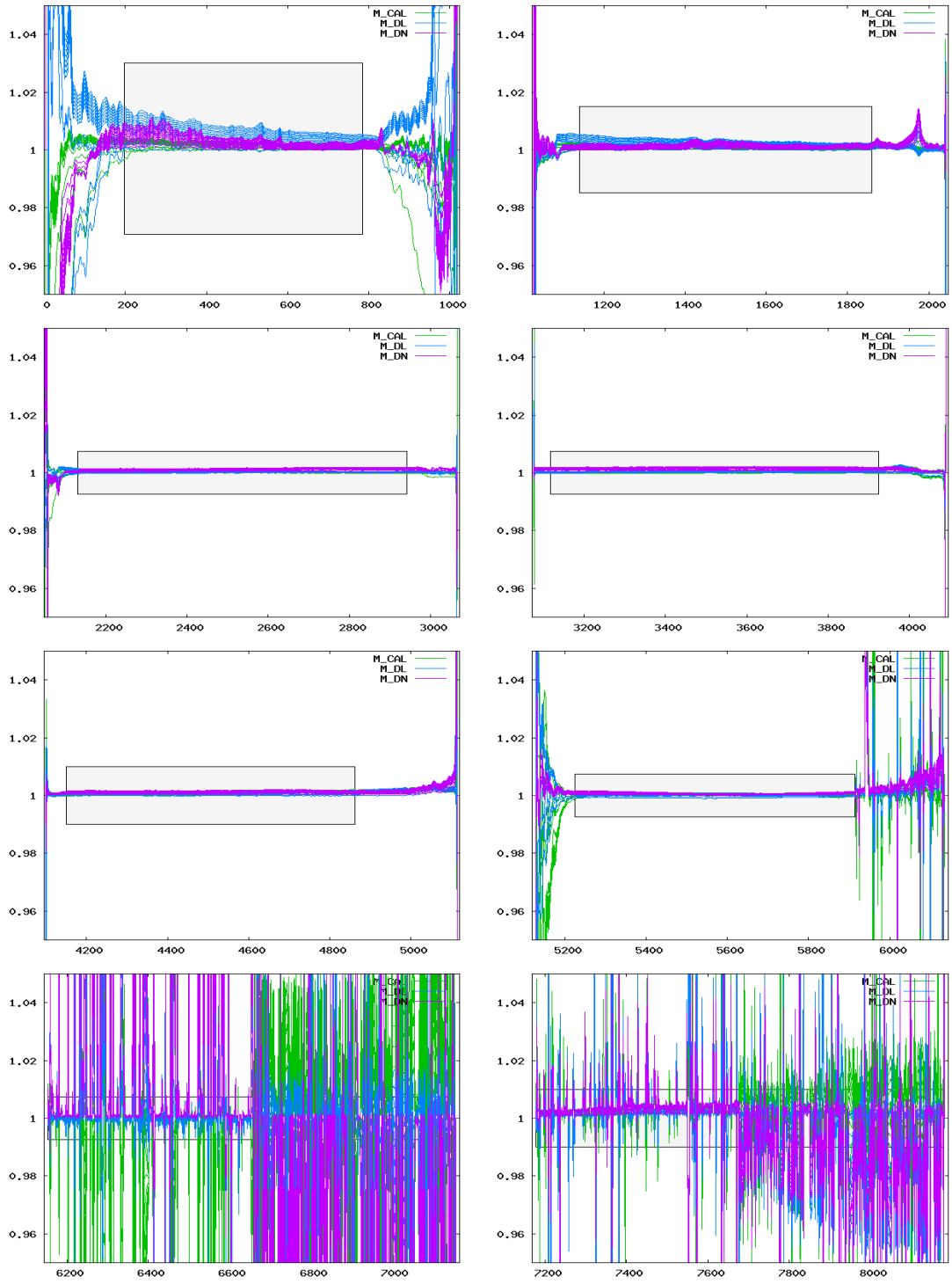

Figure 1: Ratio of delivered m-factors (24 Jun 2008– 07 Jul 2008) to the corresponding m-factor of the previous delivery day (23 Jun 2008). The grey boxes visualize the maximum ratio allowed.