

# NRT M-factor delivery document

## 29 Aug 2011

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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: 23 Aug 2011– 29 Aug 2011
- Prediction: 30 Aug 2011– 05 Sep 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
9b6fb614b893b07b972a14dbd149f5f7	SCI_MF1_AXNIFE20110830_073032_20110823_182727_20110825_182727
7b9e2fc63cb0c4ca5bb28c24cfddd5dc	SCI_MF1_AXNIFE20110830_073032_20110824_193055_20110826_193055
61195fc22e20d75ca64b04170ff1f6d6	SCI_MF1_AXNIFE20110830_073032_20110825_185410_20110827_185410
49f41b2ffc8959b6ff8308cf334293c8	SCI_MF1_AXNIFE20110830_073032_20110826_181724_20110828_181724
a22e0b6c07816ee08d18cb5b2c4fc2e9	SCI_MF1_AXNIFE20110830_073032_20110827_192052_20110829_192052
61a56611b3c6827362c3d91908525123	SCI_MF1_AXNIFE20110830_073032_20110828_184407_20110830_184407
c15c45dee302b9694f4fe6e7eb7296eb	SCI_MF1_AXNIFE20110830_073032_20110829_180722_20110831_180722
600688d878e3ba1dce59a78a5cc95dec	SCI_MF1_AXNIFE20110830_073032_20110830_191050_20110901_191050
1811e9191f051a4cdb3358f8e97756b2	SCI_MF1_AXNIFE20110830_073032_20110831_183405_20110902_183405
d913aee20d647bcc2d8cc45e3ea36029	SCI_MF1_AXNIFE20110830_073032_20110901_193733_20110903_193733
f4b7448876a6fc10f1759cc444cff364	SCI_MF1_AXNIFE20110830_073032_20110902_190048_20110904_190048
ca558c7f3137edd8f666475e18f1cd3e	SCI_MF1_AXNIFE20110830_073032_20110903_182402_20110905_182402
964e65d41d84cd282166f4e43d5a9b74	SCI_MF1_AXNIFE20110830_073032_20110904_192730_20110906_192730
f316f52bc866990e43ffadf53e9c8a4f	SCI_MF1_AXNIFE20110830_073032_20110905_185045_20111003_185045

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

validity identifier	M.CAL	M.DL	M.DN
20110823_182727_20110825_182727	meas.	meas.	interp.
20110824_193055_20110826_193055	meas.	meas.	interp.
20110825_185410_20110827_185410	meas.	meas.	meas.
20110826_181724_20110828_181724	interp.	meas.	interp.
20110827_192052_20110829_192052	meas.	meas.	interp.
20110828_184407_20110830_184407	meas.	meas.	interp.
20110829_180722_20110831_180722	meas.	meas.	meas.
20110830_191050_20110901_191050	pred.	pred.	pred.
20110831_183405_20110902_183405	pred.	pred.	pred.
20110901_193733_20110903_193733	pred.	pred.	pred.
20110902_190048_20110904_190048	pred.	pred.	pred.
20110903_182402_20110905_182402	pred.	pred.	pred.
20110904_192730_20110906_192730	pred.	pred.	pred.
20110905_185045_20111003_185045	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	1.0048	1.0140	1.0467	0.9986	0.9947	1.0060	1.0600	OK
2	1.0010	1.0054	1.0049	0.9998	0.9978	0.9988	1.0200	OK
3	1.0007	1.0022	1.0034	0.9997	0.9992	0.9983	1.0100	OK
4	1.0008	1.0006	1.0016	0.9998	0.9999	0.9994	1.0100	OK
5	1.0008	1.0008	1.0011	0.9999	0.9999	1.0000	1.0120	OK
6	1.0013	1.0015	1.0016	1.0005	1.0004	1.0007	1.0100	OK
7	1.0005	1.0014	1.0008	–	–	–	1.0070	OK
8	1.0066	1.0084	1.0024	–	–	–	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 22 Aug 2011, therefore  $M_{t_0}$  is taken from the m-factor file SCI MF1 AXNIFE20110823.074427\_20110822.190412.20110824.190412 .

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

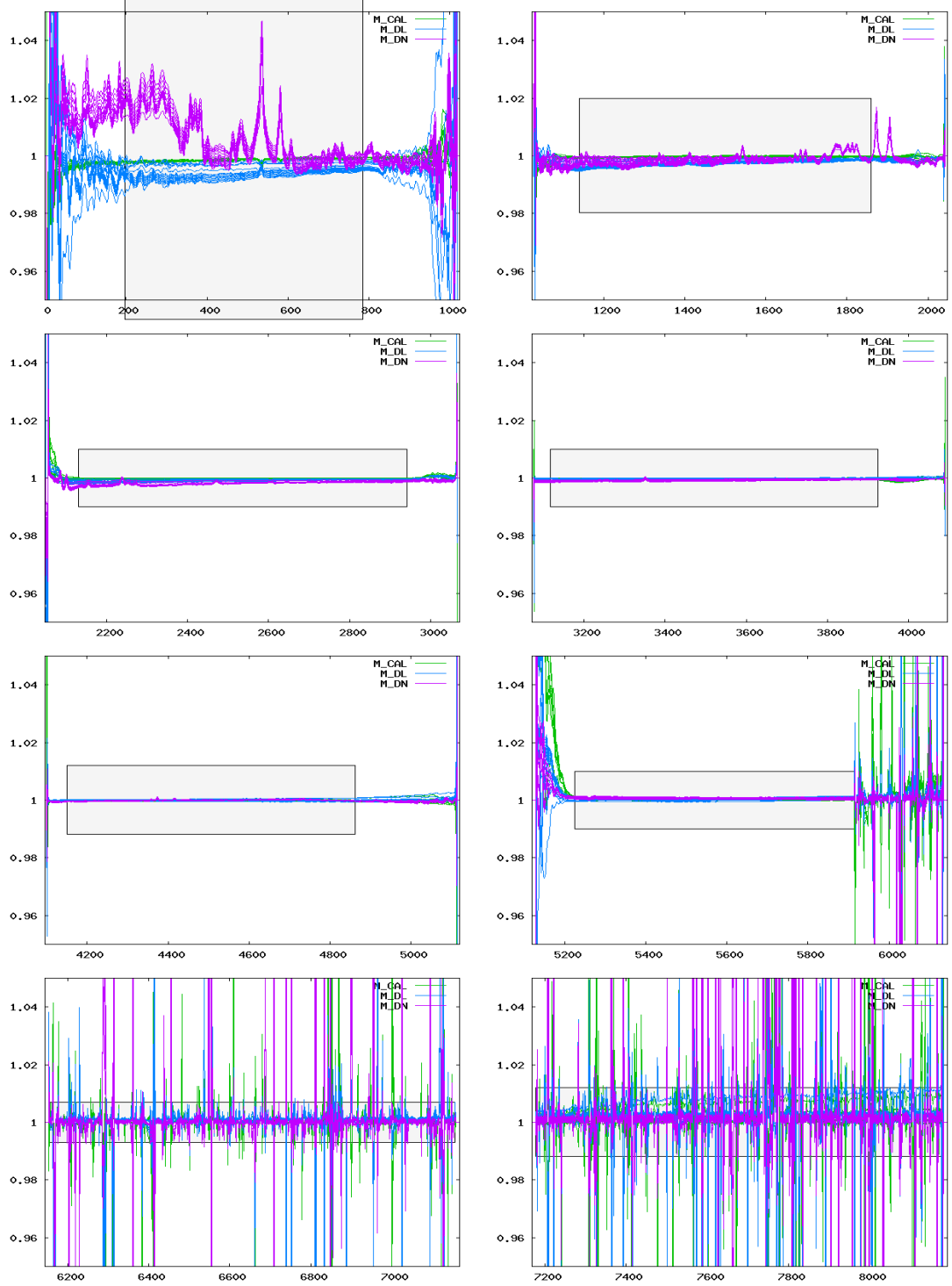


Figure 1: Ratio of delivered m-factors (23 Aug 2011– 05 Sep 2011) to the corresponding m-factor of the previous delivery day (22 Aug 2011). The grey boxes visualize the maximum ratio allowed.