NRT M-factor delivery document 26 Sep 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: 20 Sep 2011– 26 Sep 2011
- Prediction: 27 Sep 2011– 03 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
0e69f2277708f4cc1bb017efd32941aa	SCI_MF1_AXNIFE20110927_070316_20110920_194046_20110922_194046
f0ded12e740131502bcd0523c755e5d4	SCI_MF1_AXNIFE20110927_070316_20110921_190401_20110923_190401
e0f8957cf3a5655ff2d6beec33af8e4c	SCI_MF1_AXNIFE20110927_070316_20110922_182716_20110924_182716
c6c7aa967e5fab214f700f2e9d772760	SCI_MF1_AXNIFE20110927_070316_20110923_193044_20110925_193044
49047ff9cb64909e69f57b88b4fd8959	SCI_MF1_AXNIFE20110927_070316_20110924_185359_20110926_185359
9a056d8918ccb8d9229048b1e2212384	SCI_MF1_AXNIFE20110927_070316_20110925_181713_20110927_181713
23a9d2bfe648437df2c1d48efb006a06	SCI_MF1_AXNIFE20110927_070316_20110926_192042_20110928_192042
e2ebe09a9056d7e13c336382bb7a6d16	SCI_MF1_AXNIFE20110927_070316_20110927_184356_20110929_184356
5708c7e5faff645a4d1c9853a832ed56	SCI_MF1_AXNIFE20110927_070316_20110928_180711_20110930_180711
327b4be4ee8c7aadbfc02fd7352b4a64	SCI_MF1_AXNIFE20110927_070316_20110929_191039_20111001_191039
9a7489e499fa6dceb424870c74f691f8	SCI_MF1_AXNIFE20110927_070316_20110930_183354_20111002_183354
ad4ba4375c6fa40f6da54e0877a31b76	SCI_MF1_AXNIFE20110927_070316_20111001_193722_20111003_193722
cf7ee55da1857bd051eeda6897ba70fd	SCI_MF1_AXNIFE20110927_070316_20111002_190037_20111004_190037
611d0f165b6b008002f340096bd25124	SCI_MF1_AXNIFE20110927_070316_20111003_182351_20111031_182351

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

validity identifier	M_CAL	M_DL	M_DN
20110920_194046_20110922_194046	meas.	meas.	pred.
20110921_190401_20110923_190401	meas.	meas.	pred.
20110922_182716_20110924_182716	interp.	meas.	pred.
20110923_193044_20110925_193044	interp.	interp.	pred.
20110924_185359_20110926_185359	meas.	meas.	pred.
20110925_181713_20110927_181713	meas.	meas.	pred.
20110926_192042_20110928_192042	meas.	meas.	pred.
20110927_184356_20110929_184356	pred.	pred.	pred.
20110928_180711_20110930_180711	pred.	pred.	pred.
20110929_191039_20111001_191039	pred.	pred.	pred.
20110930_183354_20111002_183354	pred.	pred.	pred.
20111001_193722_20111003_193722	pred.	pred.	pred.
20111002_190037_20111004_190037	pred.	pred.	pred.
20111003_182351_20111031_182351	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	1.0083	1.0430	1.0193	1.0006	0.9806	0.9931	1.0500	OK
2	1.0027	1.0232	1.0106	1.0013	0.9923	0.9970	1.0300	OK
3	1.0016	1.0068	1.0029	1.0007	0.9985	0.9996	1.0100	OK
4	1.0026	1.0016	1.0015	1.0007	1.0000	1.0006	1.0100	OK
5	1.0014	1.0016	1.0016	1.0006	0.9999	1.0007	1.0120	OK
6	1.0018	1.0018	1.0028	1.0007	1.0004	1.0013	1.0100	OK
7	1.0009	1.0014	1.0025	–	–	–	1.0070	OK
8	1.0028	1.0036	1.0025	–	–	–	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 19 Sep 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110920_072459_20110919_183718_20110921_183718` .

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

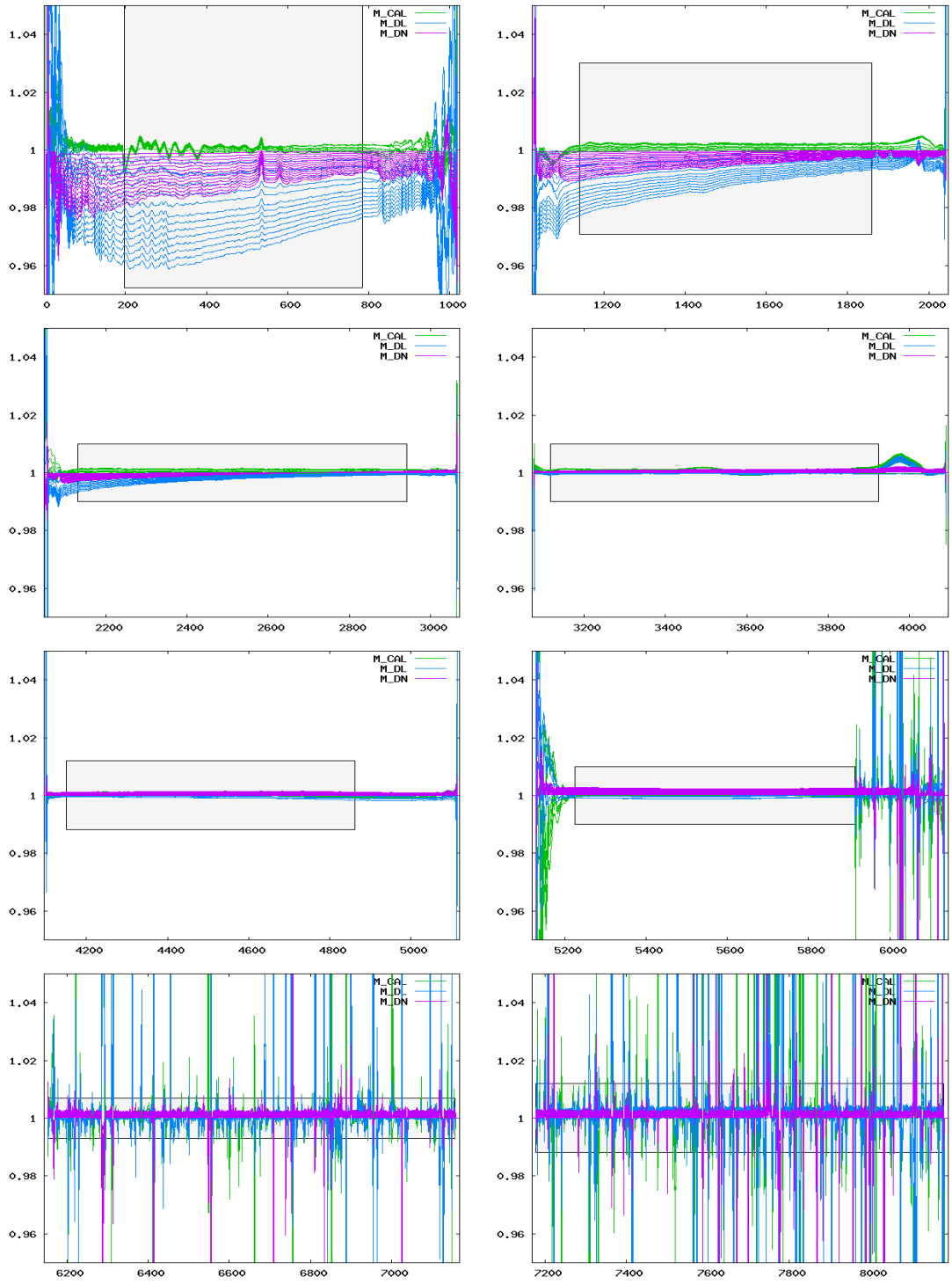

Figure 1: Ratio of delivered m-factors (20 Sep 2011– 03 Oct 2011) to the corresponding m-factor of the previous delivery day (19 Sep 2011). The grey boxes visualize the maximum ratio allowed.