NRT M-factor delivery document 26 Dec 2011

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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 Dec 2011– 26 Dec 2011
- Prediction: 27 Dec 2011– 02 Jan 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
c9029e604f1bd189fb12ad9539dd3708	SCI_MF1_AXNIFE20111227_082821_20111220_190328_20111222_190328
143e6f8ed18e9c2a2508ed061fdc28c6	SCI_MF1_AXNIFE20111227_082821_20111221_182643_20111223_182643
b8b8a1b0ff7b3af2aebbfc5409dcfcd5	SCI_MF1_AXNIFE20111227_082821_20111222_193011_20111224_193011
401f7f1dcf0d37a62ac3c8d46c35a258	SCI_MF1_AXNIFE20111227_082821_20111223_185326_20111225_185326
ab4fd2cfc80d651aa43c297848152e95	SCI_MF1_AXNIFE20111227_082821_20111224_181640_20111226_181640
9c16e47a995f2a6bf8d37bf713c5b311	SCI_MF1_AXNIFE20111227_082821_20111225_192009_20111227_192009
dff0d67c60c7af010e3d19e86b1ee5df	SCI_MF1_AXNIFE20111227_082821_20111226_184323_20111228_184323
f68bbf55e4be240b55afb061ef39ecf6	SCI_MF1_AXNIFE20111227_082821_20111227_180638_20111229_180638
4a1b16f9dd7a09ee065f5dde9cf1959c	SCI_MF1_AXNIFE20111227_082821_20111228_191006_20111230_191006
779b5215e06b4a4b1437bfe1d84edac5	SCI_MF1_AXNIFE20111227_082821_20111229_183321_20111231_183321
d0e8d8ad15234d0caa163ff4f16f39b3	SCI_MF1_AXNIFE20111227_082821_20111230_193649_20120101_193649
d4e0799c777dcbddfbaaf5939b93afb2	SCI_MF1_AXNIFE20111227_082821_20111231_190004_20120102_190004
2ae6379f6cae7138259c4d2ca69e523f	SCI_MF1_AXNIFE20111227_082821_20120101_182318_20120103_182318
7a6ba1432a49a802961c9bbbe6dcdc0c	SCI_MF1_AXNIFE20111227_082821_20120102_192647_20120130_192647

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

validity identifier	M_CAL	M_DL	M_DN
20111220_190328_20111222_190328	meas.	meas.	interp.
20111221_182643_20111223_182643	meas.	meas.	meas.
20111222_193011_20111224_193011	meas.	meas.	interp.
20111223_185326_20111225_185326	meas.	meas.	interp.
20111224_181640_20111226_181640	meas.	meas.	interp.
20111225_192009_20111227_192009	meas.	meas.	meas.
20111226_184323_20111228_184323	meas.	meas.	pred.
20111227_180638_20111229_180638	pred.	pred.	pred.
20111228_191006_20111230_191006	pred.	pred.	pred.
20111229_183321_20111231_183321	pred.	pred.	pred.
20111230_193649_20120101_193649	pred.	pred.	pred.
20111231_190004_20120102_190004	pred.	pred.	pred.
20120101_182318_20120103_182318	pred.	pred.	pred.
20120102_192647_20120130_192647	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	1.0082	1.1030	1.0790	1.0024	0.9702	0.9819	1.1900	OK
2	1.0038	1.0357	1.0216	1.0016	0.9901	0.9951	1.0700	OK
3	1.0015	1.0109	1.0054	1.0006	0.9979	0.9993	1.0200	OK
4	1.0014	1.0017	1.0014	1.0003	0.9997	0.9999	1.0100	OK
5	1.0012	1.0021	1.0015	1.0005	1.0005	1.0003	1.0120	OK
6	1.0012	1.0025	1.0017	0.9999	1.0011	1.0010	1.0100	OK
7	1.0009	1.0027	1.0006	–	–	–	1.0070	OK
8	1.0043	1.0055	1.0050	–	–	–	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 Dec 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111220_080227_20111219_194014_20111221_194014` .

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

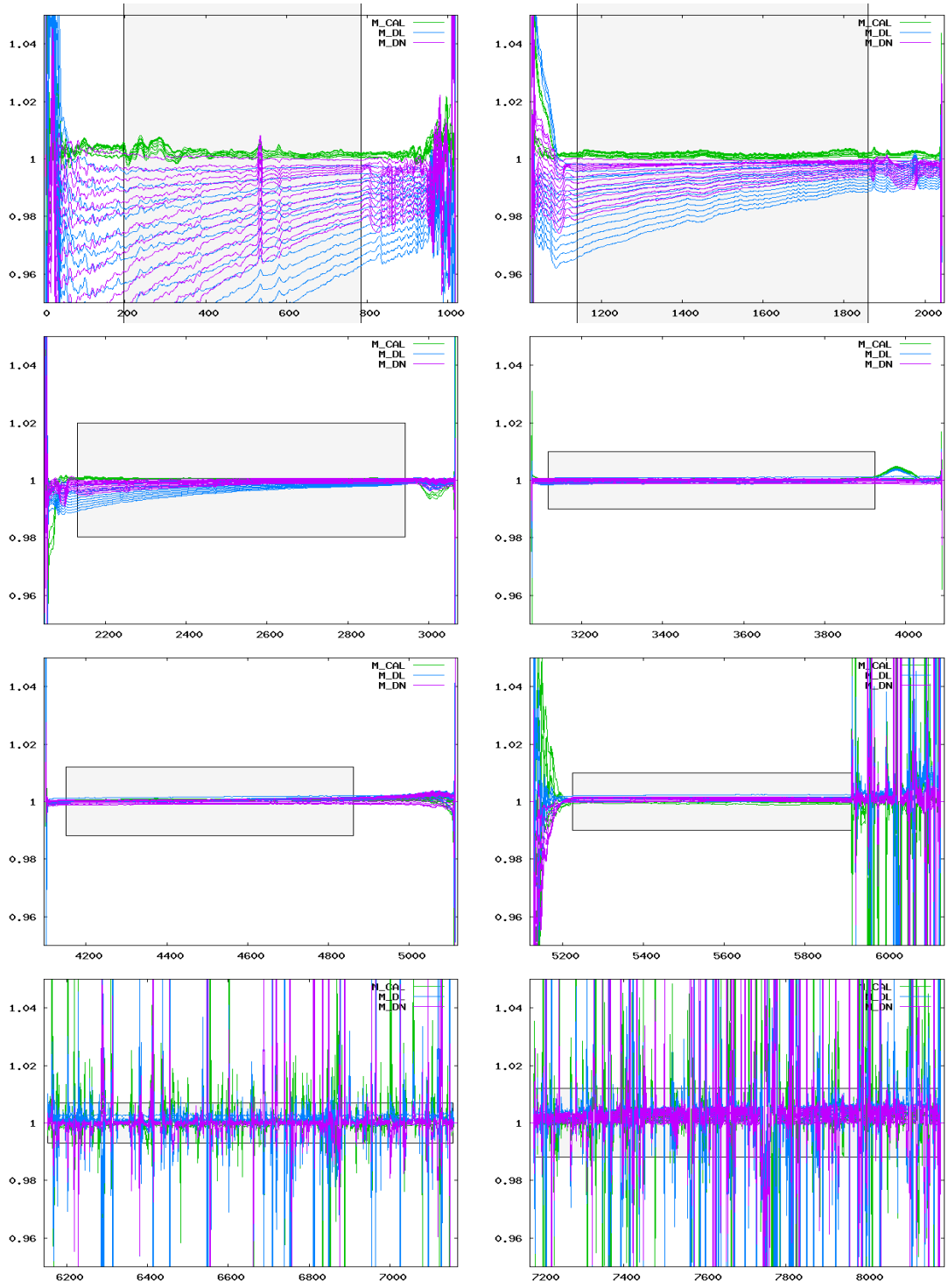

Figure 1: Ratio of delivered m-factors (20 Dec 2011– 02 Jan 2012) to the corresponding m-factor of the previous delivery day (19 Dec 2011). The grey boxes visualize the maximum ratio allowed.