NRT M-factor delivery document 27 Apr 2009

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27 Apr 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: 21 Apr 2009– 27 Apr 2009
- Prediction: 28 Apr 2009– 04 May 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
69986ad4aa53a3966140b20dbbbd72b6	SCI_MF1_AXNIFE20090427_215513_20090421_185656_20090423_185656
cd3465e69e5fff73f11a4378b06f349f	SCI_MF1_AXNIFE20090427_215513_20090422_182519_20090424_182519
89fab5202b487ac272b8bce4aecddad5	SCI_MF1_AXNIFE20090427_215513_20090423_193418_20090425_193418
308090c1744bd3ed3bbc7e5a9c9eb2ac	SCI_MF1_AXNIFE20090427_215513_20090424_190241_20090426_190241
78a9832e4a63dba97732ece739f1e4d1	SCI_MF1_AXNIFE20090427_215513_20090425_183104_20090427_183104
eba006ecf1294904a1d598f9931706c3	SCI_MF1_AXNIFE20090427_215513_20090426_194003_20090428_194003
e5c8b7bccc8c0e0ae5e1de76ed2cf241	SCI_MF1_AXNIFE20090427_215513_20090427_190826_20090429_190826
d2609fbdc1b0b9ab08e7787683c2bbbb	SCI_MF1_AXNIFE20090427_215513_20090428_183649_20090430_183649
561e0fd973a4ed20c8b51a174ed9bfde	SCI_MF1_AXNIFE20090427_215513_20090429_194548_20090501_194548
568cc1e419bd9bb81101cd8692dcd201	SCI_MF1_AXNIFE20090427_215513_20090430_191411_20090502_191411
cd9bfb17333118d2bdf04a6ea2f8faf5	SCI_MF1_AXNIFE20090427_215513_20090501_184234_20090503_184234
26ea978d53ca68222a7c6999e4ce8962	SCI_MF1_AXNIFE20090427_215513_20090502_181057_20090504_181057
d6bd37b32b4efe45d195248acf22c020	SCI_MF1_AXNIFE20090427_215513_20090503_191956_20090505_191956
1e392fd5ff86ee24a46ec86a99e44072	SCI_MF1_AXNIFE20090427_215513_20090504_184819_20090601_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090421_185656_20090423_185656	meas.	meas.	interp.
20090422_182519_20090424_182519	meas.	meas.	interp.
20090423_193418_20090425_193418	meas.	meas.	meas.
20090424_190241_20090426_190241	meas.	meas.	pred.
20090425_183104_20090427_183104	meas.	meas.	pred.
20090426_194003_20090428_194003	meas.	meas.	pred.
20090427_190826_20090429_190826	meas.	pred.	pred.
20090428_183649_20090430_183649	pred.	pred.	pred.
20090429_194548_20090501_194548	pred.	pred.	pred.
20090430_191411_20090502_191411	pred.	pred.	pred.
20090501_184234_20090503_184234	pred.	pred.	pred.
20090502_181057_20090504_181057	pred.	pred.	pred.
20090503_191956_20090505_191956	pred.	pred.	pred.
20090504_184819_20090601_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	1.0087	1.0175	1.0314	1.0010	1.0065	1.0110	1.0400	OK
2	1.0030	1.0095	1.0130	1.0013	1.0032	1.0048	1.0200	OK
3	1.0008	1.0019	1.0045	1.0003	1.0004	1.0016	1.0100	OK
4	1.0012	1.0006	1.0021	1.0004	1.0001	1.0011	1.0100	OK
5	1.0016	1.0013	1.0014	1.0003	1.0002	1.0003	1.0120	OK
6	1.0026	1.0014	1.0014	1.0008	1.0001	1.0001	1.0100	OK
7	1.0008	1.0014	1.0003	–	–	–	1.0070	OK
8	1.0143	1.0109	1.0098	–	–	–	1.0120	Not 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 20 Apr 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090420_215442_20090420_192833_20090422_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 exceeds the limits. Additional checks are necessary.

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

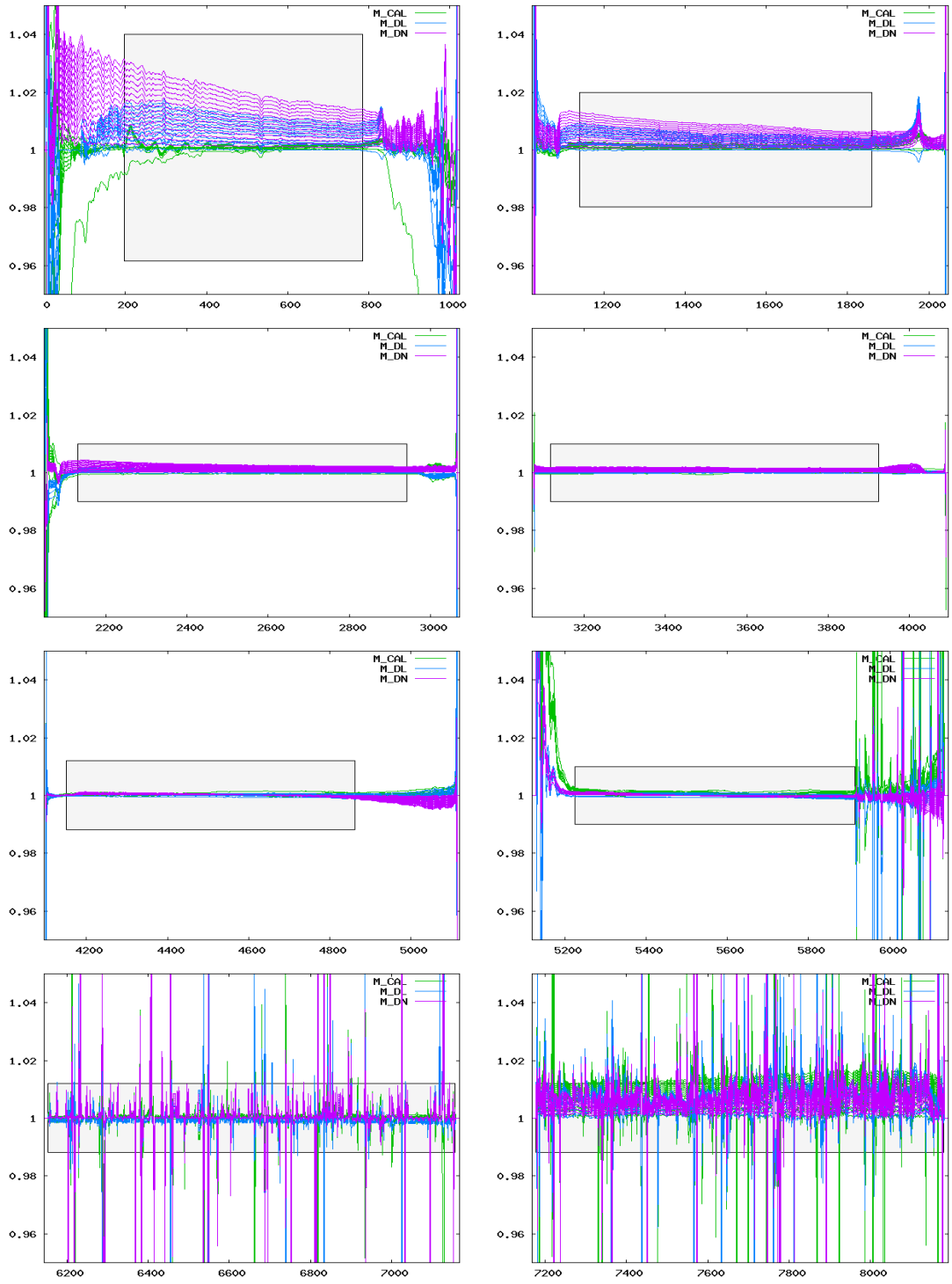

Figure 1: Ratio of delivered m-factors (21 Apr 2009– 04 May 2009) to the corresponding m-factor of the previous delivery day (20 Apr 2009). The grey boxes visualize the maximum ratio allowed.