NRT M-factor delivery document 20 Sep 2010

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20 Sep 2010

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: 14 Sep 2010– 20 Sep 2010
- Prediction: 21 Sep 2010– 27 Sep 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
a60ec412fa51a1414816d23fa1534fac	SCI_MF1_AXNIFE20100921_034259_20100914_193709_20100916_193709
d5aba458eb90b354a1ceb8dcddeac9c0	SCI_MF1_AXNIFE20100921_034259_20100915_190532_20100917_190532
2064fdfbb6eb3966bdbf330ad6231c9b	SCI_MF1_AXNIFE20100921_034259_20100916_183355_20100918_183355
540251c73cbb4b328cc2080061b7d25c	SCI_MF1_AXNIFE20100921_034259_20100917_194254_20100919_194254
90a5fc41bc2797c5620f90926d23f736	SCI_MF1_AXNIFE20100921_034259_20100918_191117_20100920_191117
5ad0dbeae0e487a497d4d7f47983b112	SCI_MF1_AXNIFE20100921_034259_20100919_183940_20100921_183940
444d78aee67189c13ea1269ffa822d51	SCI_MF1_AXNIFE20100921_034259_20100920_194839_20100922_194839
54f5fa413810018a9146a37746e49a19	SCI_MF1_AXNIFE20100921_034259_20100921_191702_20100923_191702
9f36a3119b3910d624c9f088588977be	SCI_MF1_AXNIFE20100921_034259_20100922_184525_20100924_184525
e4fc70bfe576d4b8a65d2042916d7274	SCI_MF1_AXNIFE20100921_034259_20100923_181348_20100925_181348
86f89ce4b91e1668dd5be5052ed5ecfb	SCI_MF1_AXNIFE20100921_034259_20100924_192247_20100926_192247
3dcfa3a06306610f81901673964e910f	SCI_MF1_AXNIFE20100921_034259_20100925_185110_20100927_185110
8bb8f642763a00c2d63ac035e66719ce	SCI_MF1_AXNIFE20100921_034259_20100926_181933_20100928_181933
3bcd1cd2562495f8e87d669c7f7f1464	SCI_MF1_AXNIFE20100921_034259_20100927_192832_20101025_192832

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

validity identifier	M_CAL	M_DL	M_DN
20100914_193709_20100916_193709	meas.	meas.	interp.
20100915_190532_20100917_190532	meas.	meas.	interp.
20100916_183355_20100918_183355	meas.	meas.	interp.
20100917_194254_20100919_194254	meas.	meas.	meas.
20100918_191117_20100920_191117	meas.	meas.	pred.
20100919_183940_20100921_183940	meas.	meas.	pred.
20100920_194839_20100922_194839	meas.	meas.	pred.
20100921_191702_20100923_191702	pred.	pred.	pred.
20100922_184525_20100924_184525	pred.	pred.	pred.
20100923_181348_20100925_181348	pred.	pred.	pred.
20100924_192247_20100926_192247	pred.	pred.	pred.
20100925_185110_20100927_185110	pred.	pred.	pred.
20100926_181933_20100928_181933	pred.	pred.	pred.
20100927_192832_20101025_192832	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	1.0052	1.0067	1.0135	0.9989	1.0023	0.9972	1.0400	OK
2	1.0008	1.0056	1.0036	1.0002	1.0020	1.0000	1.0200	OK
3	1.0004	1.0015	1.0027	0.9999	1.0004	0.9988	1.0100	OK
4	1.0005	1.0004	1.0023	0.9998	1.0001	0.9985	1.0100	OK
5	1.0010	1.0007	1.0025	0.9995	1.0001	0.9984	1.0120	OK
6	1.0008	1.0020	1.0013	1.0000	1.0012	0.9995	1.0100	OK
7	1.0004	1.0018	1.0006	–	–	–	1.0070	OK
8	1.0009	1.0012	1.0006	–	–	–	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 13 Sep 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100914_034305_20100913_182811_20100915_182811` .

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

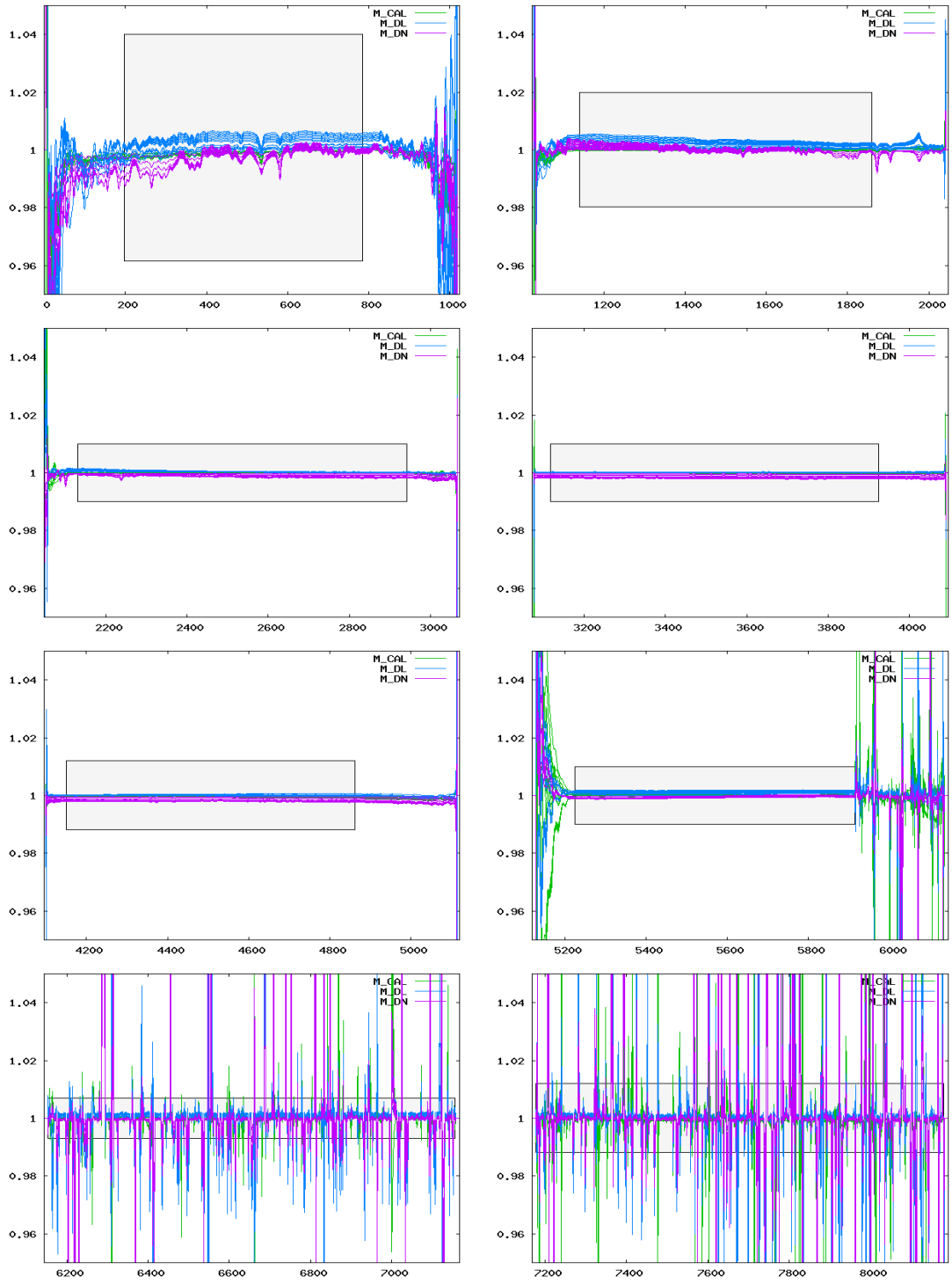

Figure 1: Ratio of delivered m-factors (14 Sep 2010– 27 Sep 2010) to the corresponding m-factor of the previous delivery day (13 Sep 2010). The grey boxes visualize the maximum ratio allowed.