NRT M-factor delivery document 28 Jun 2010

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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 07.01.

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: 22 Jun 2010– 28 Jun 2010
- Prediction: 29 Jun 2010– 05 Jul 2010

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
2cd2a796e61595621e80f5e283acc50f	SCI_MF1_AXNIFE20100629_034209_20100622_183648_20100624_183648
fec1d0873e435a98a50eba02a99d6783	SCI_MF1_AXNIFE20100629_034209_20100623_194547_20100625_194547
df67e3528c3df8c7d62491661a0e1da6	SCI_MF1_AXNIFE20100629_034209_20100624_191410_20100626_191410
9c5fbc9e66d02d46b47ad8557029d330	SCI_MF1_AXNIFE20100629_034209_20100625_184233_20100627_184233
70a1666001250a6b468b54b1c8358a55	SCI_MF1_AXNIFE20100629_034209_20100626_181056_20100628_181056
d450c9ce8564e71c67a648c1ce5912ba	SCI_MF1_AXNIFE20100629_034209_20100627_191955_20100629_191955
7848bafcc8ae5130bb0909fb03a20d1e	SCI_MF1_AXNIFE20100629_034209_20100628_184818_20100630_184818
cff459733fddad9afdd0a5219506f417	SCI_MF1_AXNIFE20100629_034209_20100629_181641_20100701_181641
b05656f7ce27820fcf3ab66eb7d3f3cd	SCI_MF1_AXNIFE20100629_034209_20100630_192540_20100702_192540
d13d2e4ef37ec83f0559e6ca67328a7a	SCI_MF1_AXNIFE20100629_034209_20100701_185403_20100703_185403
6231b187ea080e95b2110e5fd4f538fb	SCI_MF1_AXNIFE20100629_034209_20100702_182226_20100704_182226
3e9c7607fd829667a1e9d7723fd71104	SCI_MF1_AXNIFE20100629_034209_20100703_193125_20100705_193125
f8a85c9e32b66c9776d802f5592073b2	SCI_MF1_AXNIFE20100629_034209_20100704_185948_20100706_185948
74ff46c87d3730ef1d1f3d25095320af	SCI_MF1_AXNIFE20100629_034209_20100705_182811_20100802_182811

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

validity identifier	M_CAL	M_DL	M_DN
20100622_183648_20100624_183648	meas.	meas.	interp.
20100623_194547_20100625_194547	interp.	meas.	interp.
20100624_191410_20100626_191410	meas.	meas.	interp.
20100625_184233_20100627_184233	meas.	meas.	meas.
20100626_181056_20100628_181056	pred.	meas.	pred.
20100627_191955_20100629_191955	pred.	meas.	pred.
20100628_184818_20100630_184818	pred.	meas.	pred.
20100629_181641_20100701_181641	pred.	pred.	pred.
20100630_192540_20100702_192540	pred.	pred.	pred.
20100701_185403_20100703_185403	pred.	pred.	pred.
20100702_182226_20100704_182226	pred.	pred.	pred.
20100703_193125_20100705_193125	pred.	pred.	pred.
20100704_185948_20100706_185948	pred.	pred.	pred.
20100705_182811_20100802_182811	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	1.0021	1.0118	1.0112	1.0008	1.0051	1.0033	1.0400	OK
2	1.0019	1.0081	1.0058	1.0007	1.0029	1.0019	1.0200	OK
3	1.0006	1.0025	1.0018	1.0001	1.0006	1.0003	1.0100	OK
4	1.0005	1.0008	1.0003	1.0001	1.0002	1.0002	1.0100	OK
5	1.0011	1.0011	1.0005	1.0002	1.0005	1.0001	1.0120	OK
6	1.0018	1.0013	1.0005	1.0006	1.0006	0.9998	1.0100	OK
7	1.0014	1.0011	1.0002	–	–	–	1.0070	OK
8	1.0012	1.0010	1.0001	–	–	–	1.0120	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 21 Jun 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100622_034239_20100621_190825_20100623_190825` .

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

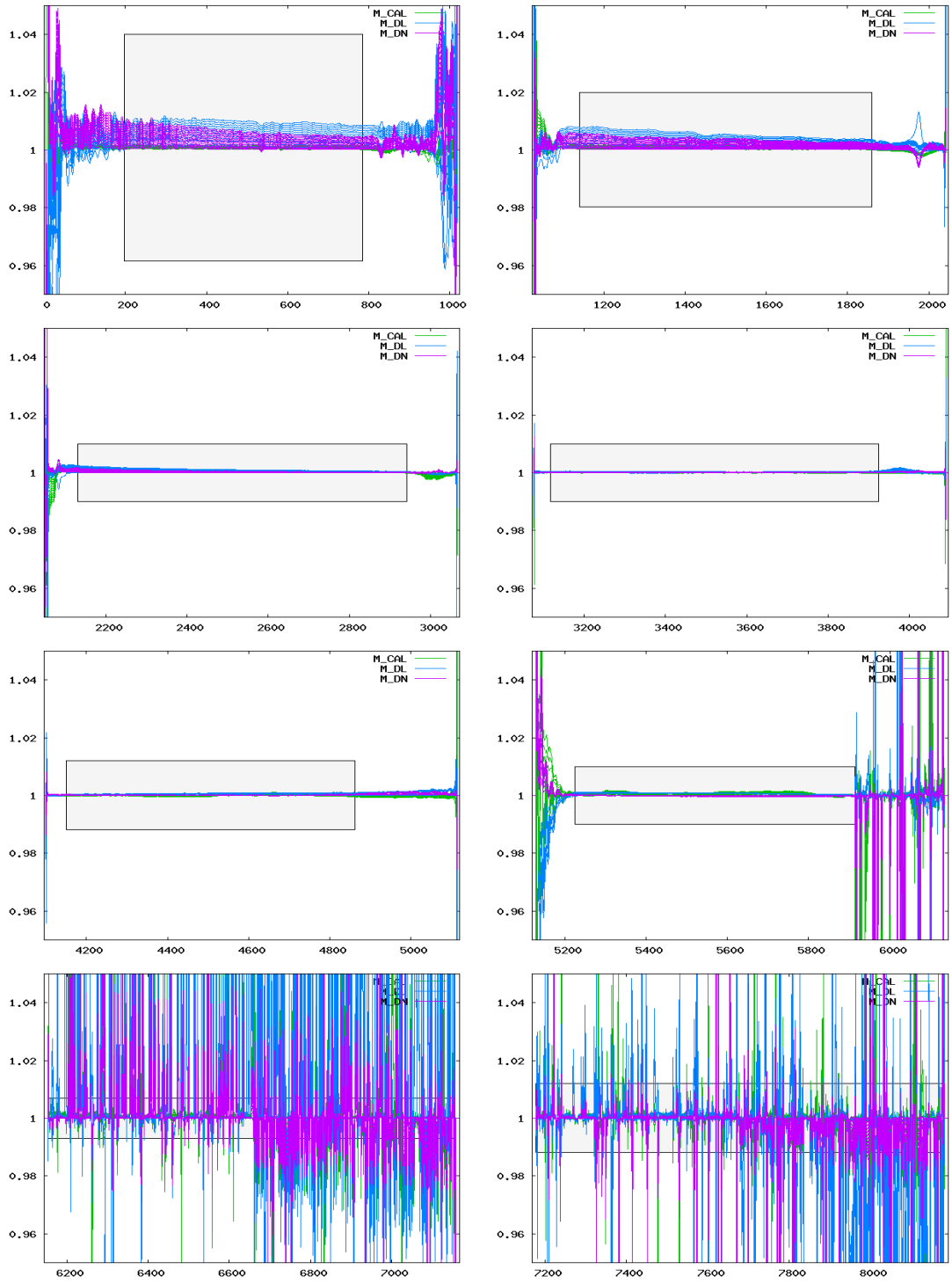

Figure 1: Ratio of delivered m-factors (22 Jun 2010– 05 Jul 2010) to the corresponding m-factor of the previous delivery day (21 Jun 2010). The grey boxes visualize the maximum ratio allowed.