NRT M-factor delivery document 02 Apr 2012

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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: 27 Mar 2012– 02 Apr 2012
- Prediction: 03 Apr 2012– 09 Apr 2012

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
5249e0559b000719cd4d85a09ab575c0	SCI_MF1_AXNIFE20120403_064600_20120327_190933_20120329_190933
22552e8985af1a07fd6e4137cdfd1716	SCI_MF1_AXNIFE20120403_064600_20120328_183248_20120330_183248
5351cd276f6036e755950e98b2c18286	SCI_MF1_AXNIFE20120403_064600_20120329_193616_20120331_193616
67cb05ce4d788cfbe5c7ac69976ba398	SCI_MF1_AXNIFE20120403_064600_20120330_185931_20120401_185931
027a07c123c1d66bac8570d6db06fc86	SCI_MF1_AXNIFE20120403_064600_20120331_182245_20120402_182245
e39e5d19316d05bd409ebf9402fe1652	SCI_MF1_AXNIFE20120403_064600_20120401_192614_20120403_192614
ec06b0533b905d7aead44f0fe02be2ef	SCI_MF1_AXNIFE20120403_064600_20120402_184928_20120404_184928
9de012036b252c94bf5a17c4b25e4f93	SCI_MF1_AXNIFE20120403_064600_20120403_181243_20120405_181243
60fd350e4460cc44b6224ee7ebf3dce6	SCI_MF1_AXNIFE20120403_064600_20120404_191611_20120406_191611
8113c023997e35dd114604f9586bb7ce	SCI_MF1_AXNIFE20120403_064600_20120405_183926_20120407_183926
1d62aaf7a2d31a903dd99c238cbecbe0	SCI_MF1_AXNIFE20120403_064600_20120406_180240_20120408_180240
f11f8a6a25b828ff478c96528b245de5	SCI_MF1_AXNIFE20120403_064600_20120407_190609_20120409_190609
84c91ef7884df09bdcbb2a80a15671c3	SCI_MF1_AXNIFE20120403_064600_20120408_182923_20120410_182923
b1f2243a7a302eba901c8c247b794abc	SCI_MF1_AXNIFE20120403_064600_20120409_193252_20120507_193252

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

validity identifier	M_CAL	M_DL	M_DN
20120327_190933_20120329_190933	meas.	meas.	meas.
20120328_183248_20120330_183248	meas.	meas.	meas.
20120329_193616_20120331_193616	meas.	meas.	interp.
20120330_185931_20120401_185931	meas.	meas.	meas.
20120331_182245_20120402_182245	meas.	meas.	meas.
20120401_192614_20120403_192614	meas.	meas.	meas.
20120402_184928_20120404_184928	meas.	meas.	meas.
20120403_181243_20120405_181243	pred.	pred.	pred.
20120404_191611_20120406_191611	pred.	pred.	pred.
20120405_183926_20120407_183926	pred.	pred.	pred.
20120406_180240_20120408_180240	pred.	pred.	pred.
20120407_190609_20120409_190609	pred.	pred.	pred.
20120408_182923_20120410_182923	pred.	pred.	pred.
20120409_193252_20120507_193252	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	1.0058	1.0507	1.0307	0.9986	0.9822	0.9926	1.0600	OK
2	1.0011	1.0187	1.0128	0.9996	0.9935	0.9972	1.0200	OK
3	1.0006	1.0062	1.0034	1.0000	0.9982	1.0005	1.0100	OK
4	1.0004	1.0015	1.0026	1.0002	0.9992	1.0018	1.0100	OK
5	1.0014	1.0039	1.0024	0.9998	0.9982	1.0012	1.0120	OK
6	1.0024	1.0024	1.0025	1.0014	0.9985	1.0014	1.0100	OK
7	1.0018	1.0020	1.0013	–	–	–	1.0070	OK
8	1.0010	1.0034	1.0018	–	–	–	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 26 Mar 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120327_073206_20120326_180605_20120328_180605` .

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

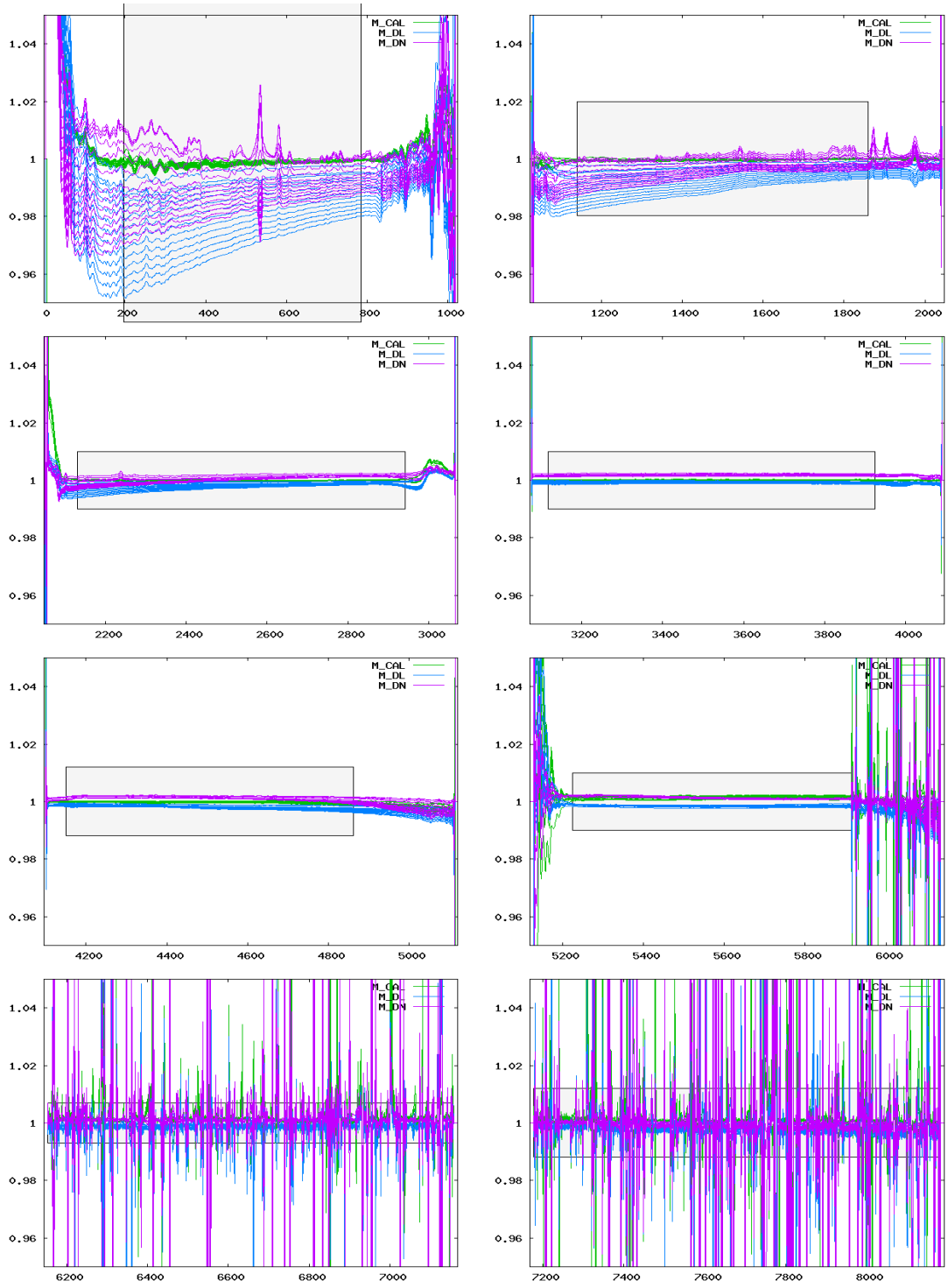

Figure 1: Ratio of delivered m-factors (27 Mar 2012– 09 Apr 2012) to the corresponding m-factor of the previous delivery day (26 Mar 2012). The grey boxes visualize the maximum ratio allowed.