

# 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 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: 29 Jul 2008– 04 Aug 2008
- Prediction: 05 Aug 2008– 11 Aug 2008

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
d8a28a030a7ae34ac811d0dbf79371e8	SCI_MF1_AXNIFE20080804_215634_20080729_181642_20080731_181642
1ed119a0aad15147614e10d214fb6c15	SCI_MF1_AXNIFE20080804_215634_20080730_192541_20080801_192541
4a16d5f7aa9ec4bfa1dadbb14f9e0adb8	SCI_MF1_AXNIFE20080804_215634_20080731_185404_20080802_185404
b5fd37d098d4b325ae1f11ff21c3128b	SCI_MF1_AXNIFE20080804_215634_20080801_182227_20080803_182227
e6d70643b683be23024d2341a23ffa0c	SCI_MF1_AXNIFE20080804_215634_20080802_193126_20080804_193126
e3034872bf864970cea80c15a223db68	SCI_MF1_AXNIFE20080804_215634_20080803_185949_20080805_185949
29adf13c493c4ace461d6700359afbb1	SCI_MF1_AXNIFE20080804_215634_20080804_182812_20080806_182812
0def26b32c045f6a9582c4dcf4a08571	SCI_MF1_AXNIFE20080804_215634_20080805_193711_20080807_193711
288957e02c49edd73689a5c61eb8cf7c	SCI_MF1_AXNIFE20080804_215634_20080806_190534_20080808_190534
d89599e32e7583702c02443baf8c8a2b	SCI_MF1_AXNIFE20080804_215634_20080807_183357_20080809_183357
6aa8ec0473f88d258400942bd828ceb1	SCI_MF1_AXNIFE20080804_215634_20080808_194256_20080810_194256
51a29966546355ced978f7eb1669fbb7	SCI_MF1_AXNIFE20080804_215634_20080809_191119_20080811_191119
6aa420ea10a42dcf48478c626881df94	SCI_MF1_AXNIFE20080804_215634_20080810_183942_20080812_183942
dd18a92f958d61f74f66d7634247ac85	SCI_MF1_AXNIFE20080804_215634_20080811_194841_20080908_194841

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

validity identifier	M.CAL	M.DL	M.DN
20080729_181642_20080731_181642	meas.	meas.	meas.
20080730_192541_20080801_192541	meas.	meas.	interp.
20080731_185404_20080802_185404	meas.	meas.	interp.
20080801_182227_20080803_182227	meas.	meas.	interp.
20080802_193126_20080804_193126	meas.	meas.	meas.
20080803_185949_20080805_185949	meas.	meas.	pred.
20080804_182812_20080806_182812	pred.	pred.	pred.
20080805_193711_20080807_193711	pred.	pred.	pred.
20080806_190534_20080808_190534	pred.	pred.	pred.
20080807_183357_20080809_183357	pred.	pred.	pred.
20080808_194256_20080810_194256	pred.	pred.	pred.
20080809_191119_20080811_191119	pred.	pred.	pred.
20080810_183942_20080812_183942	pred.	pred.	pred.
20080811_194841_20080908_194841	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	1.0028	1.0077	1.0074	1.0006	1.0016	0.9979	1.0400	OK
2	1.0023	1.0038	1.0019	1.0007	1.0009	0.9996	1.0200	OK
3	1.0006	1.0011	1.0019	1.0001	1.0001	0.9999	1.0100	OK
4	1.0007	1.0006	1.0019	1.0000	1.0001	1.0002	1.0100	OK
5	1.0018	1.0011	1.0031	1.0002	0.9997	1.0007	1.0120	OK
6	1.0016	1.0014	1.0020	0.9998	0.9993	1.0006	1.0100	OK
7	0.9991	0.9994	0.9998	–	–	–	1.0070	OK
8	1.0003	1.0016	1.0029	–	–	–	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 28 Jul 2008, therefore  $M_{t_0}$  is taken from the m-factor file `SCI MF1 AXNIFE20080728.215444_20080728.184819.20080730.184819`.

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

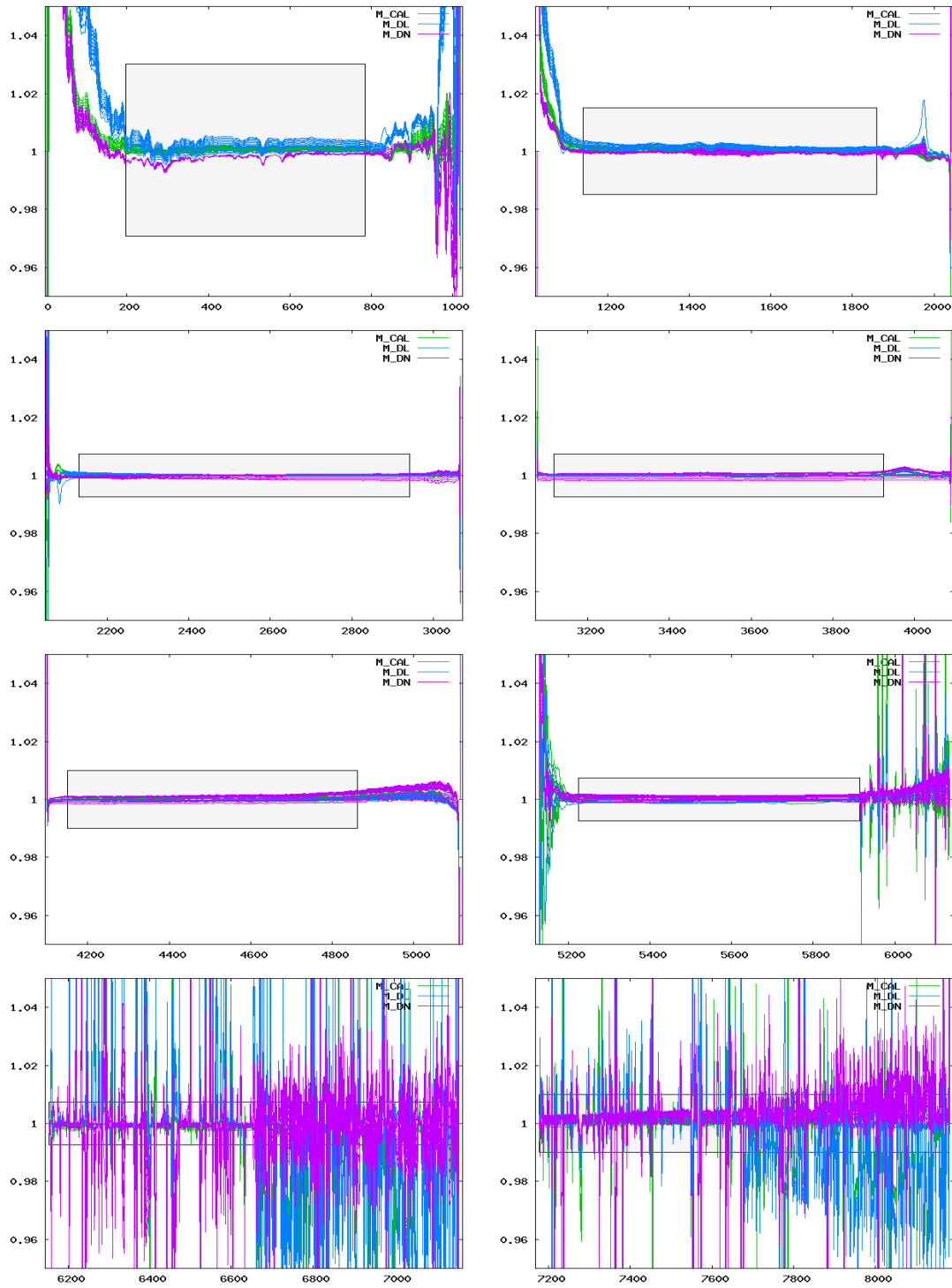


Figure 1: Ratio of delivered m-factors (29 Jul 2008– 11 Aug 2008) to the corresponding m-factor of the previous delivery day (28 Jul 2008). The grey boxes visualize the maximum ratio allowed.