NRT M-factor delivery document 22 Nov 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: 16 Nov 2010– 22 Nov 2010
- Prediction: 23 Nov 2010– 29 Nov 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
0e4f2b79623392b1a5911519f5f465d2	SCI_MF1_AXNIFE20101123_084150_20101116_193558_20101118_193558
2f2cb3ae170a958f9426c765541cefa0	SCI_MF1_AXNIFE20101123_084150_20101117_185913_20101119_185913
22ec359041885ecf83baf87131e15ba5	SCI_MF1_AXNIFE20101123_084150_20101118_182227_20101120_182227
0f09952f72e94c1b4a96a3bab8dee3e8	SCI_MF1_AXNIFE20101123_084150_20101119_192556_20101121_192556
03692241a30d6dee369df41512ef8514	SCI_MF1_AXNIFE20101123_084150_20101120_184910_20101122_184910
7d2e6aac48d027b5220f367e06cf9ec7	SCI_MF1_AXNIFE20101123_084150_20101121_181225_20101123_181225
42111b83e65e1fd61b6d404049837496	SCI_MF1_AXNIFE20101123_084150_20101122_191553_20101124_191553
6c86b8d1514487ef4e784120f1dbb718	SCI_MF1_AXNIFE20101123_084150_20101123_183908_20101125_183908
50b3f7707c6ced8bb091bcdf270dbfae	SCI_MF1_AXNIFE20101123_084150_20101124_194236_20101126_194236
680ce72de76db495fad153a1ff109f9c	SCI_MF1_AXNIFE20101123_084150_20101125_190551_20101127_190551
90f7b1d659ec026b3bb9e0866d985989	SCI_MF1_AXNIFE20101123_084150_20101126_182905_20101128_182905
68e1b9a5aa07c2d6049c04fc681669d5	SCI_MF1_AXNIFE20101123_084150_20101127_193234_20101129_193234
0ba9d307cae84b9b315e771ae697b734	SCI_MF1_AXNIFE20101123_084150_20101128_185548_20101130_185548
5ded401343d651acf3fc885733de7a22	SCI_MF1_AXNIFE20101123_084150_20101129_181903_20101227_181903

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

validity identifier	M_CAL	M_DL	M_DN
20101116_193558_20101118_193558	meas.	meas.	interp.
20101117_185913_20101119_185913	meas.	meas.	meas.
20101118_182227_20101120_182227	meas.	meas.	interp.
20101119_192556_20101121_192556	meas.	meas.	interp.
20101120_184910_20101122_184910	meas.	meas.	meas.
20101121_181225_20101123_181225	pred.	pred.	pred.
20101122_191553_20101124_191553	pred.	pred.	pred.
20101123_183908_20101125_183908	pred.	pred.	pred.
20101124_194236_20101126_194236	pred.	pred.	pred.
20101125_190551_20101127_190551	pred.	pred.	pred.
20101126_182905_20101128_182905	pred.	pred.	pred.
20101127_193234_20101129_193234	pred.	pred.	pred.
20101128_185548_20101130_185548	pred.	pred.	pred.
20101129_181903_20101227_181903	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	1.0169	1.0110	1.0142	0.9997	1.0042	1.0012	1.0400	OK
2	1.0006	1.0052	1.0017	1.0000	1.0019	1.0001	1.0200	OK
3	1.0006	1.0021	1.0015	0.9998	1.0003	1.0001	1.0100	OK
4	1.0011	1.0013	1.0026	0.9999	1.0002	1.0009	1.0100	OK
5	1.0011	1.0014	1.0019	0.9999	1.0003	1.0012	1.0120	OK
6	1.0018	1.0023	1.0025	1.0003	1.0011	1.0016	1.0100	OK
7	1.0004	1.0019	1.0024	–	–	–	1.0070	OK
8	1.0010	1.0014	1.0015	–	–	–	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 15 Nov 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101116_092558_20101115_183230_20101117_183230` .

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

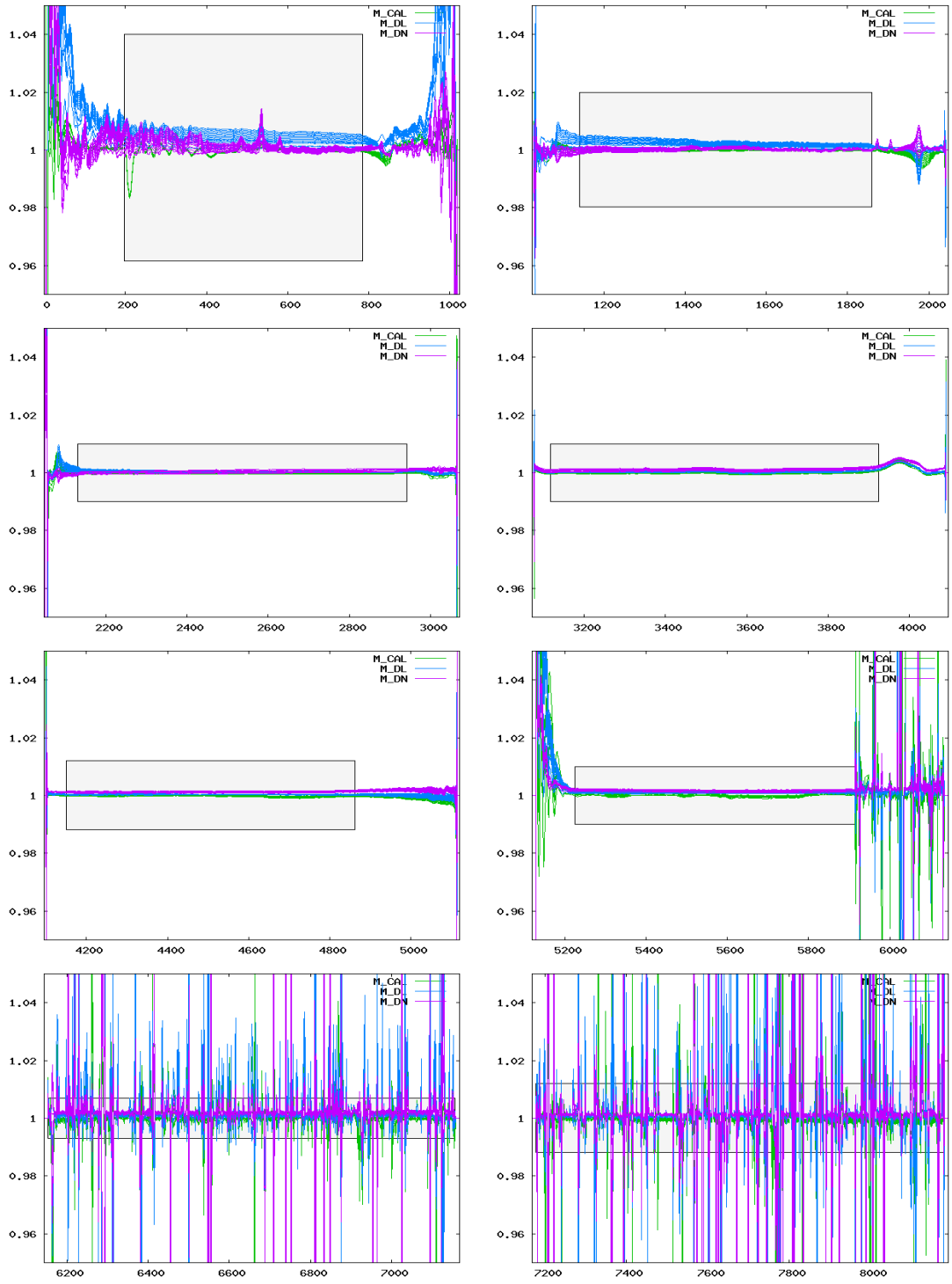

Figure 1: Ratio of delivered m-factors (16 Nov 2010– 29 Nov 2010) to the corresponding m-factor of the previous delivery day (15 Nov 2010). The grey boxes visualize the maximum ratio allowed.