

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: 19 Jul 2011– 25 Jul 2011
- Prediction: 26 Jul 2011– 01 Aug 2011

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
a9cfcc864d3a4c8c28e39f1a9f64aab50	SCI_MF1_AXNIFE20110726_070624_20110719_181057_20110721_181057
a9fdb3684ff45810d4b4c83a49ab378c	SCI_MF1_AXNIFE20110726_070624_20110720_191425_20110722_191425
e80bf0210d39e9aa86071944b16b948b	SCI_MF1_AXNIFE20110726_070624_20110721_183740_20110723_183740
6bf9802b84fe48555659dd2119d232ce	SCI_MF1_AXNIFE20110726_070624_20110722_194108_20110724_194108
623904796a045111863204ab247ccb28	SCI_MF1_AXNIFE20110726_070624_20110723_190423_20110725_190423
245cd8ad8f6efa3309ec95f8d71d87d0	SCI_MF1_AXNIFE20110726_070624_20110724_182738_20110726_182738
91dc968d8e93278bded03811610cc43a	SCI_MF1_AXNIFE20110726_070624_20110725_193106_20110727_193106
f79150f6809cde9cec5d3f1655629e44	SCI_MF1_AXNIFE20110726_070624_20110726_185420_20110728_185420
8d4c9171526e916310370294852f82b9	SCI_MF1_AXNIFE20110726_070624_20110727_181735_20110729_181735
5dbf409f02b305e188bcc80e6923f681	SCI_MF1_AXNIFE20110726_070624_20110728_192103_20110730_192103
36a623d08a2d46c0d27ed90164ad0b28	SCI_MF1_AXNIFE20110726_070624_20110729_184418_20110731_184418
064ae6e1d186db7fb3c4027aeac3176e	SCI_MF1_AXNIFE20110726_070624_20110730_180733_20110801_180733
a859be7ec4b37b7d223e17656cf6499	SCI_MF1_AXNIFE20110726_070624_20110731_191101_20110802_191101
9c0d9c5432738e9a1ce79a7cb3ac7a0d	SCI_MF1_AXNIFE20110726_070624_20110801_183416_20110829_183416

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

validity identifier	M_CAL	M_DL	M_DN
20110719_181057_20110721_181057	interp.	interp.	interp.
20110720_191425_20110722_191425	meas.	meas.	interp.
20110721_183740_20110723_183740	meas.	meas.	interp.
20110722_194108_20110724_194108	interp.	meas.	interp.
20110723_190423_20110725_190423	meas.	meas.	meas.
20110724_182738_20110726_182738	meas.	meas.	pred.
20110725_193106_20110727_193106	meas.	meas.	pred.
20110726_185420_20110728_185420	pred.	pred.	pred.
20110727_181735_20110729_181735	pred.	pred.	pred.
20110728_192103_20110730_192103	pred.	pred.	pred.
20110729_184418_20110731_184418	pred.	pred.	pred.
20110730_180733_20110801_180733	pred.	pred.	pred.
20110731_191101_20110802_191101	pred.	pred.	pred.
20110801_183416_20110829_183416	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	1.0349	1.0056	1.0260	1.0034	0.9978	0.9898	1.0400	OK
2	1.0032	1.0028	1.0075	1.0012	0.9990	0.9972	1.0200	OK
3	1.0010	1.0018	1.0021	1.0001	0.9997	0.9996	1.0100	OK
4	1.0012	1.0010	1.0011	1.0004	1.0001	1.0002	1.0100	OK
5	1.0020	1.0012	1.0026	1.0009	1.0004	1.0008	1.0120	OK
6	1.0011	1.0007	1.0014	1.0003	1.0002	1.0005	1.0100	OK
7	1.0003	1.0006	1.0010	—	—	—	1.0070	OK
8	1.0027	1.0035	1.0027	—	—	—	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 18 Jul 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110719_072245_20110718_184742_20110720_184742 .

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

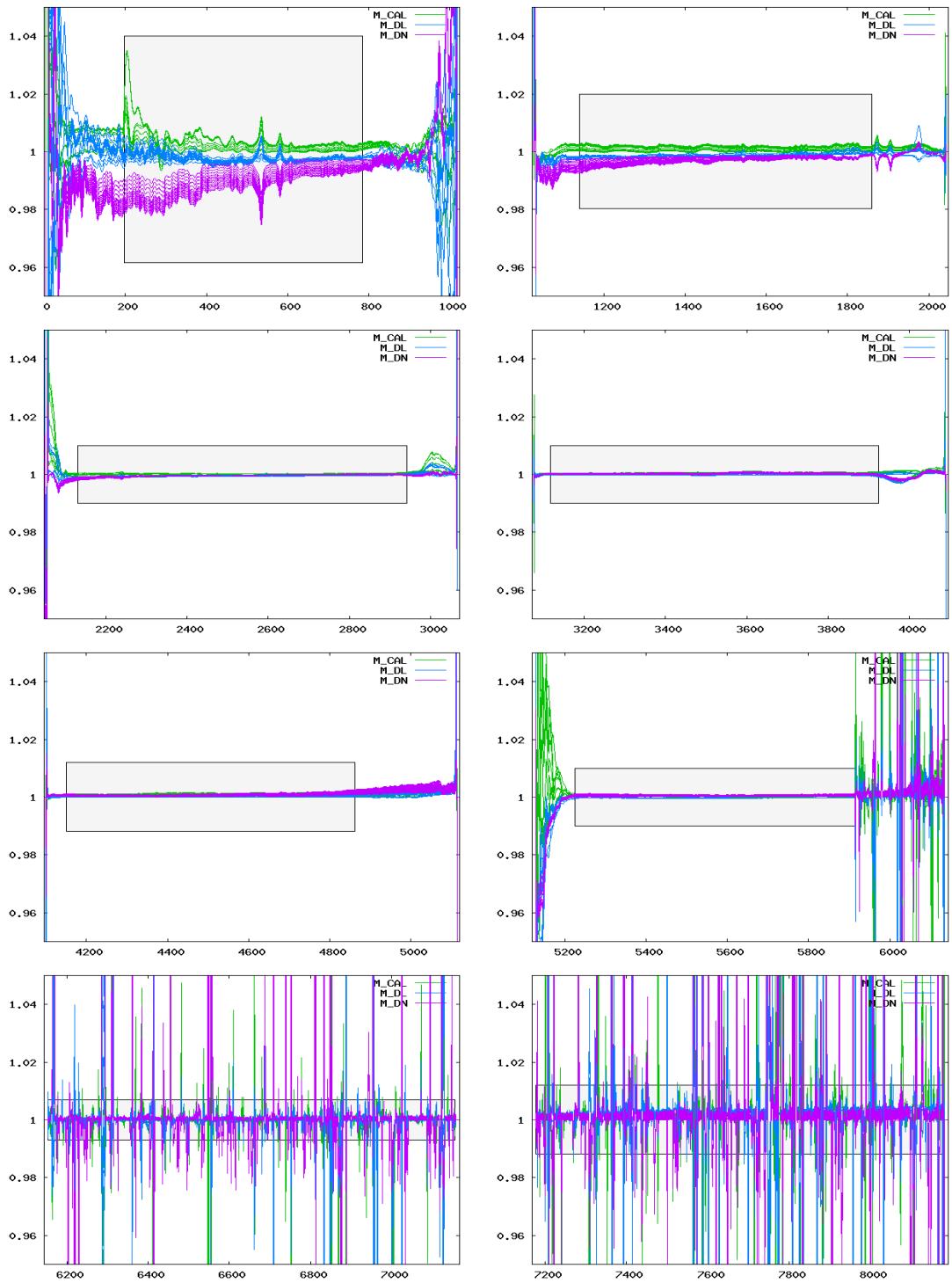


Figure 1: Ratio of delivered m-factors (19 Jul 2011–01 Aug 2011) to the corresponding m-factor of the previous delivery day (18 Jul 2011). The grey boxes visualize the maximum ratio allowed.