NRT M-factor delivery document 26 Mar 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: 20 Mar 2012– 26 Mar 2012
- Prediction: 27 Mar 2012– 02 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
4324bfbef9529aea372dfa9ea4001202	SCI_MF1_AXNIFE20120327_073206_20120320_182610_20120322_182610
a73b71bb92b381a62c030d375a3480aa	SCI_MF1_AXNIFE20120327_073206_20120321_192938_20120323_192938
fe2d90ef45c21add1463c320537d5589	SCI_MF1_AXNIFE20120327_073206_20120322_185253_20120324_185253
7d08cb1c4c9444368ac9e1b453ebf401	SCI_MF1_AXNIFE20120327_073206_20120323_181607_20120325_181607
9ecb2168594a6ca0d1ea4ef185bc6abc	SCI_MF1_AXNIFE20120327_073206_20120324_191936_20120326_191936
7f8aa5ef078676d392b85d5bf1c6c2e6	SCI_MF1_AXNIFE20120327_073206_20120325_184250_20120327_184250
6d5f785cb025f53c73f02822dd7d1532	SCI_MF1_AXNIFE20120327_073206_20120326_180605_20120328_180605
f07ac6daeb15070fa5159dc4b09e489e	SCI_MF1_AXNIFE20120327_073206_20120327_190933_20120329_190933
440e0356466a429f2736c98160b11566	SCI_MF1_AXNIFE20120327_073206_20120328_183248_20120330_183248
deae7131c4808aae7e795b33ee4e903c	SCI_MF1_AXNIFE20120327_073206_20120329_193616_20120331_193616
4e7664eb460645ea631cbd207b842311	SCI_MF1_AXNIFE20120327_073206_20120330_185931_20120401_185931
9ed8887eff6b360465662d6fe681a013	SCI_MF1_AXNIFE20120327_073206_20120331_182245_20120402_182245
6a655791111e5b69816c134a36959f27	SCI_MF1_AXNIFE20120327_073206_20120401_192614_20120403_192614
5ed546c68d56a2d5639d2b400348a8cc	SCI_MF1_AXNIFE20120327_073206_20120402_184928_20120430_184928

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

validity identifier	M_CAL	M_DL	M_DN
20120320_182610_20120322_182610	meas.	meas.	meas.
20120321_192938_20120323_192938	meas.	meas.	meas.
20120322_185253_20120324_185253	meas.	meas.	meas.
20120323_181607_20120325_181607	meas.	meas.	meas.
20120324_191936_20120326_191936	meas.	meas.	meas.
20120325_184250_20120327_184250	meas.	meas.	meas.
20120326_180605_20120328_180605	meas.	meas.	meas.
20120327_190933_20120329_190933	pred.	pred.	pred.
20120328_183248_20120330_183248	pred.	pred.	pred.
20120329_193616_20120331_193616	pred.	pred.	pred.
20120330_185931_20120401_185931	pred.	pred.	pred.
20120331_182245_20120402_182245	pred.	pred.	pred.
20120401_192614_20120403_192614	pred.	pred.	pred.
20120402_184928_20120430_184928	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	1.0089	1.0397	1.0505	0.9978	0.9883	0.9877	1.0600	OK
2	1.0015	1.0125	1.0106	0.9995	0.9963	0.9969	1.0200	OK
3	1.0008	1.0040	1.0044	1.0000	0.9992	0.9992	1.0100	OK
4	1.0009	1.0009	1.0019	0.9998	0.9996	0.9993	1.0100	OK
5	1.0020	1.0018	1.0033	0.9992	0.9994	0.9988	1.0120	OK
6	1.0019	1.0015	1.0028	1.0006	1.0001	0.9989	1.0100	OK
7	1.0008	1.0016	1.0024	–	–	–	1.0070	OK
8	1.0009	1.0031	1.0030	–	–	–	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 19 Mar 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120320_121854_20120319_190255_20120321_190255` .

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

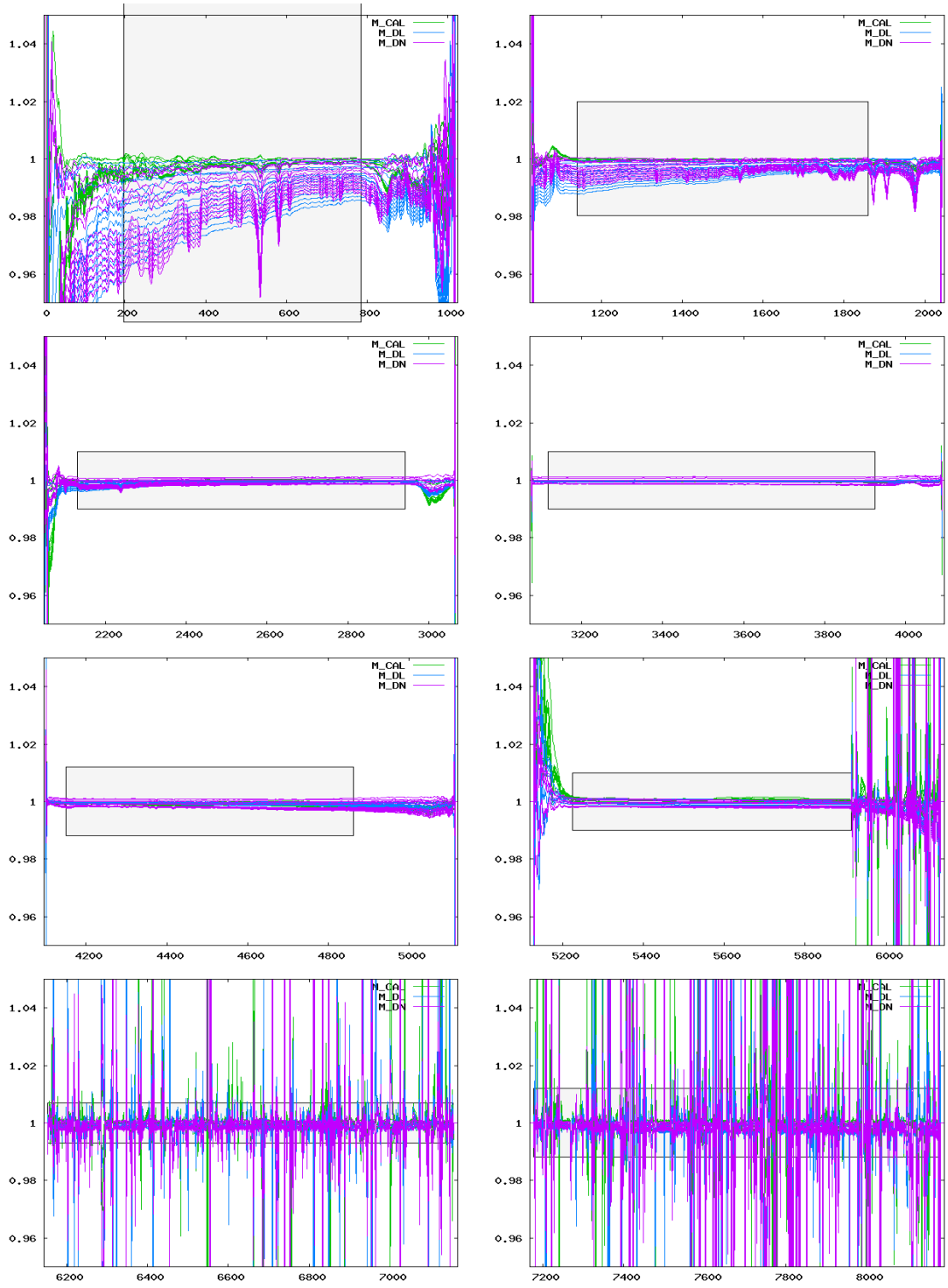

Figure 1: Ratio of delivered m-factors (20 Mar 2012– 02 Apr 2012) to the corresponding m-factor of the previous delivery day (19 Mar 2012). The grey boxes visualize the maximum ratio allowed.