

# 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: 03 Jun 2008– 09 Jun 2008
- Prediction: 10 Jun 2008– 16 Jun 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
e5eb4fac77f425138f618a316f12a68a	SCI_MF1_AXNIFE20080609_215756_20080603_191704_20080605_191704
60644abdd2b4729a52fa27a747d25aaa	SCI_MF1_AXNIFE20080609_215756_20080604_184527_20080606_184527
7e74f29fb3160a6c48fa81d1a4d0d3e1	SCI_MF1_AXNIFE20080609_215756_20080605_181350_20080607_181350
038c4145f65c1133143c56858e1f8eb9	SCI_MF1_AXNIFE20080609_215756_20080606_192249_20080608_192249
173723df7f47030039dbf3654c1d4066	SCI_MF1_AXNIFE20080609_215756_20080607_185112_20080609_185112
16bfefd01fa78d40c59b29647cf9de1c	SCI_MF1_AXNIFE20080609_215756_20080608_181935_20080610_181935
b89f105b45bc2da51299ae30ac8b5e69	SCI_MF1_AXNIFE20080609_215756_20080609_192834_20080611_192834
9d9eea91c119813bcd01705877558084	SCI_MF1_AXNIFE20080609_215756_20080610_185657_20080612_185657
ce0c17192813e73c90312b173c556021	SCI_MF1_AXNIFE20080609_215756_20080611_182520_20080613_182520
66f56df310a3a6f15b662cd984faf18f	SCI_MF1_AXNIFE20080609_215756_20080612_193419_20080614_193419
ceb72bd17f05f2dbe4cb8b09a9db1a1b	SCI_MF1_AXNIFE20080609_215756_20080613_190242_20080615_190242
e64bf08048d2e87f1e96743f90708e48	SCI_MF1_AXNIFE20080609_215756_20080614_183105_20080616_183105
b1d58b842e9b9b744fa9e105d6dba603	SCI_MF1_AXNIFE20080609_215756_20080615_194004_20080617_194004
a8d7e41d18d58a161084803ff362d839	SCI_MF1_AXNIFE20080609_215756_20080616_190827_20080714_190827

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

validity identifier	M.CAL	M.DL	M.DN
20080603_191704_20080605_191704	meas.	meas.	interp.
20080604_184527_20080606_184527	meas.	meas.	meas.
20080605_181350_20080607_181350	meas.	meas.	interp.
20080606_192249_20080608_192249	meas.	meas.	interp.
20080607_185112_20080609_185112	meas.	meas.	interp.
20080608_181935_20080610_181935	meas.	meas.	meas.
20080609_192834_20080611_192834	meas.	pred.	pred.
20080610_185657_20080612_185657	pred.	pred.	pred.
20080611_182520_20080613_182520	pred.	pred.	pred.
20080612_193419_20080614_193419	pred.	pred.	pred.
20080613_190242_20080615_190242	pred.	pred.	pred.
20080614_183105_20080616_183105	pred.	pred.	pred.
20080615_194004_20080617_194004	pred.	pred.	pred.
20080616_190827_20080714_190827	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	1.0120	1.0106	1.0010	1.0034	1.0025	1.0400	OK
2	1.0019	1.0045	1.0036	1.0008	1.0015	1.0013	1.0200	OK
3	1.0007	1.0017	1.0019	1.0003	1.0003	1.0012	1.0100	OK
4	1.0009	1.0005	1.0019	1.0002	1.0002	1.0013	1.0100	OK
5	1.0016	1.0011	1.0014	1.0000	1.0000	1.0004	1.0120	OK
6	1.0015	1.0014	1.0011	1.0003	1.0003	1.0004	1.0100	OK
7	0.9999	0.9984	0.9999	–	–	–	1.0070	OK
8	1.0003	0.9998	1.0000	–	–	–	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 Jun 2008, therefore  $M_{t_0}$  is taken from the m-factor file `SCI MF1 AXNIFE20080602.215450_20080602.194841_20080604_194841` .

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

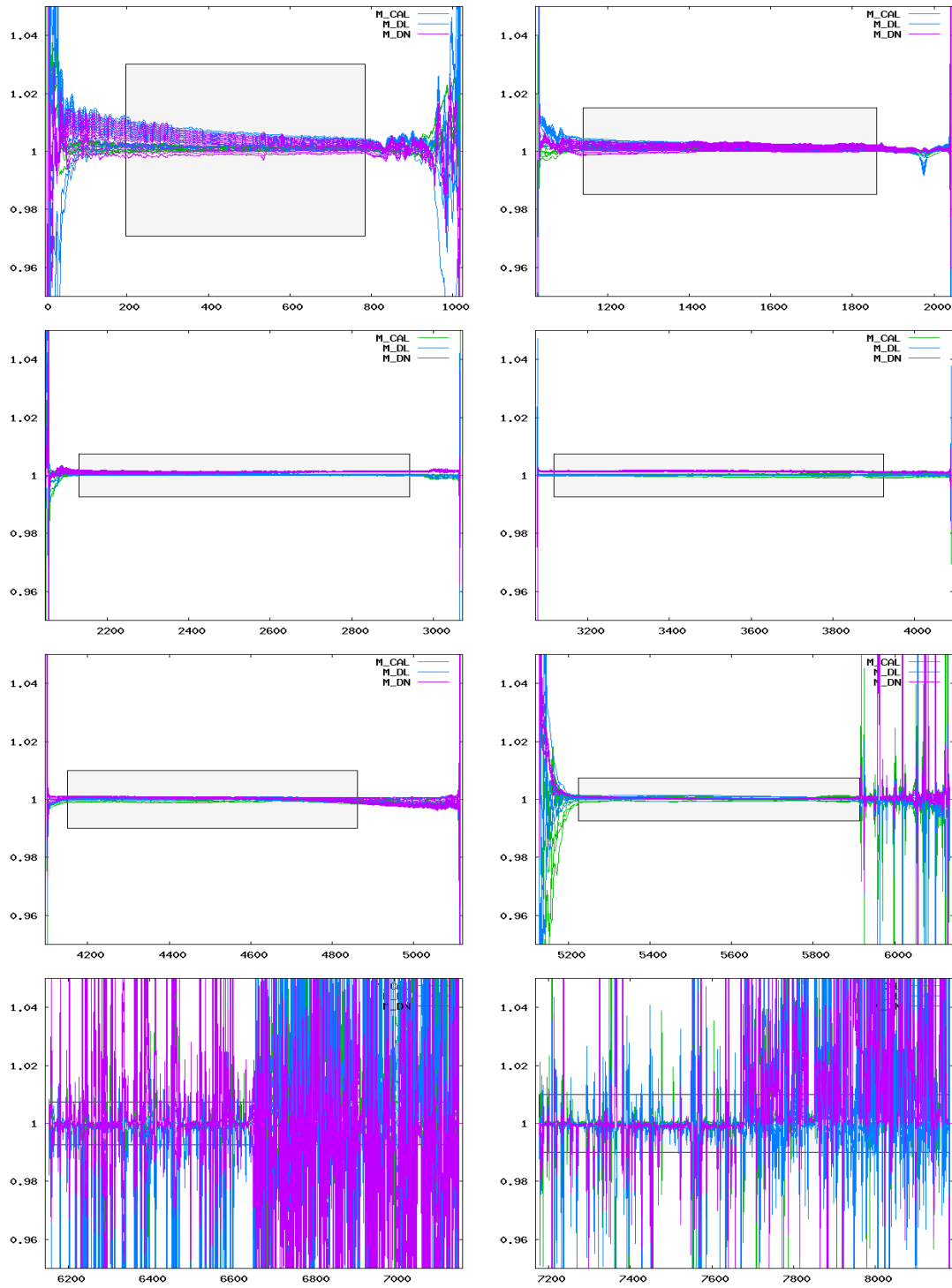


Figure 1: Ratio of delivered m-factors (03 Jun 2008– 16 Jun 2008) to the corresponding m-factor of the previous delivery day (02 Jun 2008). The grey boxes visualize the maximum ratio allowed.