NRT M-factor delivery document 07 Dec 2009

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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 06.01.

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: 01 Dec 2009– 07 Dec 2009
- Prediction: 08 Dec 2009– 14 Dec 2009

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
60cc1660025ce60e26fcdc2e10522801	SCI_MF1_AXNIFE20091207_225521_20091201_181641_20091203_181641
4fb7f575743c278e7212e34048b019cf	SCI_MF1_AXNIFE20091207_225521_20091202_192540_20091204_192540
2906b18957e8c893bf31d6bb643f9f38	SCI_MF1_AXNIFE20091207_225521_20091203_185403_20091205_185403
dacf615392c1055bfda54c8ef24b455a	SCI_MF1_AXNIFE20091207_225521_20091204_182226_20091206_182226
daebff5c8914d9e50a860f5291875ca8	SCI_MF1_AXNIFE20091207_225521_20091205_193125_20091207_193125
a3f822c1e55ee269de935ba84b2a31a2	SCI_MF1_AXNIFE20091207_225521_20091206_185948_20091208_185948
01a0f24091a9d0d023a34e27a4d03ae5	SCI_MF1_AXNIFE20091207_225521_20091207_182811_20091209_182811
c890c8004b734ef2e08b7f86c4024c26	SCI_MF1_AXNIFE20091207_225521_20091208_193710_20091210_193710
65282776b661e74143f7a73c8d33ad6d	SCI_MF1_AXNIFE20091207_225521_20091209_190533_20091211_190533
69f235f0645a1605c269c8a7f5e61e5a	SCI_MF1_AXNIFE20091207_225521_20091210_183356_20091212_183356
40e485d16f09b8cc92874e434ff77f16	SCI_MF1_AXNIFE20091207_225521_20091211_194255_20091213_194255
672df1c3e94f67a4be729678c6c7dbee	SCI_MF1_AXNIFE20091207_225521_20091212_191118_20091214_191118
0a292979f9388b695ef3ba845bbde4a3	SCI_MF1_AXNIFE20091207_225521_20091213_183941_20091215_183941
15273acc2e5a3f870b08639f2ce9a53b	SCI_MF1_AXNIFE20091207_225521_20091214_194840_20100111_194840

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

validity identifier	M_CAL	M_DL	M_DN
20091201_181641_20091203_181641	meas.	meas.	interp.
20091202_192540_20091204_192540	meas.	meas.	interp.
20091203_185403_20091205_185403	meas.	meas.	interp.
20091204_182226_20091206_182226	meas.	meas.	meas.
20091205_193125_20091207_193125	meas.	meas.	pred.
20091206_185948_20091208_185948	meas.	meas.	pred.
20091207_182811_20091209_182811	meas.	pred.	pred.
20091208_193710_20091210_193710	pred.	pred.	pred.
20091209_190533_20091211_190533	pred.	pred.	pred.
20091210_183356_20091212_183356	pred.	pred.	pred.
20091211_194255_20091213_194255	pred.	pred.	pred.
20091212_191118_20091214_191118	pred.	pred.	pred.
20091213_183941_20091215_183941	pred.	pred.	pred.
20091214_194840_20100111_194840	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	1.0095	1.0142	1.0078	1.0017	1.0053	1.0013	1.0400	OK
2	1.0028	1.0076	1.0037	1.0012	1.0024	1.0004	1.0200	OK
3	1.0008	1.0023	1.0031	1.0001	1.0002	0.9980	1.0100	OK
4	1.0016	1.0011	1.0039	1.0000	1.0000	0.9974	1.0100	OK
5	1.0013	1.0006	1.0028	1.0000	1.0000	0.9982	1.0120	OK
6	1.0025	1.0018	1.0018	1.0002	1.0004	0.9997	1.0100	OK
7	1.0005	1.0020	1.0021	–	–	–	1.0070	OK
8	1.0004	1.0007	1.0010	–	–	–	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 30 Nov 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091130_225439_20091130_184818_20091202_184818` .

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

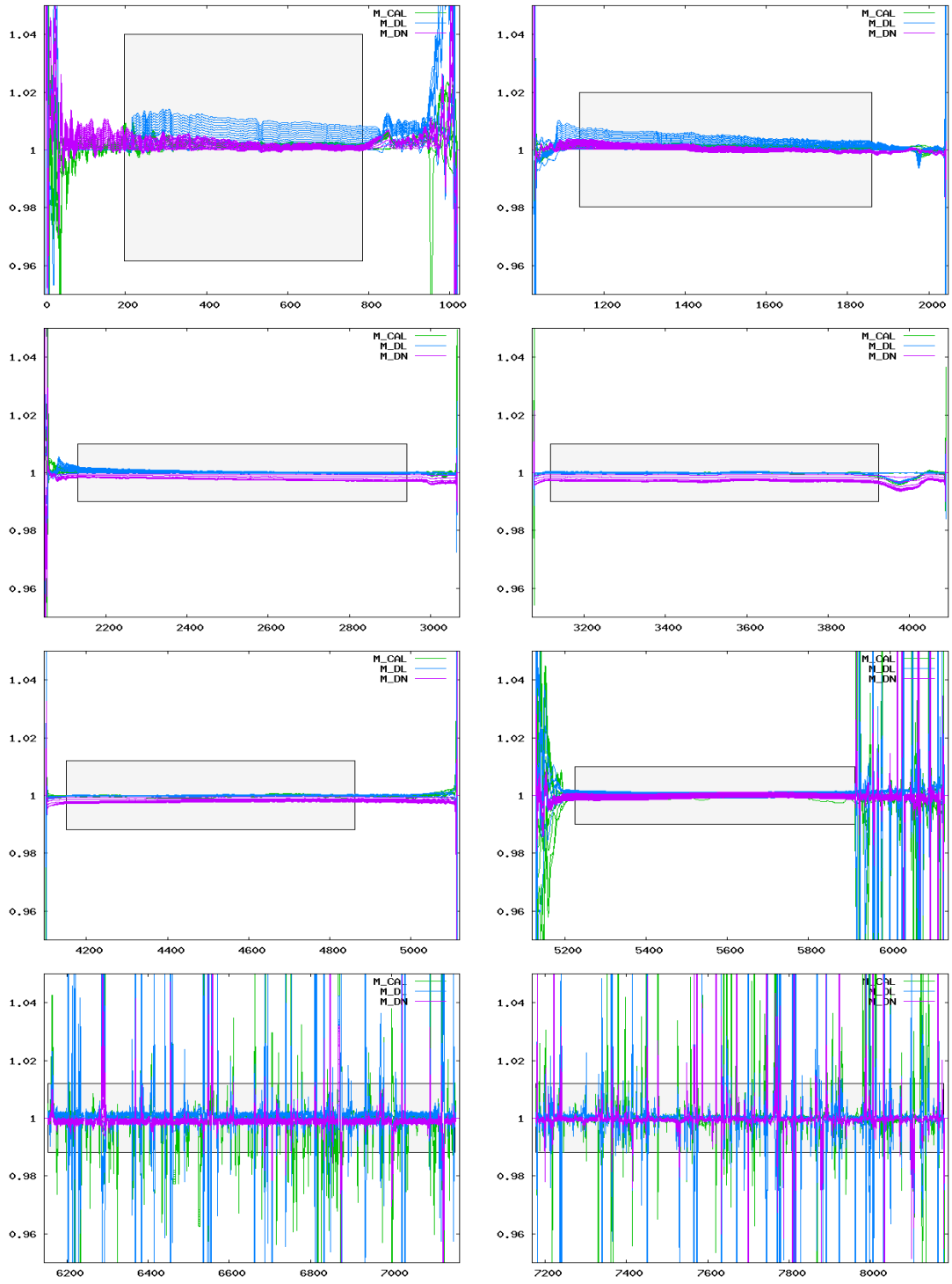

Figure 1: Ratio of delivered m-factors (01 Dec 2009– 14 Dec 2009) to the corresponding m-factor of the previous delivery day (30 Nov 2009). The grey boxes visualize the maximum ratio allowed.