NRT M-factor delivery document 06 Dec 2010

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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: 30 Nov 2010– 06 Dec 2010
- Prediction: 07 Dec 2010– 13 Dec 2010

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
8de44ee4f0832b8181acb144c5a8046d	SCI_MF1_AXNIFE20101207_085424_20101130_192231_20101202_192231
b1633e52f3f2419d5914bcada11c428c	SCI_MF1_AXNIFE20101207_085424_20101201_184546_20101203_184546
59df4e8cc5cb5e2d4386718f534e9dab	SCI_MF1_AXNIFE20101207_085424_20101202_194914_20101204_194914
364ce9aada331c246b2a167c259ad9b3	SCI_MF1_AXNIFE20101207_085424_20101203_191229_20101205_191229
8d4bc21febd364d01713d2e4b8620a14	SCI_MF1_AXNIFE20101207_085424_20101204_183543_20101206_183543
65ffde2f860e52945b7fb0f388dd71f5	SCI_MF1_AXNIFE20101207_085424_20101205_193912_20101207_193912
0fbc8fc9f24885d6fac6555570e7b403	SCI_MF1_AXNIFE20101207_085424_20101206_190226_20101208_190226
eed6e00c96a9ad08e7633a9ebb2273d8	SCI_MF1_AXNIFE20101207_085424_20101207_182541_20101209_182541
87e79b026be88ce56548b59984af5409	SCI_MF1_AXNIFE20101207_085424_20101208_192909_20101210_192909
03afa2ce007f3a0f38f07d9c84ee9d4f	SCI_MF1_AXNIFE20101207_085424_20101209_185224_20101211_185224
37c4a57fefb7e21c5cef4021e730a986	SCI_MF1_AXNIFE20101207_085424_20101210_181538_20101212_181538
c869f65f6382f559cc4b5720af0bbe30	SCI_MF1_AXNIFE20101207_085424_20101211_191907_20101213_191907
f01a41352493063872107f5e4687ffa5	SCI_MF1_AXNIFE20101207_085424_20101212_184221_20101214_184221
6d3a1e19839522de87322b2f8caf2fec	SCI_MF1_AXNIFE20101207_085424_20101213_194550_20110110_194550

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

validity identifier	M_CAL	M_DL	M_DN
20101130_192231_20101202_192231	meas.	meas.	interp.
20101201_184546_20101203_184546	meas.	meas.	interp.
20101202_194914_20101204_194914	meas.	meas.	interp.
20101203_191229_20101205_191229	meas.	meas.	meas.
20101204_183543_20101206_183543	meas.	meas.	pred.
20101205_193912_20101207_193912	meas.	meas.	pred.
20101206_190226_20101208_190226	meas.	meas.	pred.
20101207_182541_20101209_182541	pred.	pred.	pred.
20101208_192909_20101210_192909	pred.	pred.	pred.
20101209_185224_20101211_185224	pred.	pred.	pred.
20101210_181538_20101212_181538	pred.	pred.	pred.
20101211_191907_20101213_191907	pred.	pred.	pred.
20101212_184221_20101214_184221	pred.	pred.	pred.
20101213_194550_20110110_194550	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	1.0065	1.0076	1.0044	0.9999	1.0040	1.0002	1.0400	OK
2	1.0017	1.0057	1.0035	1.0006	1.0022	1.0007	1.0200	OK
3	1.0006	1.0019	1.0044	1.0000	1.0002	1.0021	1.0100	OK
4	1.0003	1.0004	1.0051	0.9999	1.0000	1.0032	1.0100	OK
5	1.0006	1.0010	1.0048	1.0001	1.0002	1.0031	1.0120	OK
6	1.0010	1.0010	1.0057	0.9998	1.0000	1.0027	1.0100	OK
7	1.0003	1.0006	1.0058	–	–	–	1.0070	OK
8	1.0012	1.0025	1.0042	–	–	–	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 29 Nov 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101130_044259_20101129_181903_20101201_181903` .

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

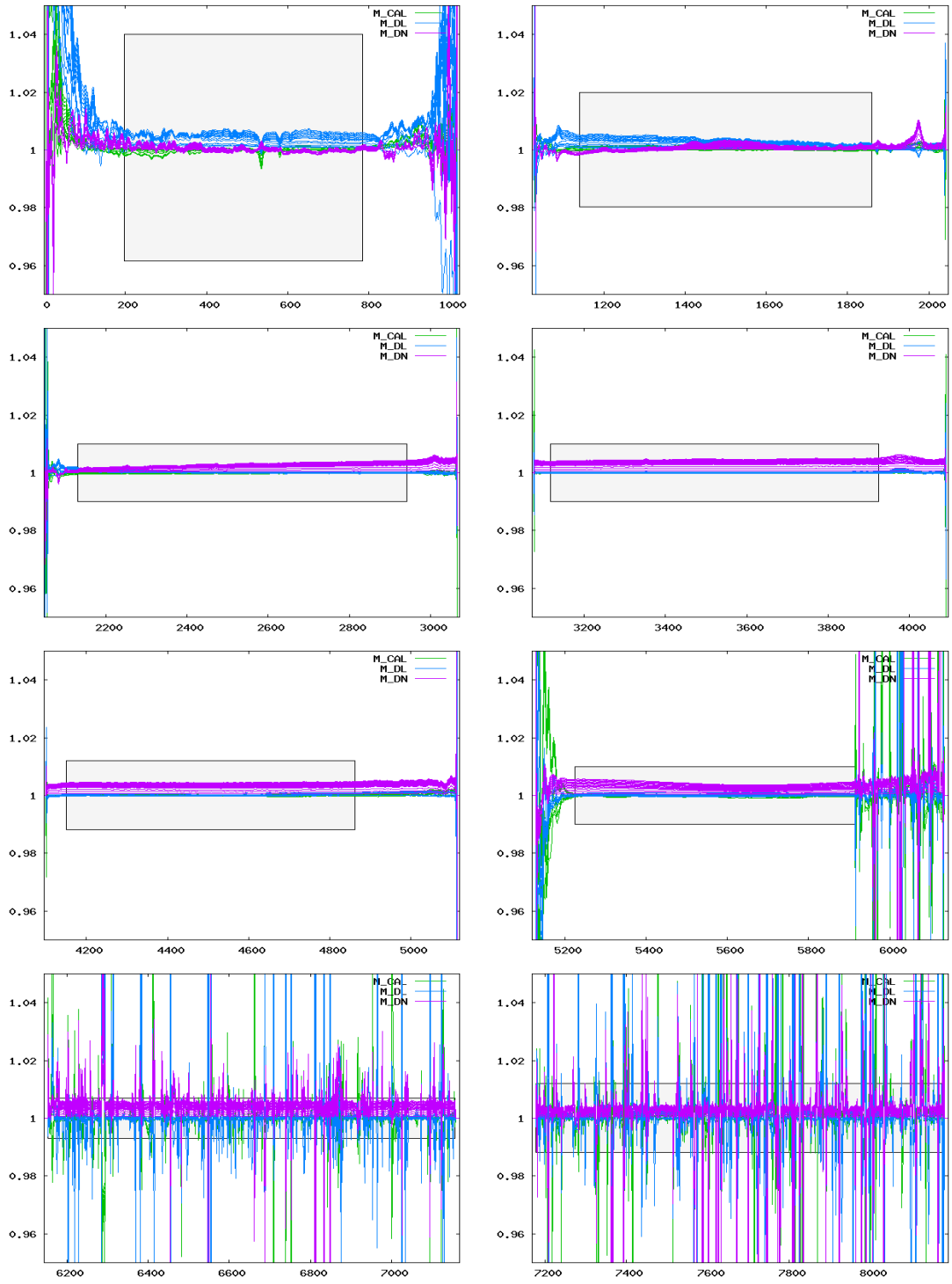

Figure 1: Ratio of delivered m-factors (30 Nov 2010– 13 Dec 2010) to the corresponding m-factor of the previous delivery day (29 Nov 2010). The grey boxes visualize the maximum ratio allowed.