NRT M-factor delivery document 02 Jan 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: 27 Dec 2011– 02 Jan 2012
- Prediction: 03 Jan 2012– 09 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
09444508766401d3dafda7945f0f6e47	SCI_MF1_AXNIFE20120103_084349_20111227_180638_20111229_180638
3ddee67c3742369904f83e7d87af162f	SCI_MF1_AXNIFE20120103_084349_20111228_191006_20111230_191006
a6064f9a1fd6b78d83883573388b621f	SCI_MF1_AXNIFE20120103_084349_20111229_183321_20111231_183321
e818ca4d81e7eb961e81fa3705896a01	SCI_MF1_AXNIFE20120103_084349_20111230_193649_20120101_193649
806d94d57405d4d7655ef6732ec56df4	SCI_MF1_AXNIFE20120103_084349_20111231_190004_20120102_190004
efb7c6ef90a5ca98a46557f948ca3ae1	SCI_MF1_AXNIFE20120103_084349_20120101_182318_20120103_182318
aae632bc1772306321a4a84ac0b7dda7	SCI_MF1_AXNIFE20120103_084349_20120102_192647_20120104_192647
fd0c5403dc99d2e1da79ec4818f4c728	SCI_MF1_AXNIFE20120103_084349_20120103_185001_20120105_185001
83739a25ee9773c9ce374d831698601f	SCI_MF1_AXNIFE20120103_084349_20120104_181316_20120106_181316
448383f39e133790336cbe908931eb5d	SCI_MF1_AXNIFE20120103_084349_20120105_191644_20120107_191644
c9e7d6b3a6e3496db205c93a820e650b	SCI_MF1_AXNIFE20120103_084349_20120106_183959_20120108_183959
501318353c9c37bf1a92d4744189aaa9	SCI_MF1_AXNIFE20120103_084349_20120107_180313_20120109_180313
b59ea7a9ae750d18e6f10344afa8cce6	SCI_MF1_AXNIFE20120103_084349_20120108_190642_20120110_190642
11ed0d571fdf47a6ea454307f6952d58	SCI_MF1_AXNIFE20120103_084349_20120109_182956_20120206_182956

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

validity identifier	M_CAL	M_DL	M_DN
20111227_180638_20111229_180638	meas.	meas.	interp.
20111228_191006_20111230_191006	meas.	meas.	interp.
20111229_183321_20111231_183321	meas.	meas.	meas.
20111230_193649_20120101_193649	meas.	meas.	interp.
20111231_190004_20120102_190004	meas.	meas.	interp.
20120101_182318_20120103_182318	meas.	meas.	meas.
20120102_192647_20120104_192647	meas.	meas.	meas.
20120103_185001_20120105_185001	pred.	pred.	pred.
20120104_181316_20120106_181316	pred.	pred.	pred.
20120105_191644_20120107_191644	pred.	pred.	pred.
20120106_183959_20120108_183959	pred.	pred.	pred.
20120107_180313_20120109_180313	pred.	pred.	pred.
20120108_190642_20120110_190642	pred.	pred.	pred.
20120109_182956_20120206_182956	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	1.0074	1.0983	1.0726	0.9979	0.9695	0.9779	1.1000	OK
2	1.0016	1.0332	1.0273	0.9999	0.9898	0.9905	1.0400	OK
3	1.0012	1.0104	1.0111	0.9995	0.9973	0.9961	1.0200	OK
4	1.0006	1.0020	1.0032	0.9996	0.9991	0.9983	1.0100	OK
5	1.0012	1.0014	1.0020	1.0000	0.9999	0.9992	1.0120	OK
6	1.0017	1.0012	1.0013	0.9992	0.9998	0.9995	1.0100	OK
7	1.0018	1.0008	1.0009	–	–	–	1.0070	OK
8	1.0031	1.0060	1.0059	–	–	–	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 26 Dec 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111227_082821_20111226_184323_20111228_184323` .

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

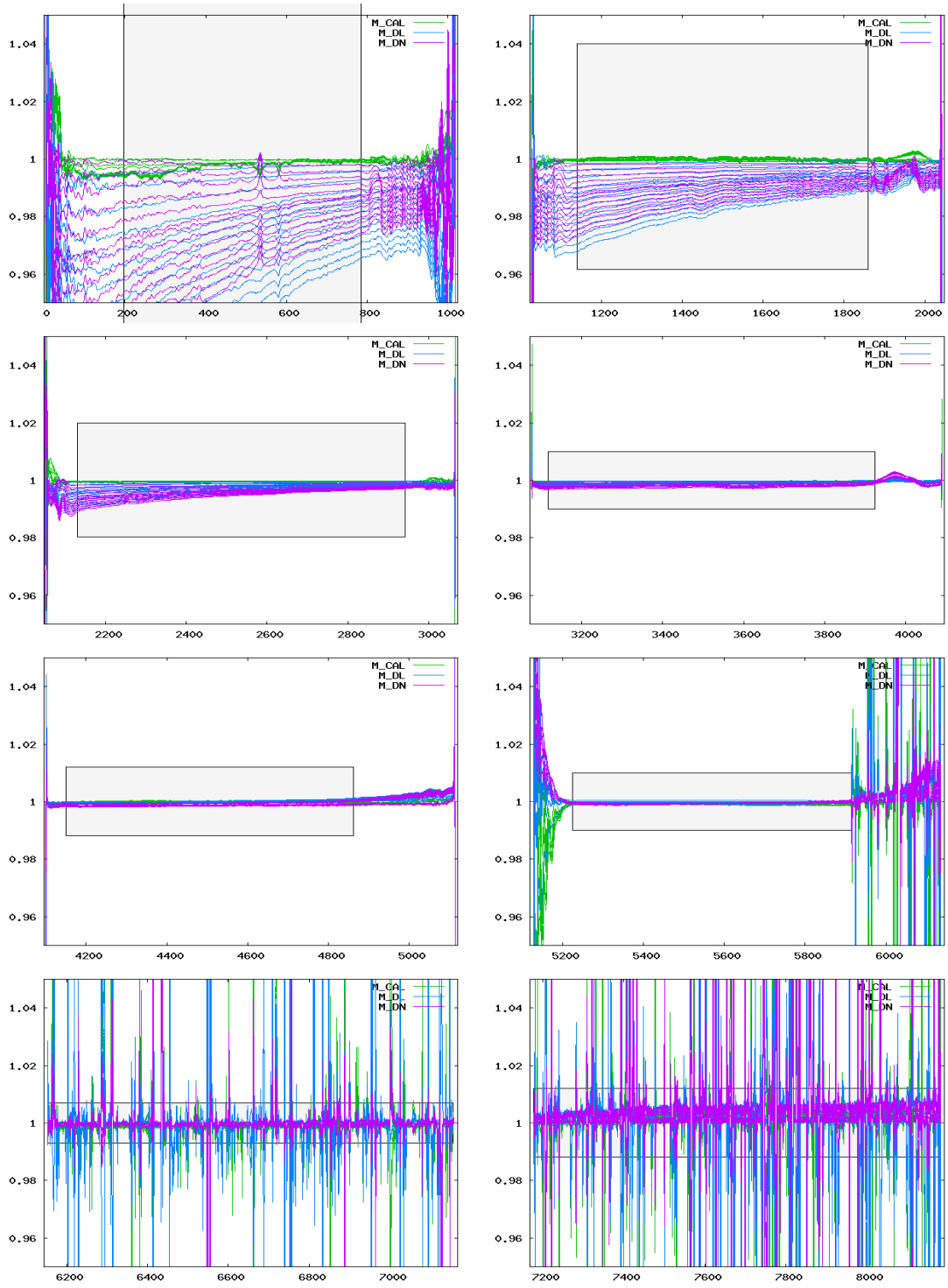

Figure 1: Ratio of delivered m-factors (27 Dec 2011– 09 Jan 2012) to the corresponding m-factor of the previous delivery day (26 Dec 2011). The grey boxes visualize the maximum ratio allowed.