NRT M-factor delivery document 21 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: 15 Mar 2011– 21 Mar 2011
- Prediction: 22 Mar 2011– 28 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
d7e3339bfd121deea50363e3f88a6a3c	SCI_MF1_AXNIFE20110322_044335_20110315_183146_20110317_183146
0eb176db99093f0147b21f93aab1b5ed	SCI_MF1_AXNIFE20110322_044335_20110316_193514_20110318_193514
85f37e73704c21007f02443f9ff08949	SCI_MF1_AXNIFE20110322_044335_20110317_185829_20110319_185829
031d918382c1353aec5c93c6e6e9698f	SCI_MF1_AXNIFE20110322_044335_20110318_182143_20110320_182143
0c263d1f4b21754a659d387b97560b5b	SCI_MF1_AXNIFE20110322_044335_20110319_192512_20110321_192512
566664f30a36e1a703b3eeda07c57325	SCI_MF1_AXNIFE20110322_044335_20110320_184826_20110322_184826
6d47a4f8529c878e50d823010f7131f4	SCI_MF1_AXNIFE20110322_044335_20110321_181141_20110323_181141
bb3665bf93e68d31c676891c4170f963	SCI_MF1_AXNIFE20110322_044335_20110322_191509_20110324_191509
27bb76758d0d67cef0a492eaeae5de71	SCI_MF1_AXNIFE20110322_044335_20110323_183824_20110325_183824
f8a09e7c3e553f74afebcc5fc50188c5	SCI_MF1_AXNIFE20110322_044335_20110324_194152_20110326_194152
a1099c552983a8b72b02480fc9bc355c	SCI_MF1_AXNIFE20110322_044335_20110325_190507_20110327_190507
d77fde037ed60ae0ff10bc53d3e4ea14	SCI_MF1_AXNIFE20110322_044335_20110326_182821_20110328_182821
48e297fd6309abb130a66122c945f8d5	SCI_MF1_AXNIFE20110322_044335_20110327_193150_20110329_193150
5ab847de78b75160a9c8e13836f12e71	SCI_MF1_AXNIFE20110322_044335_20110328_185504_20110425_185504

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

validity identifier	M_CAL	M_DL	M_DN
20110315_183146_20110317_183146	meas.	meas.	interp.
20110316_193514_20110318_193514	meas.	meas.	meas.
20110317_185829_20110319_185829	meas.	meas.	interp.
20110318_182143_20110320_182143	meas.	meas.	meas.
20110319_192512_20110321_192512	meas.	meas.	pred.
20110320_184826_20110322_184826	meas.	meas.	pred.
20110321_181141_20110323_181141	meas.	meas.	pred.
20110322_191509_20110324_191509	pred.	pred.	pred.
20110323_183824_20110325_183824	pred.	pred.	pred.
20110324_194152_20110326_194152	pred.	pred.	pred.
20110325_190507_20110327_190507	pred.	pred.	pred.
20110326_182821_20110328_182821	pred.	pred.	pred.
20110327_193150_20110329_193150	pred.	pred.	pred.
20110328_185504_20110425_185504	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	1.0213	1.0177	1.0303	1.0010	1.0041	1.0115	1.0400	OK
2	1.0021	1.0030	1.0114	1.0003	1.0015	1.0055	1.0200	OK
3	1.0008	1.0013	1.0056	1.0004	1.0005	1.0024	1.0100	OK
4	1.0017	1.0005	1.0021	1.0009	1.0002	1.0015	1.0100	OK
5	1.0017	1.0017	1.0015	1.0011	0.9998	1.0005	1.0120	OK
6	1.0049	1.0020	1.0018	1.0032	1.0004	0.9997	1.0100	OK
7	1.0046	1.0009	1.0014	–	–	–	1.0070	OK
8	1.0020	1.0046	1.0038	–	–	–	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 14 Mar 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110315_044312_20110314_190831_20110316_190831` .

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

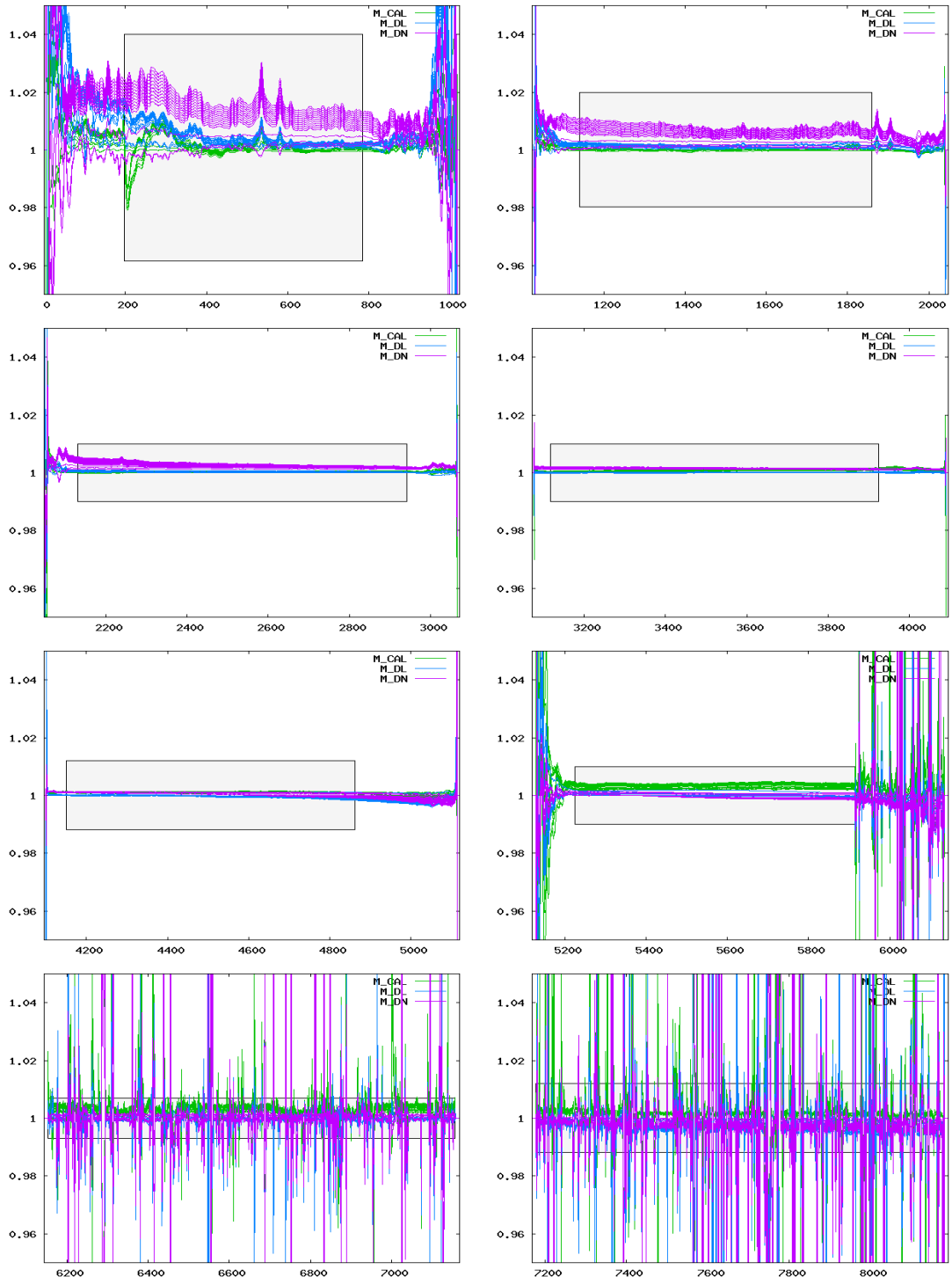

Figure 1: Ratio of delivered m-factors (15 Mar 2011– 28 Mar 2011) to the corresponding m-factor of the previous delivery day (14 Mar 2011). The grey boxes visualize the maximum ratio allowed.