

# 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: 03 May 2011– 09 May 2011
- Prediction: 10 May 2011– 16 May 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
e2c804ea0563a93cd04107c5c300d32a	SCI_MF1_AXNIFE20110510_035830_20110503_183448_20110505_183448
46b7ea2c7b7249356b98a1b336f25f60	SCI_MF1_AXNIFE20110510_035830_20110504_193817_20110506_193817
8dacb04200e4b28485acb86a8f77751c	SCI_MF1_AXNIFE20110510_035830_20110505_190131_20110507_190131
8d71f36065380b0b6491efd9365ad1a3	SCI_MF1_AXNIFE20110510_035830_20110506_182446_20110508_182446
b57d69e2f26e937a6dd3005d89761864	SCI_MF1_AXNIFE20110510_035830_20110507_192814_20110509_192814
eff3a32dcf6f59459d724fc149b09651	SCI_MF1_AXNIFE20110510_035830_20110508_185129_20110510_185129
e389c7a6cc62401ead307197930be9fc	SCI_MF1_AXNIFE20110510_035830_20110509_181443_20110511_181443
9bb8c8d8785dcb11b5a0fad750730dd	SCI_MF1_AXNIFE20110510_035830_20110510_191812_20110512_191812
caa4ca535ac5bd1caf08f5d7e3808da0	SCI_MF1_AXNIFE20110510_035830_20110511_184126_20110513_184126
864561351da39f07551082d9bcdd1726	SCI_MF1_AXNIFE20110510_035830_20110512_194455_20110514_194455
e43c726a8ba955401ffa317647a6b95c	SCI_MF1_AXNIFE20110510_035830_20110513_190809_20110515_190809
cc26f48307543f1f82fd54d937975cae	SCI_MF1_AXNIFE20110510_035830_20110514_183124_20110516_183124
ba9e52b7207f6cdaa5e049c93cf4bb79	SCI_MF1_AXNIFE20110510_035830_20110515_193452_20110517_193452
fd8176c5f1076a5ae826b4fd201d1446	SCI_MF1_AXNIFE20110510_035830_20110516_185807_20110613_185807

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

validity identifier	M.CAL	M.DL	M.DN
20110503_183448_20110505_183448	meas.	meas.	interp.
20110504_193817_20110506_193817	meas.	meas.	interp.
20110505_190131_20110507_190131	meas.	meas.	interp.
20110506_182446_20110508_182446	meas.	meas.	meas.
20110507_192814_20110509_192814	interp.	meas.	pred.
20110508_185129_20110510_185129	meas.	meas.	pred.
20110509_181443_20110511_181443	pred.	meas.	pred.
20110510_191812_20110512_191812	pred.	pred.	pred.
20110511_184126_20110513_184126	pred.	pred.	pred.
20110512_194455_20110514_194455	pred.	pred.	pred.
20110513_190809_20110515_190809	pred.	pred.	pred.
20110514_183124_20110516_183124	pred.	pred.	pred.
20110515_193452_20110517_193452	pred.	pred.	pred.
20110516_185807_20110613_185807	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	1.0118	1.0359	1.0211	0.9974	0.9854	0.9949	1.0400	OK
2	1.0024	1.0185	1.0060	0.9995	0.9944	0.9985	1.0200	OK
3	1.0008	1.0054	1.0045	1.0000	0.9988	0.9975	1.0100	OK
4	1.0011	1.0011	1.0051	0.9999	0.9994	0.9962	1.0100	OK
5	1.0021	1.0026	1.0075	0.9992	0.9991	0.9958	1.0120	OK
6	1.0016	1.0019	1.0054	1.0004	0.9997	0.9969	1.0100	OK
7	1.0007	1.0013	1.0050	—	—	—	1.0070	OK
8	1.0014	1.0033	1.0067	—	—	—	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 02 May 2011, therefore  $M_{t_0}$  is taken from the m-factor file `SCI MF1 AXNIFE20110503.051904_20110502.191134_20110504.191134` .

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

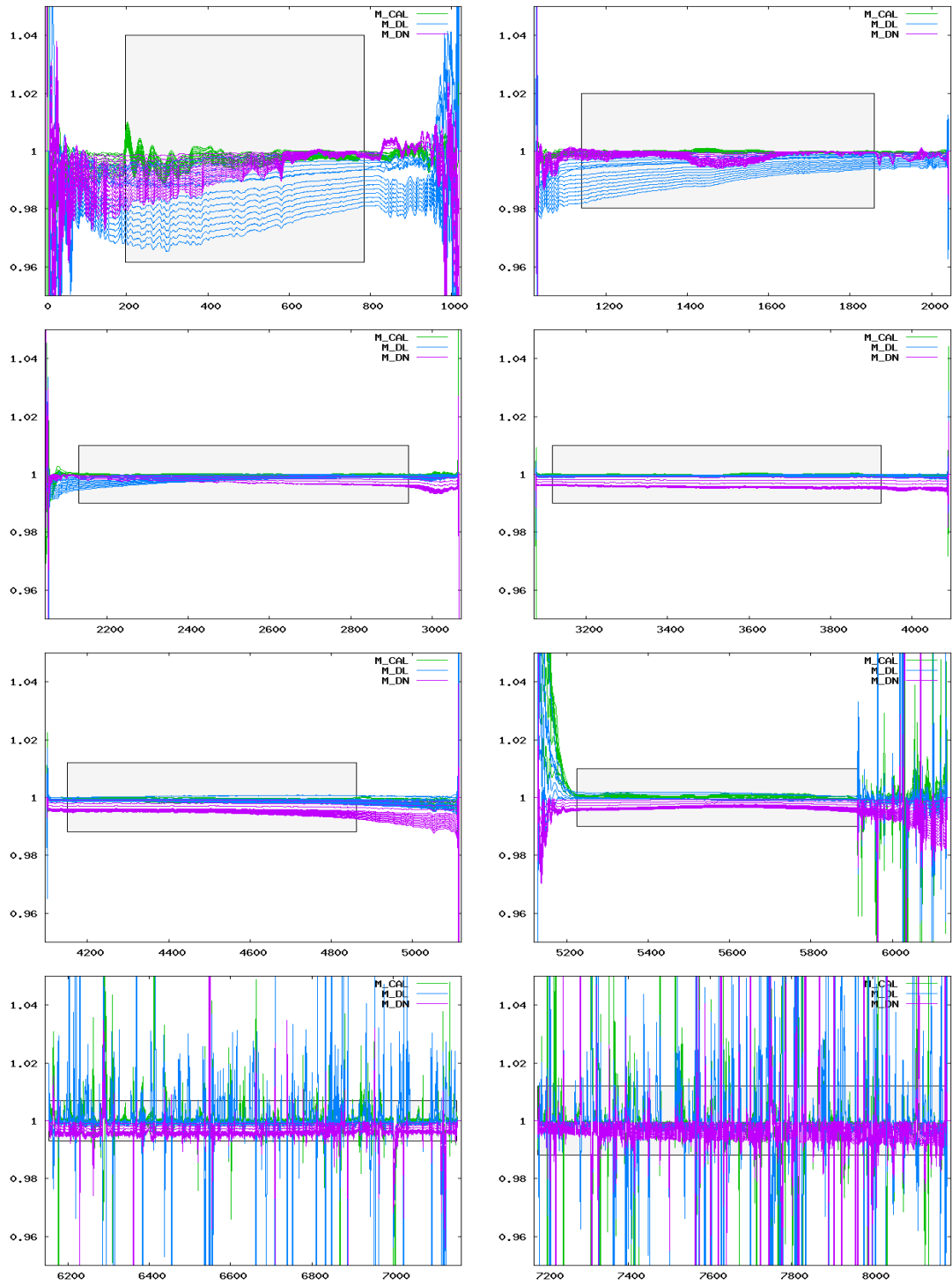


Figure 1: Ratio of delivered m-factors (03 May 2011– 16 May 2011) to the corresponding m-factor of the previous delivery day (02 May 2011). The grey boxes visualize the maximum ratio allowed.