

# 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: 09 Sep 2008– 15 Sep 2008
- Prediction: 16 Sep 2008– 22 Sep 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
a7056494b54e617587cf4d2aa518e284	SCI_MF1_AXNIFE20081014_093737_20080909_193711_20080911_193711
c93db8f9834d7e762948322a993aa	SCI_MF1_AXNIFE20081014_093737_20080910_190534_20080912_190534
4d1a7f007321861d235d783a6d74def8	SCI_MF1_AXNIFE20081014_093737_20080911_183357_20080913_183357
affdd4bd24cf3d379183d23ca51d20ee	SCI_MF1_AXNIFE20081014_093737_20080912_194256_20080914_194256
fa1675443fe7a525019340ff8ac88ec9	SCI_MF1_AXNIFE20081014_093737_20080913_191119_20080915_191119
1cc26f35a8f73d53aa2f6472f0381f20	SCI_MF1_AXNIFE20081014_093737_20080914_183942_20080916_183942
efc9cba145f4b238e0586e52d81af7de	SCI_MF1_AXNIFE20081014_093737_20080915_194841_20080917_194841
763befd606bf3f2a502cdeed91ca5a2	SCI_MF1_AXNIFE20081014_093737_20080916_191704_20080918_191704
842dc92ecb8e2b68bf9809729b6cae58	SCI_MF1_AXNIFE20081014_093737_20080917_184527_20080919_184527
dc086e0eae45f0f3fc2654bfa4f1faa7	SCI_MF1_AXNIFE20081014_093737_20080918_181350_20080920_181350
0e5d6a6b14da1fcb9a236d839c20031c	SCI_MF1_AXNIFE20081014_093737_20080919_192249_20080921_192249
b1dbec7b4979f33da05ef9d6e436c4f6	SCI_MF1_AXNIFE20081014_093737_20080920_185112_20080922_185112
e6966b11d5a582a6f5bff2330cc4d20f	SCI_MF1_AXNIFE20081014_093737_20080921_181935_20080923_181935
f99fcc71f2b43979c9037747d3018da6	SCI_MF1_AXNIFE20081014_093737_20080922_192834_20081020_192834

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

validity identifier	M.CAL	M.DL	M.DN
20080909_193711_20080911_193711	meas.	meas.	interp.
20080910_190534_20080912_190534	meas.	meas.	interp.
20080911_183357_20080913_183357	meas.	meas.	interp.
20080912_194256_20080914_194256	meas.	meas.	meas.
20080913_191119_20080915_191119	meas.	meas.	interp.
20080914_183942_20080916_183942	interp.	meas.	meas.
20080915_194841_20080917_194841	meas.	meas.	pred.
20080916_191704_20080918_191704	pred.	pred.	pred.
20080917_184527_20080919_184527	pred.	pred.	pred.
20080918_181350_20080920_181350	pred.	pred.	pred.
20080919_192249_20080921_192249	pred.	pred.	pred.
20080920_185112_20080922_185112	pred.	pred.	pred.
20080921_181935_20080923_181935	pred.	pred.	pred.
20080922_192834_20081020_192834	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	1.0099	1.0096	1.0093	1.0002	1.0028	1.0035	1.0400	OK
2	1.0015	1.0036	1.0054	1.0004	1.0009	1.0017	1.0200	OK
3	1.0006	1.0008	1.0021	0.9999	1.0001	0.9992	1.0100	OK
4	1.0004	1.0004	1.0022	0.9999	1.0001	0.9985	1.0100	OK
5	1.0009	1.0012	1.0017	0.9999	0.9997	0.9993	1.0120	OK
6	1.0009	1.0018	1.0013	1.0004	1.0000	1.0001	1.0100	OK
7	1.0000	1.0000	0.9987	–	–	–	1.0070	OK
8	1.0011	1.0021	1.0001	–	–	–	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 Sep 2008, therefore  $M_{t_0}$  is taken from the m-factor file `SCI MF1 AXNIFE20081014.093110_20080908.182812.20080910.182812` .

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

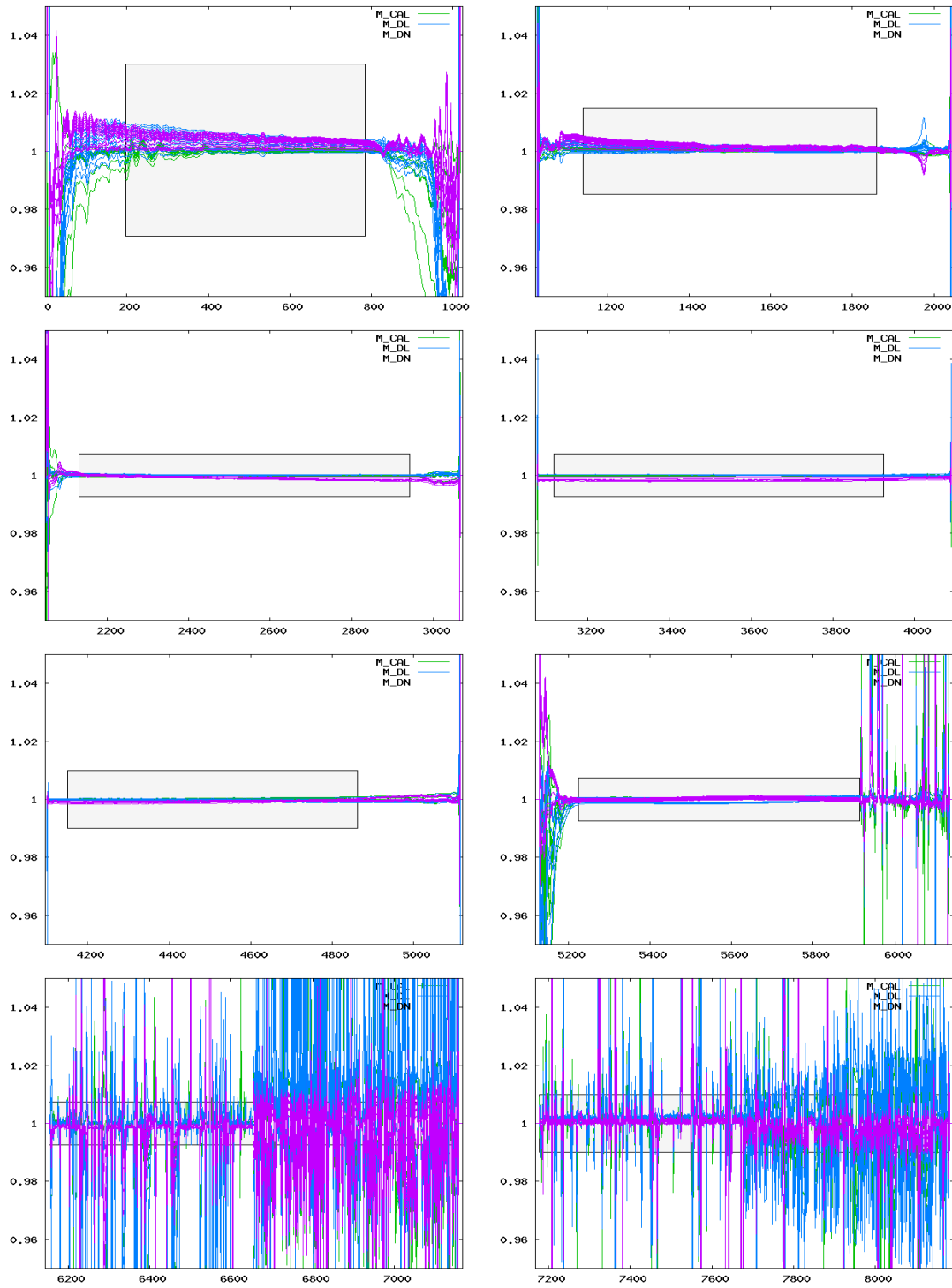


Figure 1: Ratio of delivered m-factors (09 Sep 2008– 22 Sep 2008) to the corresponding m-factor of the previous delivery day (08 Sep 2008). The grey boxes visualize the maximum ratio allowed.