NRT M-factor delivery document 19 Mar 2012

Klaus Bramstedt, ife Bremen

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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: 13 Mar 2012– 19 Mar 2012
- Prediction: 20 Mar 2012– 26 Mar 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
71362f1c0ffe61acd81fb579fa259fa0	SCI_MF1_AXNIFE20120320_121854_20120313_192300_20120315_192300
5372a0d71d842424ecdf03fa501cd3ef	SCI_MF1_AXNIFE20120320_121854_20120314_184615_20120316_184615
31269fe4759b8ca107cf9c5cefefee42	SCI_MF1_AXNIFE20120320_121854_20120315_180929_20120317_180929
e3cfe4d141bfecc906417831243da0ea	SCI_MF1_AXNIFE20120320_121854_20120316_191258_20120318_191258
3ca9e524352e142fd8a65f849c1567be	SCI_MF1_AXNIFE20120320_121854_20120317_183612_20120319_183612
27f0af2246c2b067cb24fa2c00adb63f	SCI_MF1_AXNIFE20120320_121854_20120318_193941_20120320_193941
631f1e954332275ecd4a4eff29b14176	SCI_MF1_AXNIFE20120320_121854_20120319_190255_20120321_190255
7bc647248536eb173b5b389d872e19d9	SCI_MF1_AXNIFE20120320_121854_20120320_182610_20120322_182610
63d4a3611b9629e78adf837aff9cd509	SCI_MF1_AXNIFE20120320_121854_20120321_192938_20120323_192938
990570d0191544c040e9456610b69682	SCI_MF1_AXNIFE20120320_121854_20120322_185253_20120324_185253
a7349b241f3f28fb80ad6ca7ee88820a	SCI_MF1_AXNIFE20120320_121854_20120323_181607_20120325_181607
d1efe647c95eef36186ee92791743d83	SCI_MF1_AXNIFE20120320_121854_20120324_191936_20120326_191936
19bb862aa7ca48a37340f3414121b3be	SCI_MF1_AXNIFE20120320_121854_20120325_184250_20120327_184250
58b1f5bdc93ef235c3ea3793b73f5d9b	SCI_MF1_AXNIFE20120320_121854_20120326_180605_20120423_180605

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

validity identifier	M_CAL	M_DL	M_DN
20120313_192300_20120315_192300	meas.	meas.	meas.
20120314_184615_20120316_184615	meas.	meas.	meas.
20120315_180929_20120317_180929	meas.	meas.	interp.
20120316_191258_20120318_191258	meas.	meas.	meas.
20120317_183612_20120319_183612	meas.	meas.	meas.
20120318_193941_20120320_193941	meas.	meas.	meas.
20120319_190255_20120321_190255	meas.	meas.	meas.
20120320_182610_20120322_182610	pred.	pred.	pred.
20120321_192938_20120323_192938	pred.	pred.	pred.
20120322_185253_20120324_185253	pred.	pred.	pred.
20120323_181607_20120325_181607	pred.	pred.	pred.
20120324_191936_20120326_191936	pred.	pred.	pred.
20120325_184250_20120327_184250	pred.	pred.	pred.
20120326_180605_20120423_180605	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	1.0069	1.0484	1.0263	0.9998	0.9827	0.9923	1.0500	OK
2	1.0012	1.0173	1.0099	0.9995	0.9939	0.9975	1.0200	OK
3	1.0007	1.0058	1.0030	0.9997	0.9985	0.9998	1.0100	OK
4	1.0006	1.0014	1.0018	0.9998	0.9993	1.0004	1.0100	OK
5	1.0016	1.0030	1.0026	0.9992	0.9988	0.9998	1.0120	OK
6	1.0010	1.0018	1.0020	1.0001	0.9996	0.9999	1.0100	OK
7	1.0005	1.0021	1.0014	–	–	–	1.0070	OK
8	1.0007	1.0037	1.0022	–	–	–	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 12 Mar 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120313_074451_20120312_181932_20120314_181932` .

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

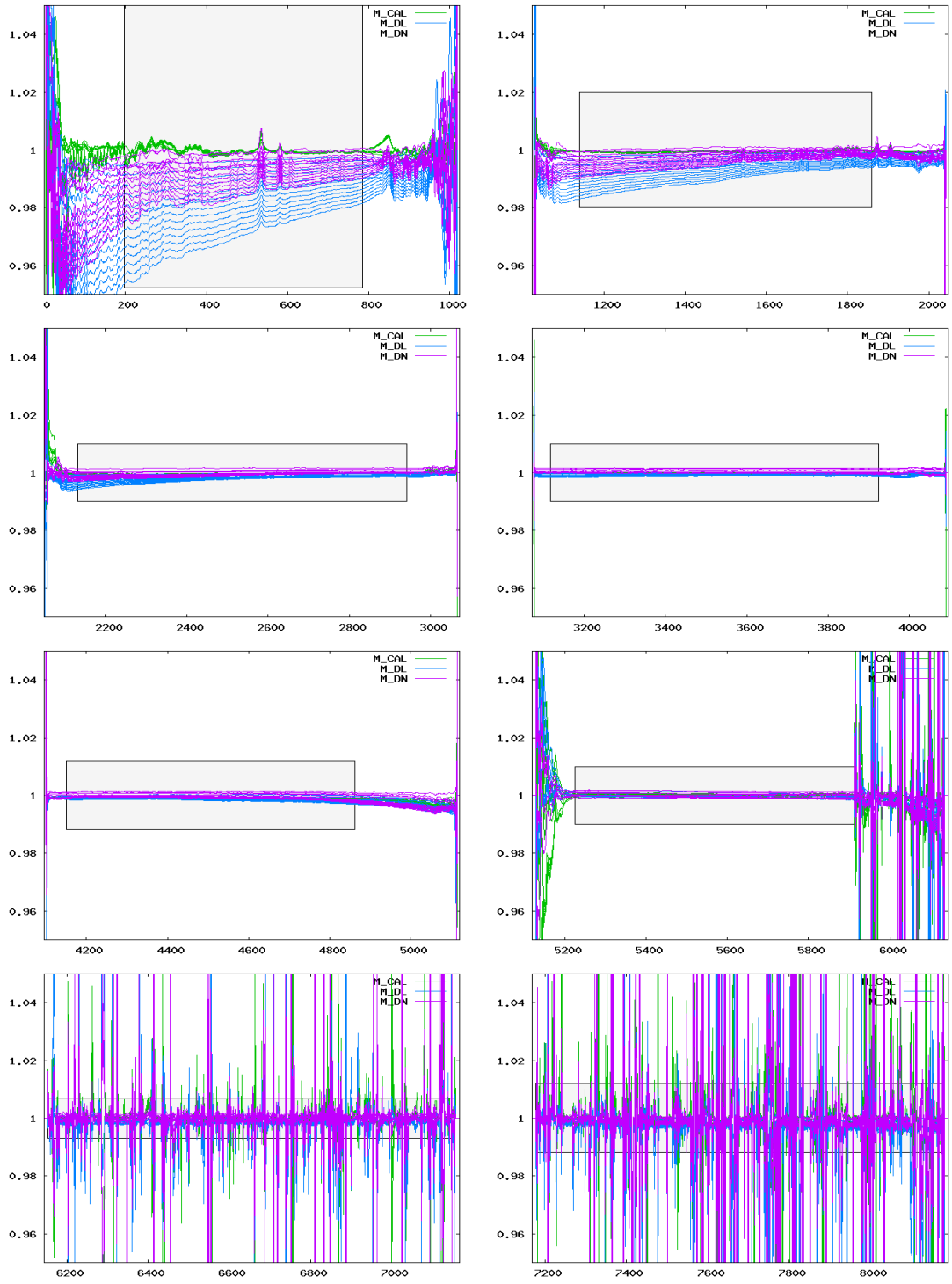

Figure 1: Ratio of delivered m-factors (13 Mar 2012– 26 Mar 2012) to the corresponding m-factor of the previous delivery day (12 Mar 2012). The grey boxes visualize the maximum ratio allowed.