NRT M-factor delivery document 14 Mar 2011

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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: 08 Mar 2011– 14 Mar 2011
- Prediction: 15 Mar 2011– 21 Mar 2011

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
f7e63e435d6052f469e4eccfae77d7cb	SCI_MF1_AXNIFE20110315_044312_20110308_192836_20110310_192836
f3700ad42c259f9c37a8a3c9806d6290	SCI_MF1_AXNIFE20110315_044312_20110309_185151_20110311_185151
5aa7cf070f65dd8a28296dee3249cf51	SCI_MF1_AXNIFE20110315_044312_20110310_181505_20110312_181505
e10481849ef9340b34cc4566f59f9e88	SCI_MF1_AXNIFE20110315_044312_20110311_191834_20110313_191834
14f568f8184eca6b79b9c4032bca7174	SCI_MF1_AXNIFE20110315_044312_20110312_184148_20110314_184148
b7b97714de4b57f8aa4fa50590f607b3	SCI_MF1_AXNIFE20110315_044312_20110313_194517_20110315_194517
d23946e41dad86d1d4064d439f7fafde	SCI_MF1_AXNIFE20110315_044312_20110314_190831_20110316_190831
c6e8eb23c1cde25ac1607a7a492ff612	SCI_MF1_AXNIFE20110315_044312_20110315_183146_20110317_183146
397ab60d868dfa6308059a5a4eb7399e	SCI_MF1_AXNIFE20110315_044312_20110316_193514_20110318_193514
1e1dc5c50ba2f8c5995f5c2737a07e26	SCI_MF1_AXNIFE20110315_044312_20110317_185829_20110319_185829
18ff12c4a68521b5cefa7604ee0fac19	SCI_MF1_AXNIFE20110315_044312_20110318_182143_20110320_182143
6b56b2811ace19a893769c2b0df958d3	SCI_MF1_AXNIFE20110315_044312_20110319_192512_20110321_192512
035b75f1bf4933a83c036efa65d5ba82	SCI_MF1_AXNIFE20110315_044312_20110320_184826_20110322_184826
a25cc1404a7c740816d62670a47206a0	SCI_MF1_AXNIFE20110315_044312_20110321_181141_20110418_181141

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

validity identifier	M_CAL	M_DL	M_DN
20110308_192836_20110310_192836	meas.	meas.	meas.
20110309_185151_20110311_185151	meas.	meas.	interp.
20110310_181505_20110312_181505	meas.	meas.	interp.
20110311_191834_20110313_191834	meas.	meas.	interp.
20110312_184148_20110314_184148	meas.	meas.	meas.
20110313_194517_20110315_194517	meas.	meas.	pred.
20110314_190831_20110316_190831	meas.	meas.	pred.
20110315_183146_20110317_183146	pred.	pred.	pred.
20110316_193514_20110318_193514	pred.	pred.	pred.
20110317_185829_20110319_185829	pred.	pred.	pred.
20110318_182143_20110320_182143	pred.	pred.	pred.
20110319_192512_20110321_192512	pred.	pred.	pred.
20110320_184826_20110322_184826	pred.	pred.	pred.
20110321_181141_20110418_181141	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	1.0072	1.0214	1.0076	0.9974	0.9905	1.0006	1.0400	OK
2	1.0019	1.0096	1.0057	0.9994	0.9961	1.0018	1.0200	OK
3	1.0014	1.0035	1.0058	0.9996	0.9990	1.0010	1.0100	OK
4	1.0013	1.0010	1.0034	0.9995	0.9995	1.0001	1.0100	OK
5	1.0025	1.0028	1.0028	0.9988	0.9992	0.9993	1.0120	OK
6	1.0019	1.0019	1.0021	0.9992	0.9995	0.9994	1.0100	OK
7	1.0013	1.0016	1.0017	–	–	–	1.0070	OK
8	1.0020	1.0032	1.0032	–	–	–	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 07 Mar 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110308_044320_20110307_182508_20110309_182508` .

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

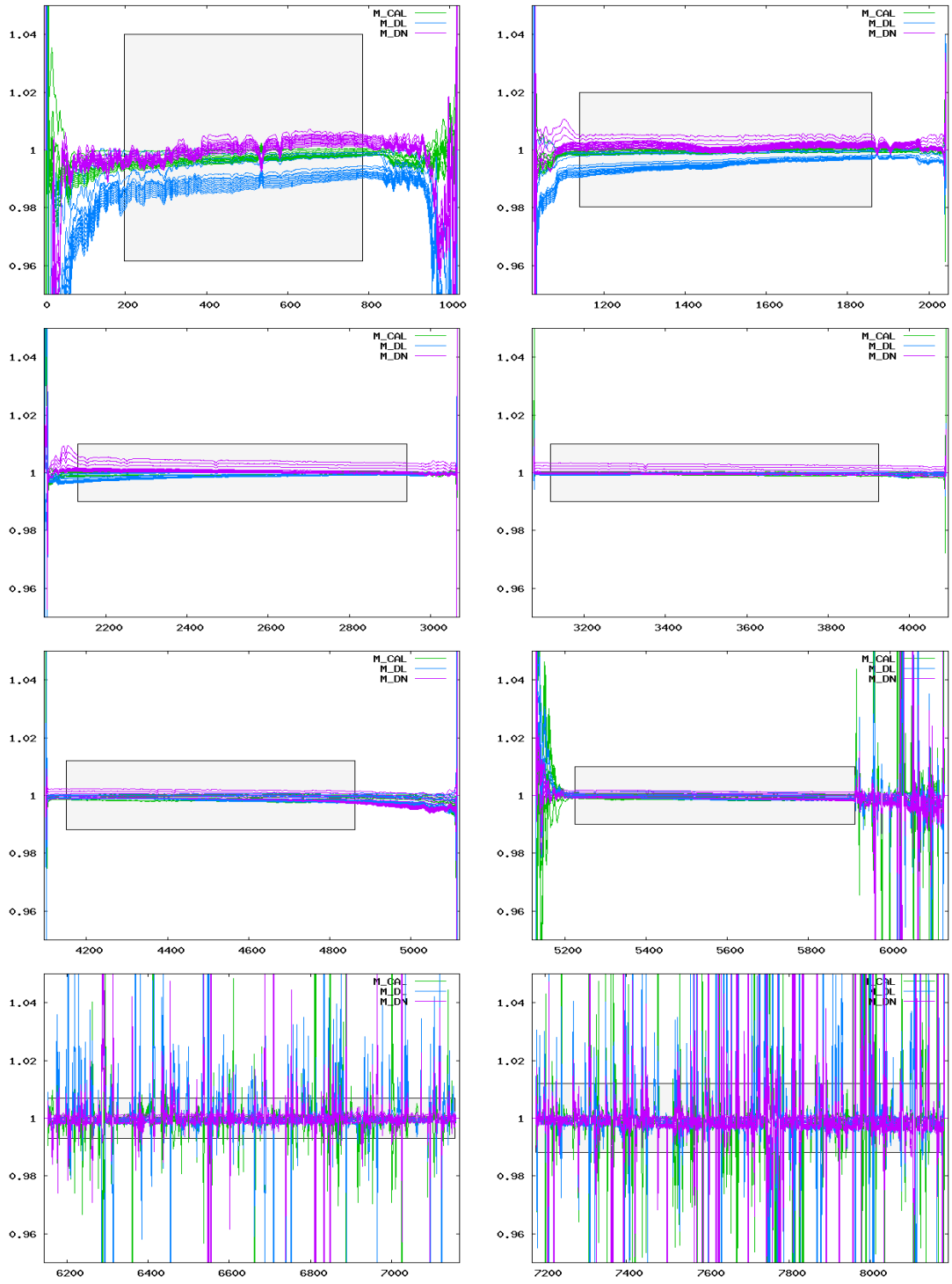

Figure 1: Ratio of delivered m-factors (08 Mar 2011– 21 Mar 2011) to the corresponding m-factor of the previous delivery day (07 Mar 2011). The grey boxes visualize the maximum ratio allowed.