

NRT M-factor delivery document

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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: 09 Nov 2010– 15 Nov 2010
- Prediction: 16 Nov 2010– 22 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
e53302b9ea8a92f901e0b58ad8768	SCI_MF1_AXNIFE20101116_092558_20101109_185235_20101111_185235
7343264514e01b64b31e56ec4d7e49d8	SCI_MF1_AXNIFE20101116_092558_20101110_181549_20101112_181549
2da7d7d6c7a5f4827e632792c13bf323	SCI_MF1_AXNIFE20101116_092558_20101111_191918_20101113_191918
c96f87d4fc78246948dcdfce72ca074b	SCI_MF1_AXNIFE20101116_092558_20101112_184232_20101114_184232
3be2ff36bcf7f2dfb19a21f4f6e0aef5	SCI_MF1_AXNIFE20101116_092558_20101113_194601_20101115_194601
660bfb06463a8d25a1a88052bec67bb7	SCI_MF1_AXNIFE20101116_092558_20101114_190915_20101116_190915
392af9574ff319b3111f4bc1e43d07bf	SCI_MF1_AXNIFE20101116_092558_20101115_183230_20101117_183230
7fcb5921742820b8b00166efdb1b3251	SCI_MF1_AXNIFE20101116_092558_20101116_193558_20101118_193558
b4c1c0a70c82f5b8541728bef354f9f6	SCI_MF1_AXNIFE20101116_092558_20101117_185913_20101119_185913
d19e73347f0809fb749a7bc634b8cc1e	SCI_MF1_AXNIFE20101116_092558_20101118_182227_20101120_182227
f798bbc2d4fffe1e381fec580f9fd5b7	SCI_MF1_AXNIFE20101116_092558_20101119_192556_20101121_192556
289b056a8a3b64855e14453e8e006830	SCI_MF1_AXNIFE20101116_092558_20101120_184910_20101122_184910
fc1aabb9d63607c9a5cedbd17eb5a6dd	SCI_MF1_AXNIFE20101116_092558_20101121_181225_20101123_181225
68885665364247681b73f01baedc189a	SCI_MF1_AXNIFE20101116_092558_20101122_191553_20101220_191553

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

validity identifier	M.CAL	M.DL	M.DN
20101109_185235_20101111_185235	meas.	meas.	meas.
20101110_181549_20101112_181549	meas.	meas.	interp.
20101111_191918_20101113_191918	meas.	meas.	interp.
20101112_184232_20101114_184232	meas.	meas.	interp.
20101113_194601_20101115_194601	meas.	meas.	meas.
20101114_190915_20101116_190915	meas.	meas.	pred.
20101115_183230_20101117_183230	meas.	meas.	pred.
20101116_193558_20101118_193558	pred.	pred.	pred.
20101117_185913_20101119_185913	pred.	pred.	pred.
20101118_182227_20101120_182227	pred.	pred.	pred.
20101119_192556_20101121_192556	pred.	pred.	pred.
20101120_184910_20101122_184910	pred.	pred.	pred.
20101121_181225_20101123_181225	pred.	pred.	pred.
20101122_191553_20101220_191553	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. SCIA-MACHY 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			limit	status
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN		
1	1.0078	1.0462	1.0234	0.9980	0.9946	0.9980	1.0500	OK
2	1.0008	1.0022	1.0062	1.0001	1.0004	1.0009	1.0200	OK
3	1.0004	1.0017	1.0051	1.0000	1.0000	1.0038	1.0100	OK
4	1.0007	1.0005	1.0055	0.9998	0.9999	1.0048	1.0100	OK
5	1.0014	1.0015	1.0060	0.9997	0.9993	1.0050	1.0120	OK
6	1.0011	1.0013	1.0076	0.9999	0.9995	1.0059	1.0100	OK
7	1.0006	1.0010	1.0060	–	–	–	1.0070	OK
8	1.0015	1.0008	1.0032	–	–	–	1.0120	OK

certain limit l :

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \quad (1)$$

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 08 Nov 2010, therefore M_{t_0} is taken from the m-factor file SCI MF1 AXNIFE20101109_135846_20101108_192920_20101110_192920 .

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 Slijkhuis, 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

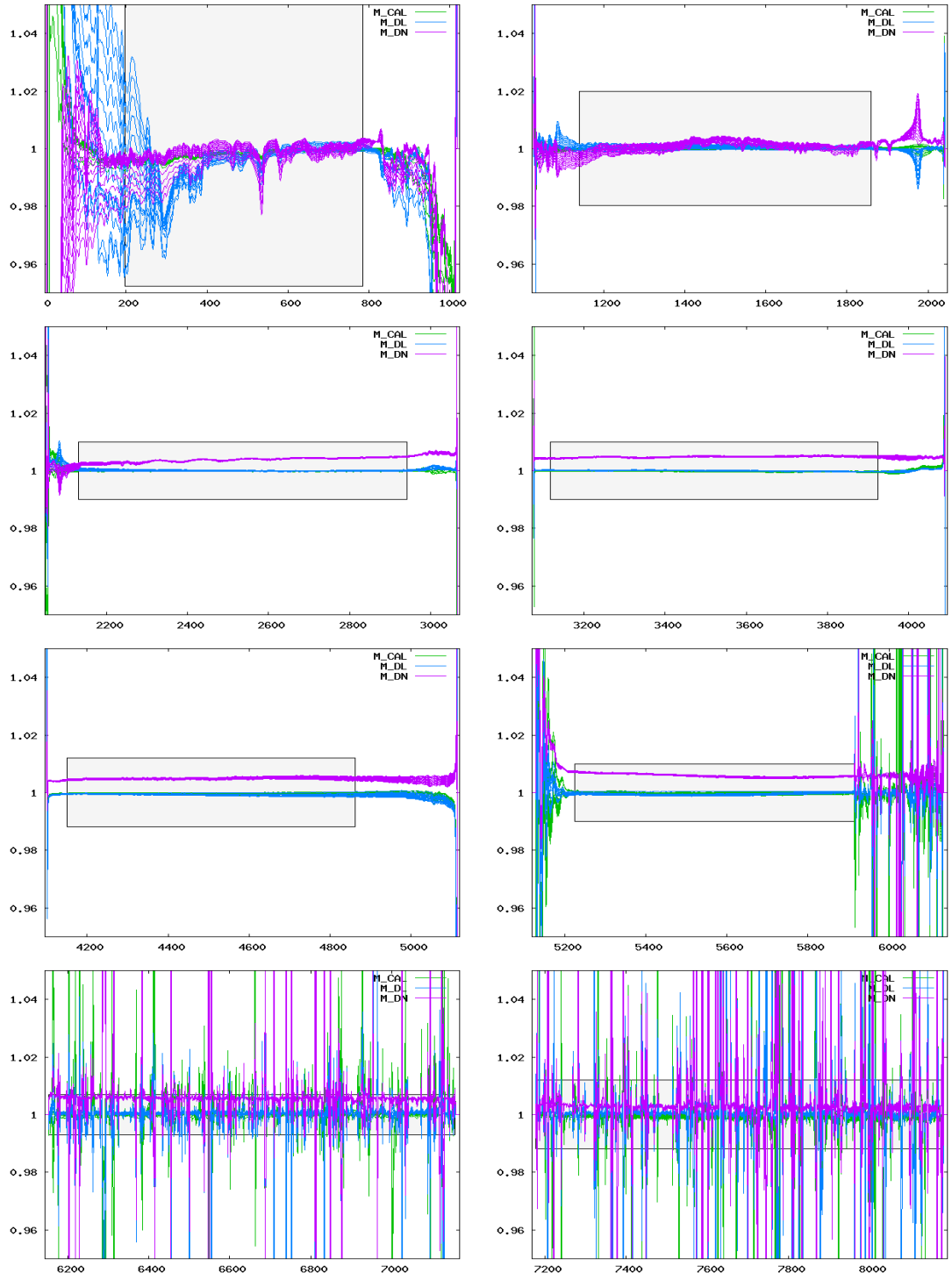


Figure 1: Ratio of delivered m-factors (09 Nov 2010– 22 Nov 2010) to the corresponding m-factor of the previous delivery day (08 Nov 2010). The grey boxes visualize the maximum ratio allowed.