# NRT M-factor delivery document 16 Aug 2010

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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: 10 Aug 2010– 16 Aug 2010
- Prediction: 17 Aug 2010–23 Aug 2010

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			
MGD-SUM 142bd84d8d33ed38467e570c735e8d5c c2ee4127260a163b9592ec81b1b760a0 f65ffa9745432fd87f148aa792ecd347 36bfdd70d95bad2f874713ae82b1fe48 1804c0cb8839cd6ef2f2bfb60553b751 83fc698c09868525f6478f6b58867fc4 c8686f6132d994802bb11e89bd67410e ef4ec3b0b8100d17fefcad3550f17c6f 97a18b8aac3a231c1764228a0791a12d cca29be9ff9af32639e500c9e90fe35f e2806f4dcaeb00863141d7150a5356c4 3e1edae90056a4943953b8284775319e bba35695408e3348d653da5abfe44a5b	m-factor auxiliary file SCI_MF1_AXNIFE20100817_034300_20100810_193710_20100812_193710 SCI_MF1_AXNIFE20100817_034300_20100811_190533_20100813_190533 SCI_MF1_AXNIFE20100817_034300_20100812_183356_20100814_183356 SCI_MF1_AXNIFE20100817_034300_20100813_194254_20100815_194254 SCI_MF1_AXNIFE20100817_034300_20100814_191117_20100816_191117 SCI_MF1_AXNIFE20100817_034300_20100815_183940_20100817_183940 SCI_MF1_AXNIFE20100817_034300_20100816_194839_20100818_194839 SCI_MF1_AXNIFE20100817_034300_20100817_191702_20100818_194839 SCI_MF1_AXNIFE20100817_034300_20100818_184525_20100820_184525 SCI_MF1_AXNIFE20100817_034300_20100819_181348_20100821_181348 SCI_MF1_AXNIFE20100817_034300_20100820_192247_20100822_192247 SCI_MF1_AXNIFE20100817_034300_20100820_192247_20100823_185110 SCI_MF1_AXNIFE20100817_034300_20100821_185110_20100823_185110			
795cffbfe0ea5cb718d6f67e65eb2e53	SCI_MF1_AXNIFE20100817_034300_20100823_192832_20100920_192832			

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

validity identifier	M_CAL	M_DL	M_DN
20100810_193710_20100812_193710	meas.	meas.	meas.
20100811_190533_20100813_190533	meas.	meas.	interp.
20100812_183356_20100814_183356	meas.	meas.	interp.
20100813_194254_20100815_194254	meas.	meas.	interp.
20100814_191117_20100816_191117	meas.	meas.	meas.
20100815_183940_20100817_183940	meas.	meas.	pred.
20100816_194839_20100818_194839	meas.	meas.	pred.
20100817_191702_20100819_191702	pred.	pred.	pred.
20100818_184525_20100820_184525	pred.	pred.	pred.
20100819_181348_20100821_181348	pred.	pred.	pred.
20100820_192247_20100822_192247	pred.	pred.	pred.
20100821_185110_20100823_185110	pred.	pred.	pred.
20100822_181933_20100824_181933	pred.	pred.	pred.
20100823_192832_20100920_192832	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 range	197 784	$\begin{array}{c} 1140 \\ 1859 \end{array}$	$2131 \\ 2943$	$3117 \\ 3925$	$\begin{array}{c} 4151 \\ 4863 \end{array}$	$5226 \\ 5914$	$6154 \\ 7157$	7178 8181

	Table 4: Content check results.									
	max. ratio (ch. $6/7$ : median)				mean rat					
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0038	1.0127	1.0239	1.0007	1.0043	0.9965	1.0400	OK		
2	1.0018	1.0058	1.0038	1.0006	1.0021	0.9997	1.0200	OK		
3	1.0005	1.0015	1.0022	0.9998	1.0003	0.9986	1.0100	OK		
4	1.0006	1.0007	1.0025	0.9998	1.0003	0.9983	1.0100	OK		
5	1.0008	1.0011	1.0016	1.0000	1.0004	0.9990	1.0120	OK		
6	1.0020	1.0017	1.0016	0.9995	1.0007	1.0004	1.0100	OK		
$\overline{7}$	1.0013	1.0014	1.0009	_	_	_	1.0070	OK		
8	1.0045	1.0061	1.0040	—	—	_	1.0120	OK		

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}}$$
 with  $M_{ratio,i} < l$  and  $\frac{1}{M_{ratio,i}} < l$  (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 09 Aug 2010, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20100810\_034223\_20100809\_182811\_20100811\_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

- Bramstedt, K, Calculation of SCIAMACHY M-Factors, *Technical note*, IFE-SCIA-TN-2007-01-CalcMFactor, Issue 1, ife Bremen, 2008.
- [2] Balzer, W, and Slijkhus, 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 (10 Aug 2010– 23 Aug 2010) to the corresponding m-factor of the previous delivery day (09 Aug 2010). The grey boxes visualize the maximum ratio allowed.