NRT M-factor delivery document 28 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: 22 Mar 2011– 28 Mar 2011
- Prediction: 29 Mar 2011– 04 Apr 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
1362433250e064c8945fb11ae1fd97c3	SCI_MF1_AXNIFE20110329_085709_20110322_191509_20110324_191509
daf3f33bb30f0674b5d41de13796fcb6	SCI_MF1_AXNIFE20110329_085709_20110323_183824_20110325_183824
07c2bbc5a9798367969a710eb1437560	SCI_MF1_AXNIFE20110329_085709_20110324_194152_20110326_194152
d1f1c5e3fc296a867d91c341858b7d19	SCI_MF1_AXNIFE20110329_085709_20110325_190507_20110327_190507
dccf03c71a235f4bcbf6e6e8ca0049f8	SCI_MF1_AXNIFE20110329_085709_20110326_182821_20110328_182821
5a95890505e3ee8151a9107407129116	SCI_MF1_AXNIFE20110329_085709_20110327_193150_20110329_193150
7ae546c901035bd1dfcf35415c9b492e	SCI_MF1_AXNIFE20110329_085709_20110328_185504_20110330_185504
12f8b3fadae0f69355d920c02e0dc653	SCI_MF1_AXNIFE20110329_085709_20110329_181819_20110331_181819
669fbfd68a4693dd496ae15ca9682c5d	SCI_MF1_AXNIFE20110329_085709_20110330_192147_20110401_192147
0f35f6e726a1429513bade192d61bb4a	SCI_MF1_AXNIFE20110329_085709_20110331_184502_20110402_184502
031e5fed3c1bdc7953c04a9a1011319e	SCI_MF1_AXNIFE20110329_085709_20110401_180816_20110403_180816
8aa0a2582c9fb666442d7802f2cd2a43	SCI_MF1_AXNIFE20110329_085709_20110402_191145_20110404_191145
156fe05cf55d192d39e344bada82afea	SCI_MF1_AXNIFE20110329_085709_20110403_183459_20110405_183459
d6e0eab6dbc6c3971109e02df803b7fc	SCI_MF1_AXNIFE20110329_085709_20110404_193828_20110502_193828

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

validity identifier	M_CAL	M_DL	M_DN
20110322_191509_20110324_191509	meas.	meas.	meas.
20110323_183824_20110325_183824	interp.	interp.	interp.
20110324_194152_20110326_194152	interp.	interp.	interp.
20110325_190507_20110327_190507	meas.	meas.	interp.
20110326_182821_20110328_182821	meas.	meas.	meas.
20110327_193150_20110329_193150	meas.	meas.	pred.
20110328_185504_20110330_185504	meas.	pred.	pred.
20110329_181819_20110331_181819	pred.	pred.	pred.
20110330_192147_20110401_192147	pred.	pred.	pred.
20110331_184502_20110402_184502	pred.	pred.	pred.
20110401_180816_20110403_180816	pred.	pred.	pred.
20110402_191145_20110404_191145	pred.	pred.	pred.
20110403_183459_20110405_183459	pred.	pred.	pred.
20110404_193828_20110502_193828	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	1.0315	1.0279	1.0177	0.9933	0.9952	1.0064	1.0400	OK
2	1.0042	1.0074	1.0075	0.9989	0.9976	1.0031	1.0200	OK
3	1.0016	1.0022	1.0039	1.0000	0.9998	1.0015	1.0100	OK
4	1.0019	1.0018	1.0018	0.9998	0.9998	1.0007	1.0100	OK
5	1.0022	1.0026	1.0016	0.9993	0.9990	0.9999	1.0120	OK
6	1.0016	1.0018	1.0014	1.0005	0.9992	0.9999	1.0100	OK
7	1.0016	1.0009	1.0005	–	–	–	1.0070	OK
8	1.0035	1.0042	1.0036	–	–	–	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 21 Mar 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110322_044335_20110321_181141_20110323_181141` .

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

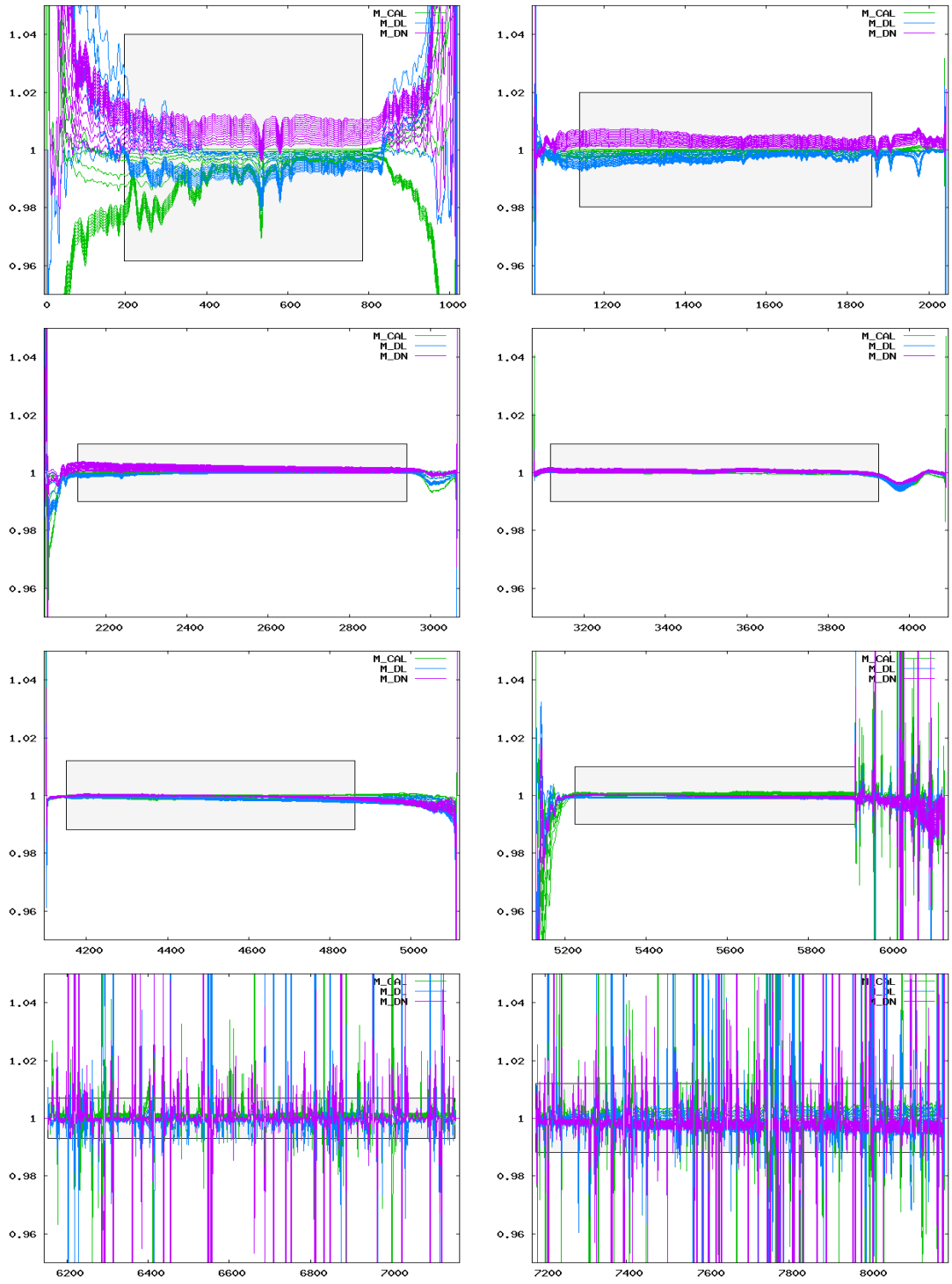

Figure 1: Ratio of delivered m-factors (22 Mar 2011– 04 Apr 2011) to the corresponding m-factor of the previous delivery day (21 Mar 2011). The grey boxes visualize the maximum ratio allowed.