NRT M-factor delivery document 01 Jun 2009

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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: 26 May 2009– 01 Jun 2009
- Prediction: 02 Jun 2009– 08 Jun 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
e82f1bab8649f37860433597e883a50e	SCI_MF1_AXNIFE20090601_215446_20090526_185656_20090528_185656
65b86a2196b3a69d0037ec92c0aef18f	SCI_MF1_AXNIFE20090601_215446_20090527_182519_20090529_182519
864da321d20174140aff244eb5a18f3a	SCI_MF1_AXNIFE20090601_215446_20090528_193418_20090530_193418
68a3844a62bf4d24cf22fbd70341414a	SCI_MF1_AXNIFE20090601_215446_20090529_190241_20090531_190241
17741ba7bbaab6aef609fa65adf7f014	SCI_MF1_AXNIFE20090601_215446_20090530_183104_20090601_183104
a34ef3bf137d458de68599841dbb1b34	SCI_MF1_AXNIFE20090601_215446_20090531_194003_20090602_194003
6ebc8ab3074bc7da57a5f9ec8e94b088	SCI_MF1_AXNIFE20090601_215446_20090601_190826_20090603_190826
577d08ddb55b1b958006aa3b3b903f8d	SCI_MF1_AXNIFE20090601_215446_20090602_183649_20090604_183649
b48a2a83b2cb96f58ca20eea2421a3e4	SCI_MF1_AXNIFE20090601_215446_20090603_194548_20090605_194548
1c29495f8c952c56e77dc9221d5020cb	SCI_MF1_AXNIFE20090601_215446_20090604_191411_20090606_191411
77044f2e5e6bc6ce674b53dfc7dc3fca	SCI_MF1_AXNIFE20090601_215446_20090605_184234_20090607_184234
91caeda1b87e99f78f56a40f5d28acdc	SCI_MF1_AXNIFE20090601_215446_20090606_181057_20090608_181057
ea7f194eb091b65742312f8235657098	SCI_MF1_AXNIFE20090601_215446_20090607_191956_20090609_191956
952d5284b78c7e3c461287a31767a365	SCI_MF1_AXNIFE20090601_215446_20090608_184819_20090706_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090526_185656_20090528_185656	meas.	meas.	interp.
20090527_182519_20090529_182519	meas.	meas.	interp.
20090528_193418_20090530_193418	meas.	meas.	meas.
20090529_190241_20090531_190241	meas.	meas.	pred.
20090530_183104_20090601_183104	meas.	meas.	pred.
20090531_194003_20090602_194003	meas.	meas.	pred.
20090601_190826_20090603_190826	pred.	pred.	pred.
20090602_183649_20090604_183649	pred.	pred.	pred.
20090603_194548_20090605_194548	pred.	pred.	pred.
20090604_191411_20090606_191411	pred.	pred.	pred.
20090605_184234_20090607_184234	pred.	pred.	pred.
20090606_181057_20090608_181057	pred.	pred.	pred.
20090607_191956_20090609_191956	pred.	pred.	pred.
20090608_184819_20090706_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	1.0084	1.0136	1.0210	1.0004	1.0054	1.0066	1.0400	OK
2	1.0019	1.0078	1.0097	1.0006	1.0026	1.0033	1.0200	OK
3	1.0008	1.0022	1.0028	0.9999	1.0004	1.0010	1.0100	OK
4	1.0006	1.0007	1.0013	1.0000	1.0002	1.0009	1.0100	OK
5	1.0012	1.0017	1.0011	0.9998	0.9995	1.0007	1.0120	OK
6	1.0016	1.0015	1.0012	1.0003	0.9991	1.0003	1.0100	OK
7	1.0008	1.0002	1.0007	–	–	–	1.0070	OK
8	1.0035	1.0018	1.0051	–	–	–	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 25 May 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090525_215454_20090525_192833_20090527_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

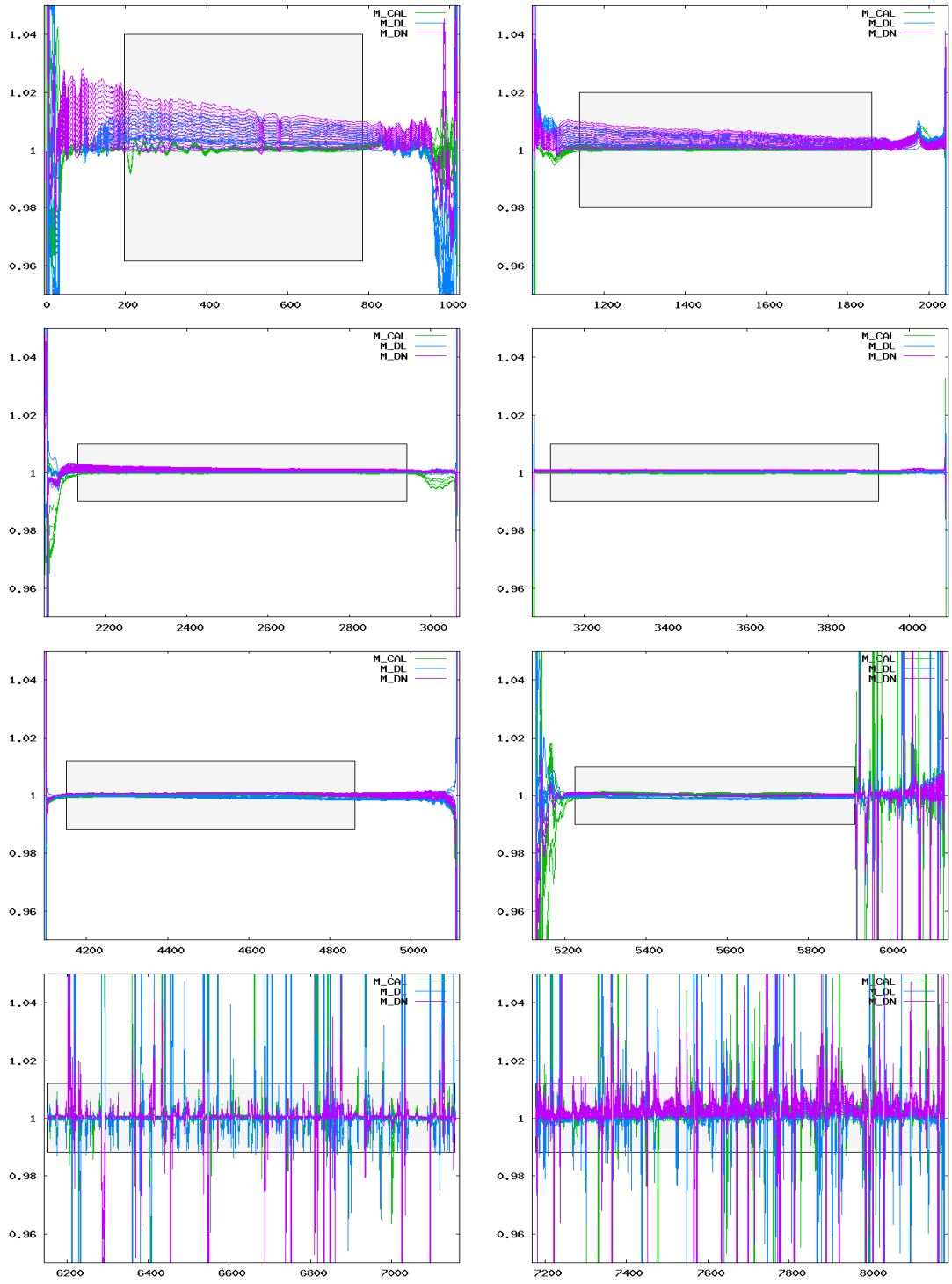

Figure 1: Ratio of delivered m-factors (26 May 2009– 08 Jun 2009) to the corresponding m-factor of the previous delivery day (25 May 2009). The grey boxes visualize the maximum ratio allowed.