NRT M-factor delivery document 29 Jun 2009

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 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: 23 Jun 2009– 29 Jun 2009
- Prediction: 30 Jun 2009– 06 Jul 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
0001987b4d642a90f5ae70a986771940	SCI_MF1_AXNIFE20090629_215354_20090623_191703_20090625_191703
5ae59076371e4bc9afe5cf2f2424c110	SCI_MF1_AXNIFE20090629_215354_20090624_184526_20090626_184526
9c47b526657d892807b83804427c768e	SCI_MF1_AXNIFE20090629_215354_20090625_181349_20090627_181349
2a599508c7353cbb5a91876d0dbab72b	SCI_MF1_AXNIFE20090629_215354_20090626_192248_20090628_192248
4c7877c57c1259079915777e5721e5e0	SCI_MF1_AXNIFE20090629_215354_20090627_185111_20090629_185111
e852c357841de1b02d53c87fb4ef1cc5	SCI_MF1_AXNIFE20090629_215354_20090628_181934_20090630_181934
a1f2e73e1991b101fd6ee2616708f8de	SCI_MF1_AXNIFE20090629_215354_20090629_192833_20090701_192833
ba85991134a7c4e85f9028722df6c6b4	SCI_MF1_AXNIFE20090629_215354_20090630_185656_20090702_185656
4917f51adf687a1c1d166e917830a9e3	SCI_MF1_AXNIFE20090629_215354_20090701_182519_20090703_182519
3da4eb311a9a18bdf3b0e44110601ea5	SCI_MF1_AXNIFE20090629_215354_20090702_193418_20090704_193418
6457057415089598ce4cfe5edcb7defd	SCI_MF1_AXNIFE20090629_215354_20090703_190241_20090705_190241
ab3def58a78f8be82ea4088c49d0166f	SCI_MF1_AXNIFE20090629_215354_20090704_183104_20090706_183104
d4708222634944f7b5f2a740218fd7f8	SCI_MF1_AXNIFE20090629_215354_20090705_194003_20090707_194003
2e34d8b62337e76a544fa459f85e5e12	SCI_MF1_AXNIFE20090629_215354_20090706_190826_20090803_190826

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

validity identifier	M_CAL	M_DL	M_DN
20090623_191703_20090625_191703	meas.	meas.	meas.
20090624_184526_20090626_184526	meas.	meas.	pred.
20090625_181349_20090627_181349	meas.	meas.	pred.
20090626_192248_20090628_192248	interp.	meas.	pred.
20090627_185111_20090629_185111	interp.	interp.	pred.
20090628_181934_20090630_181934	meas.	meas.	pred.
20090629_192833_20090701_192833	pred.	pred.	pred.
20090630_185656_20090702_185656	pred.	pred.	pred.
20090701_182519_20090703_182519	pred.	pred.	pred.
20090702_193418_20090704_193418	pred.	pred.	pred.
20090703_190241_20090705_190241	pred.	pred.	pred.
20090704_183104_20090706_183104	pred.	pred.	pred.
20090705_194003_20090707_194003	pred.	pred.	pred.
20090706_190826_20090803_190826	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	1.0129	1.0295	1.0097	1.0026	1.0093	1.0023	1.0400	OK
2	1.0036	1.0101	1.0048	1.0014	1.0036	1.0015	1.0200	OK
3	1.0012	1.0031	1.0025	1.0002	1.0008	1.0017	1.0100	OK
4	1.0006	1.0010	1.0029	1.0001	1.0004	1.0023	1.0100	OK
5	1.0013	1.0023	1.0030	0.9999	1.0011	1.0021	1.0120	OK
6	1.0015	1.0031	1.0029	0.9999	1.0014	1.0012	1.0100	OK
7	1.0011	1.0007	1.0021	–	–	–	1.0070	OK
8	1.0039	1.0040	1.0106	–	–	–	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 22 Jun 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090623_090557_20090622_194840_20090624_194840` .

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

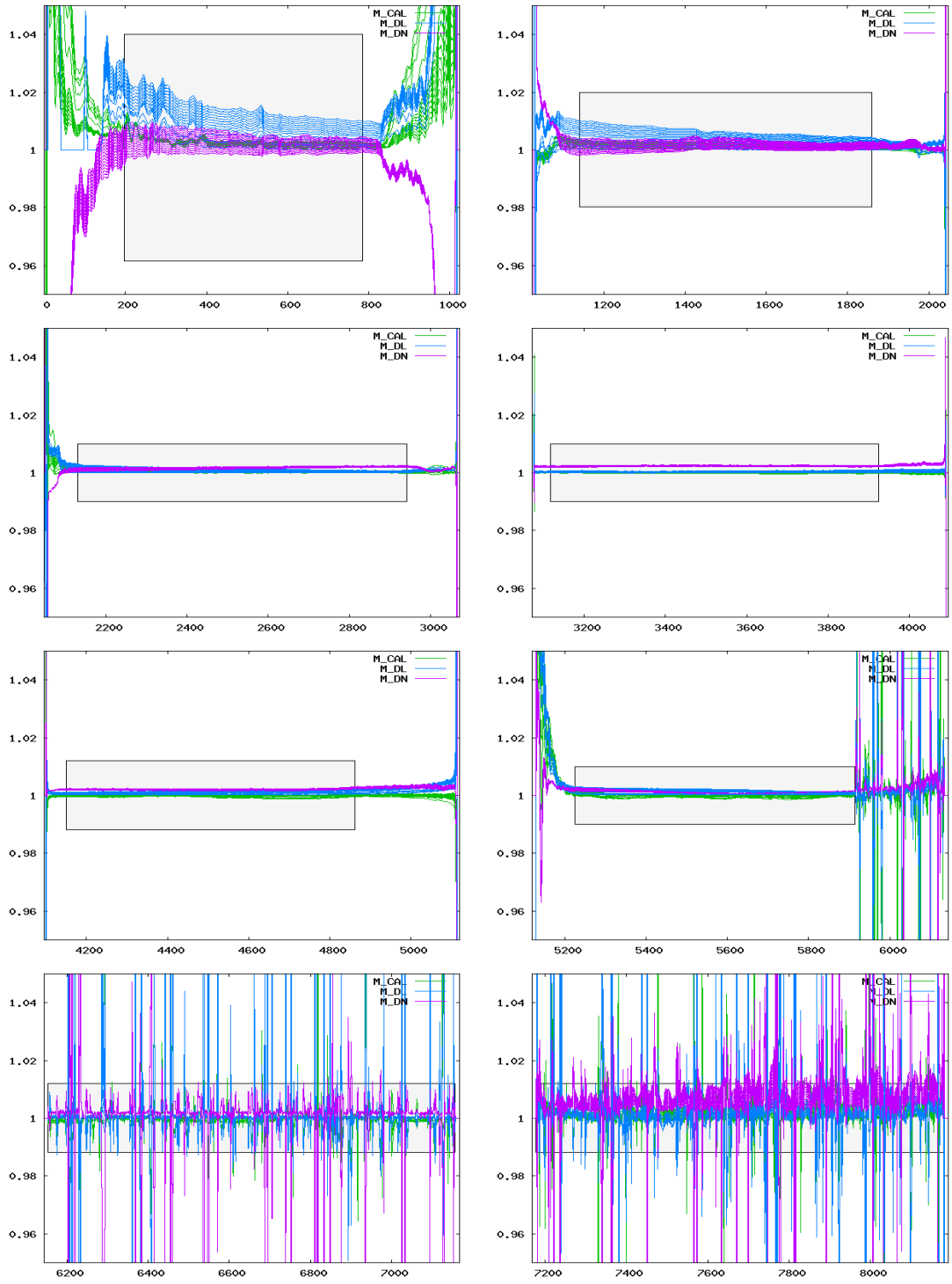

Figure 1: Ratio of delivered m-factors (23 Jun 2009– 06 Jul 2009) to the corresponding m-factor of the previous delivery day (22 Jun 2009). The grey boxes visualize the maximum ratio allowed.