

# NRT M-factor delivery document

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Klaus Bramstedt, ife Bremen

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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: 08 Dec 2009– 14 Dec 2009
- Prediction: 15 Dec 2009– 21 Dec 2009

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
2cfe5c67674903995e1e06cc76f6760a	SCI_MF1_AXNIFE20091214_225431_20091208_193710_20091210_193710
aa679aa60c899f0ad6b04e5f70b03cf8	SCI_MF1_AXNIFE20091214_225431_20091209_190533_20091211_190533
d0fad73c4d8b58144031905f461fe09d	SCI_MF1_AXNIFE20091214_225431_20091210_183356_20091212_183356
787752e23a6bb08089a92026ce8ddf5a	SCI_MF1_AXNIFE20091214_225431_20091211_194255_20091213_194255
cabfa6f3c32b37265765ec6ded1eeb52	SCI_MF1_AXNIFE20091214_225431_20091212_191118_20091214_191118
7b33d19601cc74910688c968a03626ca	SCI_MF1_AXNIFE20091214_225431_20091213_183941_20091215_183941
2bab7c85fee62d045bd3887d020072b5	SCI_MF1_AXNIFE20091214_225431_20091214_194840_20091216_194840
6df47836fdc844332c5d4d47e9593a55	SCI_MF1_AXNIFE20091214_225431_20091215_191703_20091217_191703
4f6c0df71f3d88cc5644ece41c4757f2	SCI_MF1_AXNIFE20091214_225431_20091216_184526_20091218_184526
c54c31cdd8ac7068c40f50731f2d5bc1	SCI_MF1_AXNIFE20091214_225431_20091217_181349_20091219_181349
53aeefde83882a6d8c90272c50315e74	SCI_MF1_AXNIFE20091214_225431_20091218_192248_20091220_192248
c146a5a41456f2f2829a9637e4408710	SCI_MF1_AXNIFE20091214_225431_20091219_185111_20091221_185111
14bfec2c181bf218f7af884928dc6d6	SCI_MF1_AXNIFE20091214_225431_20091220_181934_20091222_181934
bdee4fb1e057116adc435dec55d3c305	SCI_MF1_AXNIFE20091214_225431_20091221_192833_20100118_192833

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

validity identifier	M.CAL	M.DL	M.DN
20091208_193710_20091210_193710	meas.	meas.	meas.
20091209_190533_20091211_190533	meas.	meas.	interp.
20091210_183356_20091212_183356	meas.	meas.	interp.
20091211_194255_20091213_194255	meas.	meas.	interp.
20091212_191118_20091214_191118	meas.	meas.	meas.
20091213_183941_20091215_183941	meas.	meas.	pred.
20091214_194840_20091216_194840	meas.	pred.	pred.
20091215_191703_20091217_191703	pred.	pred.	pred.
20091216_184526_20091218_184526	pred.	pred.	pred.
20091217_181349_20091219_181349	pred.	pred.	pred.
20091218_192248_20091220_192248	pred.	pred.	pred.
20091219_185111_20091221_185111	pred.	pred.	pred.
20091220_181934_20091222_181934	pred.	pred.	pred.
20091221_192833_20100118_192833	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	1.0046	1.0144	1.0049	1.0007	1.0056	0.9991	1.0400	OK
2	1.0024	1.0085	1.0022	1.0009	1.0030	1.0004	1.0200	OK
3	1.0004	1.0018	1.0017	0.9999	1.0003	1.0006	1.0100	OK
4	1.0012	1.0013	1.0022	0.9999	1.0001	1.0010	1.0100	OK
5	1.0013	1.0019	1.0016	1.0003	1.0007	1.0006	1.0120	OK
6	1.0013	1.0012	1.0019	0.9997	1.0004	1.0003	1.0100	OK
7	1.0005	1.0014	1.0027	–	–	–	1.0070	OK
8	1.0014	1.0037	1.0040	–	–	–	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 07 Dec 2009, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20091207\_225521\_20091207\_182811\_20091209\_182811 .

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

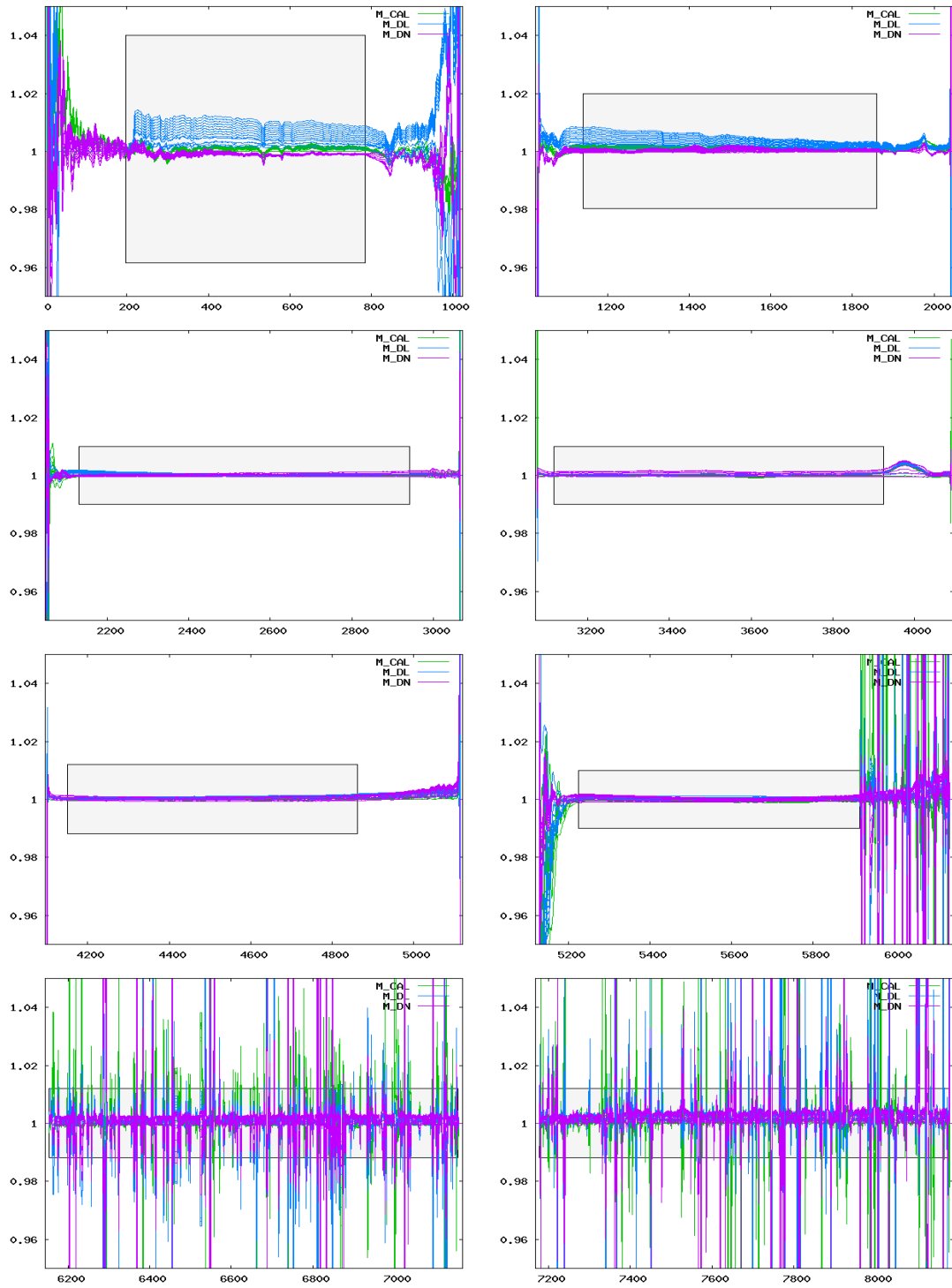


Figure 1: Ratio of delivered m-factors (08 Dec 2009– 21 Dec 2009) to the corresponding m-factor of the previous delivery day (07 Dec 2009). The grey boxes visualize the maximum ratio allowed.