NRT M-factor delivery document 20 Feb 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: 14 Feb 2012– 20 Feb 2012
- Prediction: 21 Feb 2012– 27 Feb 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
fbb045f6f7fe47b4c9464da9edb18736	SCI_MF1_AXNIFE20120221_044408_20120214_180940_20120216_180940
178945f6dabc08cab7f03a55e7049215	SCI_MF1_AXNIFE20120221_044408_20120215_191309_20120217_191309
8cc41d17627455e926c108add67880ca	SCI_MF1_AXNIFE20120221_044408_20120216_183623_20120218_183623
23e8af1c74749dc932da267be184d924	SCI_MF1_AXNIFE20120221_044408_20120217_193952_20120219_193952
b81ba686962a41a8aeadadeccc4b56be	SCI_MF1_AXNIFE20120221_044408_20120218_190306_20120220_190306
8ac04aae7e88ef2a9f589c92d158a4c7	SCI_MF1_AXNIFE20120221_044408_20120219_182621_20120221_182621
c3915f2a9c58cb1ff98ab21ea315b7eb	SCI_MF1_AXNIFE20120221_044408_20120220_192949_20120222_192949
466f3bf4f2ad36b5f50573946096988f	SCI_MF1_AXNIFE20120221_044408_20120221_185304_20120223_185304
03ec6e0f1ebfa56292bafc69abca4068	SCI_MF1_AXNIFE20120221_044408_20120222_181618_20120224_181618
eecb8e05ff13fe0b14b1145befb49648	SCI_MF1_AXNIFE20120221_044408_20120223_191947_20120225_191947
ea0b2d8af19d9ab90175f3857e41bfed	SCI_MF1_AXNIFE20120221_044408_20120224_184301_20120226_184301
20955aeb04a565b63c77f748e504f8f6	SCI_MF1_AXNIFE20120221_044408_20120225_180616_20120227_180616
6766b9e4ff73dd3d531ec1b91960e88c	SCI_MF1_AXNIFE20120221_044408_20120226_190944_20120228_190944
73d24008563361dadd702c01014ffde3	SCI_MF1_AXNIFE20120221_044408_20120227_183259_20120326_183259

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

validity identifier	M_CAL	M_DL	M_DN
20120214_180940_20120216_180940	meas.	meas.	meas.
20120215_191309_20120217_191309	meas.	meas.	meas.
20120216_183623_20120218_183623	meas.	meas.	meas.
20120217_193952_20120219_193952	meas.	meas.	meas.
20120218_190306_20120220_190306	meas.	meas.	meas.
20120219_182621_20120221_182621	meas.	meas.	meas.
20120220_192949_20120222_192949	pred.	meas.	pred.
20120221_185304_20120223_185304	pred.	pred.	pred.
20120222_181618_20120224_181618	pred.	pred.	pred.
20120223_191947_20120225_191947	pred.	pred.	pred.
20120224_184301_20120226_184301	pred.	pred.	pred.
20120225_180616_20120227_180616	pred.	pred.	pred.
20120226_190944_20120228_190944	pred.	pred.	pred.
20120227_183259_20120326_183259	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	1.0094	1.0339	1.0324	1.0006	0.9873	0.9915	1.0400	OK
2	1.0018	1.0131	1.0091	1.0006	0.9957	0.9956	1.0200	OK
3	1.0004	1.0038	1.0050	1.0002	0.9990	0.9974	1.0100	OK
4	1.0012	1.0005	1.0036	1.0005	0.9998	0.9986	1.0100	OK
5	1.0019	1.0013	1.0035	1.0010	0.9992	0.9988	1.0120	OK
6	1.0026	1.0019	1.0032	1.0017	0.9987	0.9989	1.0100	OK
7	1.0022	1.0009	1.0025	–	–	–	1.0070	OK
8	1.0054	1.0017	1.0013	–	–	–	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 13 Feb 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120214_044457_20120213_184626_20120215_184626` .

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

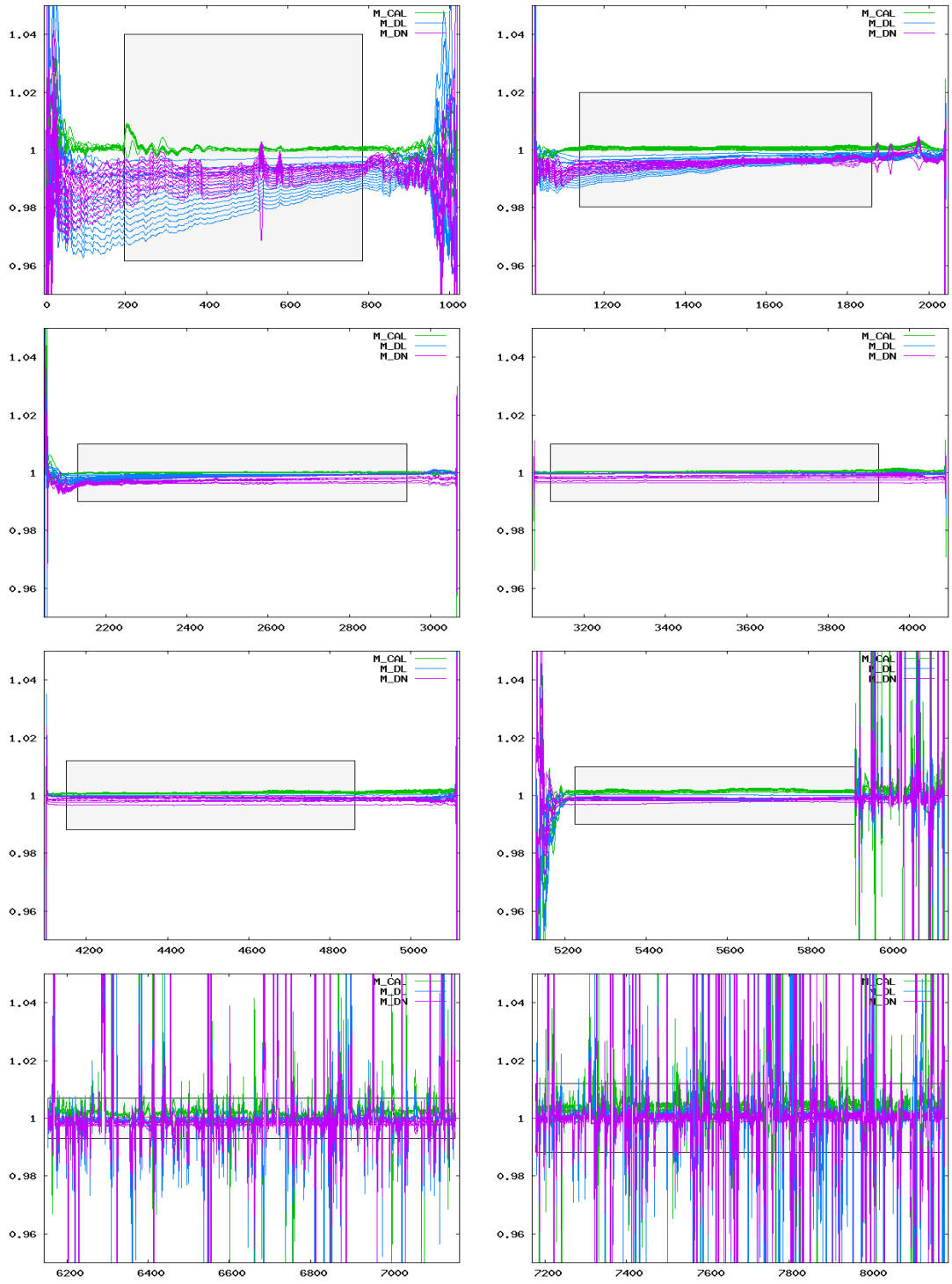

Figure 1: Ratio of delivered m-factors (14 Feb 2012– 27 Feb 2012) to the corresponding m-factor of the previous delivery day (13 Feb 2012). The grey boxes visualize the maximum ratio allowed.