NRT M-factor delivery document 01 Nov 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: 26 Oct 2010– 01 Nov 2010
- Prediction: 02 Nov 2010– 08 Nov 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
bcf0c5dcbde48b3875e742d3997e4199	SCI_MF1_AXNIFE20101102_092627_20101025_062352_20101027_062352
51facdb1fce677a1e14051b11dbb6611	SCI_MF1_AXNIFE20101102_092627_20101026_054411_20101028_054411
e445e90524f39ab51b9a426f43368359	SCI_MF1_AXNIFE20101102_092627_20101027_064739_20101029_064739
0cbb28bd3c6aac1416dfdb30dd04845b	SCI_MF1_AXNIFE20101102_092627_20101028_061054_20101030_061054
bd485400fc730597d1218e02d7036002	SCI_MF1_AXNIFE20101102_092627_20101029_053408_20101031_053408
d2db3355653bf763e2abc557e4007802	SCI_MF1_AXNIFE20101102_092627_20101030_063737_20101101_063737
c332445a65f268231b2f65b55cca4d0e	SCI_MF1_AXNIFE20101102_092627_20101031_060051_20101102_060051
fda99ab0a76e65f87562c978955d87c3	SCI_MF1_AXNIFE20101102_092627_20101101_052406_20101103_052406
c0e7d221a061fc1001957fc471de67d9	SCI_MF1_AXNIFE20101102_092627_20101102_062734_20101104_062734
bde49b69ca17308d932bd335bba43e32	SCI_MF1_AXNIFE20101102_092627_20101103_055049_20101105_055049
86005f94d410e16c009d5ebff2ec139c	SCI_MF1_AXNIFE20101102_092627_20101104_065417_20101106_065417
484e4672f7a55be583818681f7911fd7	SCI_MF1_AXNIFE20101102_092627_20101105_061732_20101107_061732
0abdc8a6d60c63a10f0a79eaffdf6b24	SCI_MF1_AXNIFE20101102_092627_20101106_054046_20101108_054046
890d4ee68f530414bc7a4279dcfaa9a2	SCI_MF1_AXNIFE20101102_092627_20101107_064415_20101205_064415

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

validity identifier	M_CAL	M_DL	M_DN
20101025_062352_20101027_062352	interp.	interp.	interp.
20101026_054411_20101028_054411	meas.	meas.	interp.
20101027_064739_20101029_064739	meas.	meas.	interp.
20101028_061054_20101030_061054	meas.	meas.	meas.
20101029_053408_20101031_053408	meas.	meas.	pred.
20101030_063737_20101101_063737	pred.	meas.	pred.
20101031_060051_20101102_060051	pred.	meas.	pred.
20101101_052406_20101103_052406	pred.	pred.	pred.
20101102_062734_20101104_062734	pred.	pred.	pred.
20101103_055049_20101105_055049	pred.	pred.	pred.
20101104_065417_20101106_065417	pred.	pred.	pred.
20101105_061732_20101107_061732	pred.	pred.	pred.
20101106_054046_20101108_054046	pred.	pred.	pred.
20101107_064415_20101205_064415	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	1.0094	1.0182	1.0170	1.0000	1.0087	1.0051	1.0400	OK
2	1.0026	1.0065	1.0108	0.9987	1.0025	1.0006	1.0200	OK
3	1.0018	1.0033	1.0071	0.9989	1.0010	0.9952	1.0100	OK
4	1.0027	1.0016	1.0091	0.9987	1.0007	0.9933	1.0100	OK
5	1.0059	1.0030	1.0104	0.9973	0.9996	0.9924	1.0120	OK
6	1.0016	1.0032	1.0070	0.9994	1.0001	0.9949	1.0100	OK
7	1.0010	1.0014	1.0056	–	–	–	1.0070	OK
8	1.0070	1.0070	1.0068	–	–	–	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 25 Oct 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101025_123817_20101025_062352_20101027_062352` .

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

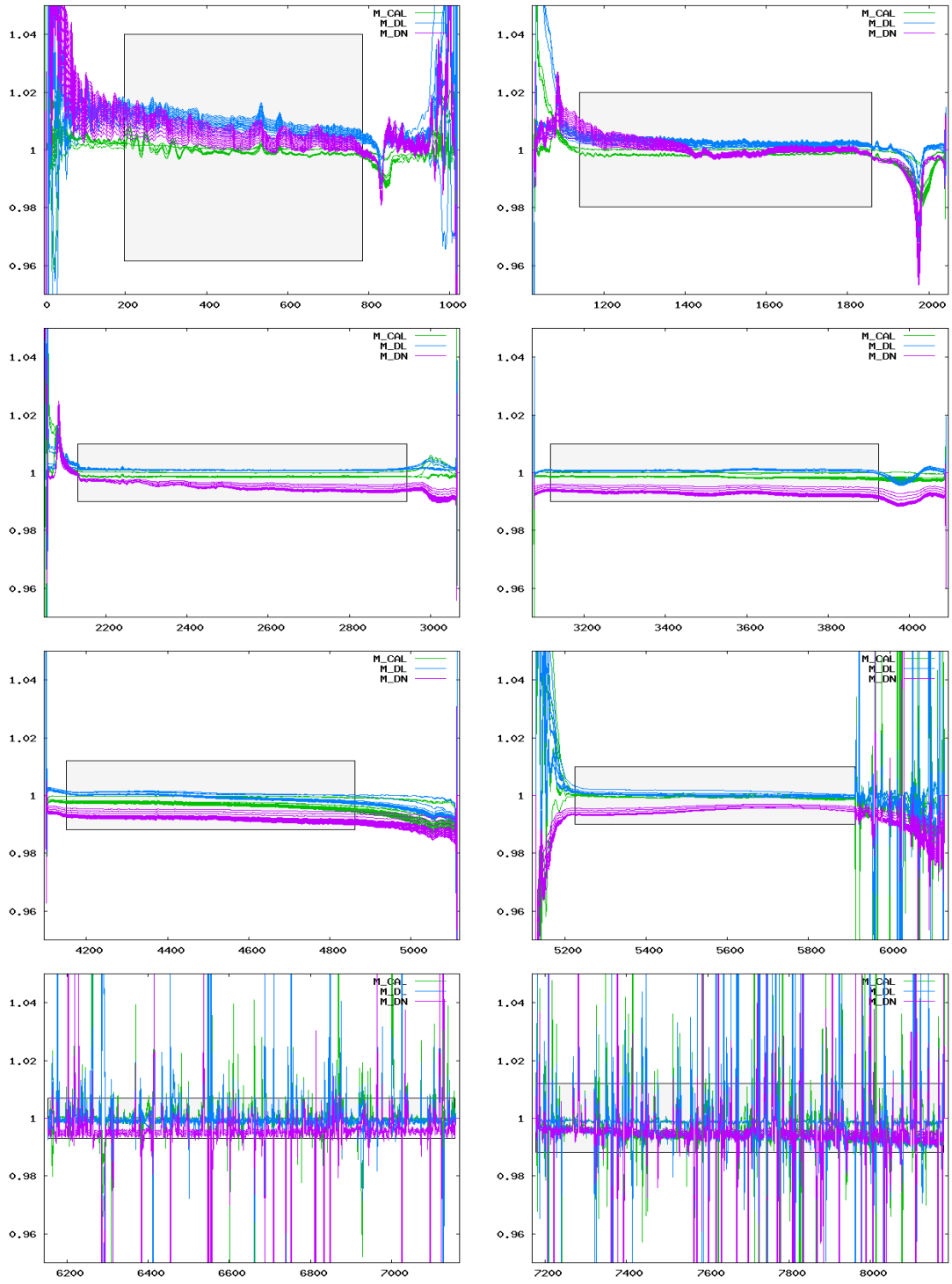

Figure 1: Ratio of delivered m-factors (26 Oct 2010– 08 Nov 2010) to the corresponding m-factor of the previous delivery day (25 Oct 2010). The grey boxes visualize the maximum ratio allowed.