NRT M-factor delivery document 06 Feb 2012

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06 Feb 2012

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: 31 Jan 2012– 06 Feb 2012
- Prediction: 07 Feb 2012– 13 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
a40678ec7688fe87f1be48365ec024c1	SCI_MF1_AXNIFE20120207_044352_20120131_182307_20120202_182307
28ffec27258f32e1a5f6eb14794c899e	SCI_MF1_AXNIFE20120207_044352_20120201_192636_20120203_192636
66ba1146bad2363dd546e0a94878c807	SCI_MF1_AXNIFE20120207_044352_20120202_184950_20120204_184950
d633890f0d17139de56dc78c918d4366	SCI_MF1_AXNIFE20120207_044352_20120203_181305_20120205_181305
e017c6ed67dd43084484d2a500d872f3	SCI_MF1_AXNIFE20120207_044352_20120204_191633_20120206_191633
185574e6f0791c619110019afe27294e	SCI_MF1_AXNIFE20120207_044352_20120205_183948_20120207_183948
8c98f3dc6515c71bfe959643457d5b03	SCI_MF1_AXNIFE20120207_044352_20120206_180302_20120208_180302
63e8b5479f044ce2f2e844f8600351e2	SCI_MF1_AXNIFE20120207_044352_20120207_190631_20120209_190631
68c14f7e8e27780d60581baaa47848ae	SCI_MF1_AXNIFE20120207_044352_20120208_182945_20120210_182945
1d6bfc7b4d0c9670d9480db39e2dd465	SCI_MF1_AXNIFE20120207_044352_20120209_193314_20120211_193314
a666c0e87a26c91b1c1c16d287342dcf	SCI_MF1_AXNIFE20120207_044352_20120210_185628_20120212_185628
ac5afb8eab9a60dedc2401536d0454ee	SCI_MF1_AXNIFE20120207_044352_20120211_181943_20120213_181943
c687c1eeeeb62d9cf234d27ab98f71a6	SCI_MF1_AXNIFE20120207_044352_20120212_192311_20120214_192311
dc355c19d1aad425d2656392f20d5813	SCI_MF1_AXNIFE20120207_044352_20120213_184626_20120312_184626

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

validity identifier	M_CAL	M_DL	M_DN
20120131_182307_20120202_182307	meas.	meas.	meas.
20120201_192636_20120203_192636	meas.	meas.	meas.
20120202_184950_20120204_184950	meas.	meas.	meas.
20120203_181305_20120205_181305	meas.	meas.	meas.
20120204_191633_20120206_191633	meas.	meas.	meas.
20120205_183948_20120207_183948	meas.	meas.	meas.
20120206_180302_20120208_180302	pred.	meas.	pred.
20120207_190631_20120209_190631	pred.	pred.	pred.
20120208_182945_20120210_182945	pred.	pred.	pred.
20120209_193314_20120211_193314	pred.	pred.	pred.
20120210_185628_20120212_185628	pred.	pred.	pred.
20120211_181943_20120213_181943	pred.	pred.	pred.
20120212_192311_20120214_192311	pred.	pred.	pred.
20120213_184626_20120312_184626	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	1.0108	1.0303	1.0334	1.0023	0.9903	0.9980	1.0400	OK
2	1.0029	1.0134	1.0096	1.0008	0.9964	0.9986	1.0200	OK
3	1.0022	1.0057	1.0035	0.9996	0.9987	1.0002	1.0100	OK
4	1.0009	1.0013	1.0023	0.9996	0.9996	1.0015	1.0100	OK
5	1.0009	1.0013	1.0027	0.9996	1.0002	1.0016	1.0120	OK
6	1.0023	1.0016	1.0024	0.9990	1.0003	1.0010	1.0100	OK
7	1.0027	1.0006	1.0014	–	–	–	1.0070	OK
8	1.0014	1.0033	1.0039	–	–	–	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 30 Jan 2012, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20120131_082744_20120130_185953_20120201_185953` .

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

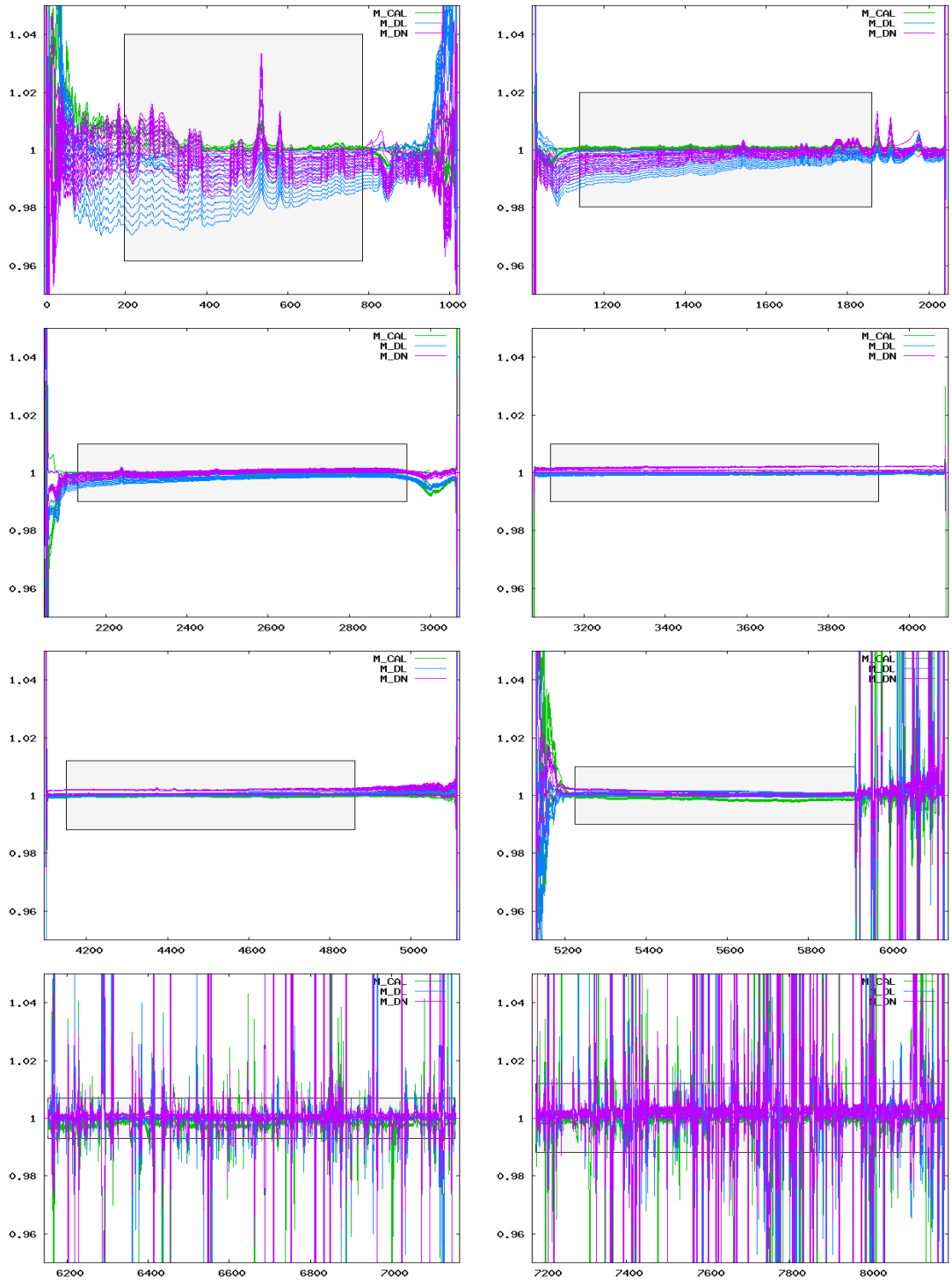

Figure 1: Ratio of delivered m-factors (31 Jan 2012– 13 Feb 2012) to the corresponding m-factor of the previous delivery day (30 Jan 2012). The grey boxes visualize the maximum ratio allowed.