NRT M-factor delivery document 24 Oct 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: 18 Oct 2011– 24 Oct 2011
- Prediction: 25 Oct 2011– 31 Oct 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
d4960184d505245d71781487a9f6d560	SCI_MF1_AXNIFE20111025_090449_20111018_191353_20111020_191353
1380d3313ab77706e5dc6dbe9ca01bed	SCI_MF1_AXNIFE20111025_090449_20111019_183707_20111021_183707
2def5cdefbdbb0167449b3d8293bf90c	SCI_MF1_AXNIFE20111025_090449_20111020_194036_20111022_194036
f2de920965d6238b9daea33cddc676d3	SCI_MF1_AXNIFE20111025_090449_20111021_190350_20111023_190350
e6b9c5e45f7ace119c77e4405820bb45	SCI_MF1_AXNIFE20111025_090449_20111022_182705_20111024_182705
6a98072a8d8acc1b0d9f200de72e7336	SCI_MF1_AXNIFE20111025_090449_20111023_193033_20111025_193033
27b7d1a9b5ce6dd9b461286cd2ebfc32	SCI_MF1_AXNIFE20111025_090449_20111024_185348_20111026_185348
94af48e01648c8df3475efcbce7efd16	SCI_MF1_AXNIFE20111025_090449_20111025_181702_20111027_181702
82ed50c2e4fdad929ee2447f27238acb	SCI_MF1_AXNIFE20111025_090449_20111026_192031_20111028_192031
d3694fbb671ff093997a69f9ff7e1aa0	SCI_MF1_AXNIFE20111025_090449_20111027_184345_20111029_184345
56e0492f1a783afe03b2ce81d1a8af68	SCI_MF1_AXNIFE20111025_090449_20111028_180700_20111030_180700
27cdf20001f29bb6c53c74ec6e7066bb	SCI_MF1_AXNIFE20111025_090449_20111029_191028_20111031_191028
22528cd9a9986ef08ec124334c381897	SCI_MF1_AXNIFE20111025_090449_20111030_183343_20111101_183343
fc057510bfc62170e25c483584d07fcd	SCI_MF1_AXNIFE20111025_090449_20111031_193711_20111128_193711

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

validity identifier	M_CAL	M_DL	M_DN
20111018_191353_20111020_191353	meas.	meas.	interp.
20111019_183707_20111021_183707	meas.	meas.	meas.
20111020_194036_20111022_194036	meas.	meas.	interp.
20111021_190350_20111023_190350	meas.	meas.	interp.
20111022_182705_20111024_182705	meas.	meas.	interp.
20111023_193033_20111025_193033	meas.	meas.	meas.
20111024_185348_20111026_185348	meas.	meas.	pred.
20111025_181702_20111027_181702	pred.	pred.	pred.
20111026_192031_20111028_192031	pred.	pred.	pred.
20111027_184345_20111029_184345	pred.	pred.	pred.
20111028_180700_20111030_180700	pred.	pred.	pred.
20111029_191028_20111031_191028	pred.	pred.	pred.
20111030_183343_20111101_183343	pred.	pred.	pred.
20111031_193711_20111128_193711	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	1.0070	1.1122	1.0932	0.9979	0.9559	0.9671	1.1200	OK
2	1.0021	1.0519	1.0422	0.9991	0.9823	0.9828	1.0600	OK
3	1.0009	1.0155	1.0146	0.9998	0.9961	0.9935	1.0200	OK
4	1.0007	1.0029	1.0047	0.9999	0.9987	0.9966	1.0100	OK
5	1.0031	1.0026	1.0034	0.9991	0.9990	0.9972	1.0120	OK
6	1.0013	1.0025	1.0026	1.0007	1.0014	0.9995	1.0100	OK
7	1.0012	1.0014	1.0015	–	–	–	1.0070	OK
8	1.0009	1.0024	1.0023	–	–	–	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 17 Oct 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111018_071050_20111017_181024_20111019_181024` .

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

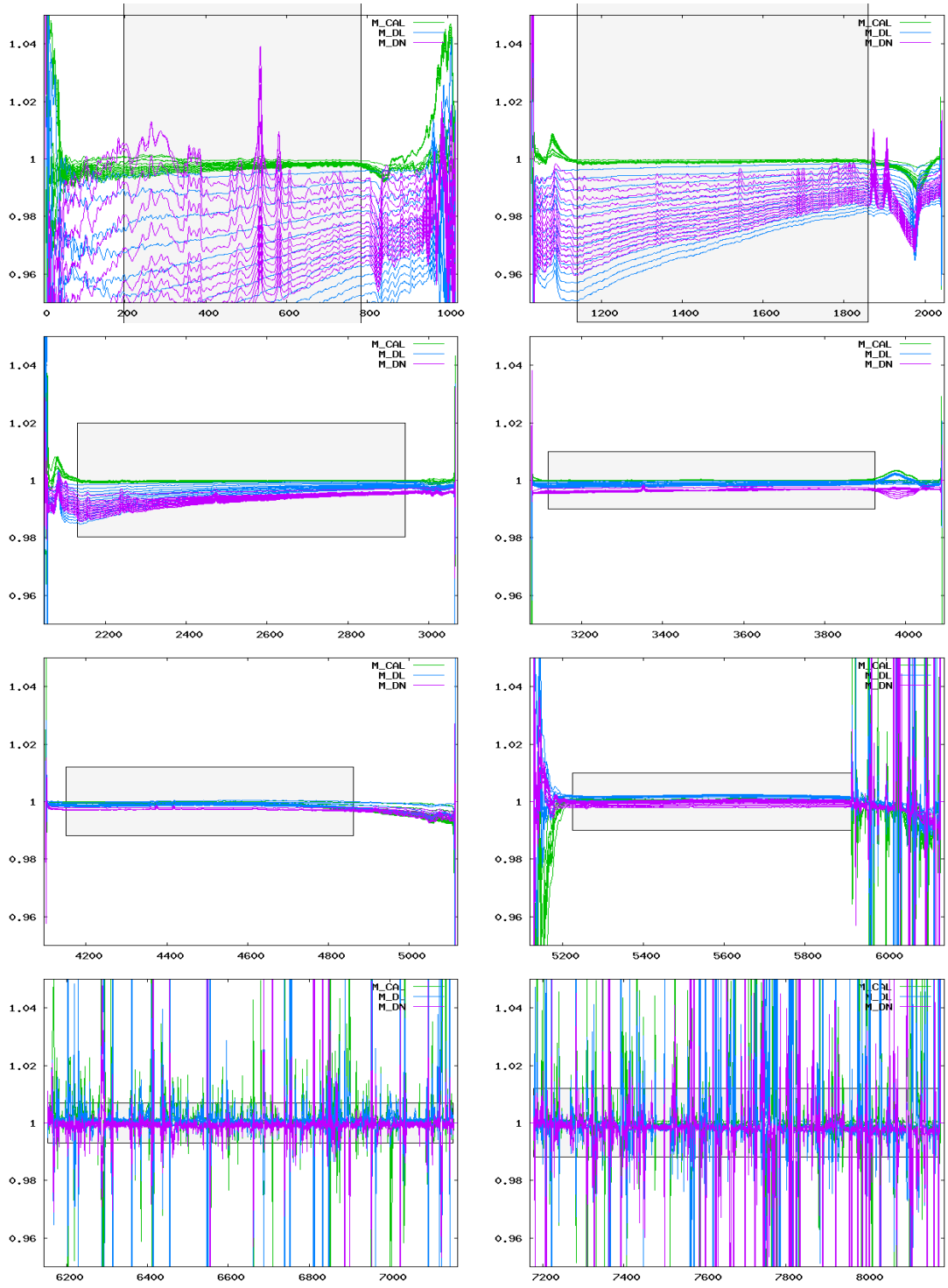

Figure 1: Ratio of delivered m-factors (18 Oct 2011– 31 Oct 2011) to the corresponding m-factor of the previous delivery day (17 Oct 2011). The grey boxes visualize the maximum ratio allowed.