# NRT M-factor delivery document 18 Apr 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: 12 Apr 2011–18 Apr 2011
- Prediction: 19 Apr 2011–25 Apr 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			
md5-sum 1e6c3e2dc8e7aad5b2d205a68c5a1388 a57cc391b3b0d4bd597d1a87a46f9634 98bbc0999c29d68890c4ae524cef5c38 c501b06d40b9ecbdca879c1e0a93d9e9 18574b8c6658fc3a27cfcc91ceb8eacd 15dcf926c6a52d3ad7f64afd3e5da966 9eb5e344d92c60368cc7e185d0583f23 c410b11df8af922023bba027aa65e23d e07cdd1bb7f02a25396db8fa15dabbaa f900c89a0d8c2c512d6926a72819f39a ec01773e854bae65fbdf23fcc9ae5ce3 cf9741d30547145775b96fcfdbd95193	m-factor auxiliary file SCI_MF1_AXNIFE20110419_133029_20110412_194506_20110414_194506 SCI_MF1_AXNIFE20110419_133029_20110413_190820_20110415_190820 SCI_MF1_AXNIFE20110419_133029_20110415_193503_20110416_183135 SCI_MF1_AXNIFE20110419_133029_20110415_193503_20110417_193503 SCI_MF1_AXNIFE20110419_133029_20110416_185818_20110418_185818 SCI_MF1_AXNIFE20110419_133029_20110417_182132_20110419_182132 SCI_MF1_AXNIFE20110419_133029_20110418_192501_20110420_192501 SCI_MF1_AXNIFE20110419_133029_20110419_184815_20110421_184815 SCI_MF1_AXNIFE20110419_133029_20110420_181130_20110422_181130 SCI_MF1_AXNIFE20110419_133029_20110421_191458_20110423_191458 SCI_MF1_AXNIFE20110419_133029_20110422_183813_20110424_183813 SCI_MF1_AXNIFE20110419_133029_20110423_1914141_20110425_194141 SCI_MF1_AXNIFE20110419_133029_20110423_1914141_20110425_194141			
28008f666934ed787d06ab2e58126420	SCI_MF1_AXNIFE20110419_133029_20110425_182810_20110523_182810			

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

validity identifier	M_CAL	M_DL	M_DN
20110412_194506_20110414_194506	meas.	meas.	interp.
20110413_190820_20110415_190820	meas.	interp.	interp.
20110414_183135_20110416_183135	meas.	interp.	interp.
20110415_193503_20110417_193503	meas.	meas.	interp.
20110416_185818_20110418_185818	meas.	meas.	meas.
20110417_182132_20110419_182132	meas.	meas.	pred.
20110418_192501_20110420_192501	pred.	meas.	pred.
20110419_184815_20110421_184815	pred.	pred.	pred.
20110420_181130_20110422_181130	pred.	pred.	pred.
20110421_191458_20110423_191458	pred.	pred.	pred.
20110422_183813_20110424_183813	pred.	pred.	pred.
20110423_194141_20110425_194141	pred.	pred.	pred.
20110424_190456_20110426_190456	pred.	pred.	pred.
20110425_182810_20110523_182810	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	1.0080	1.0368	1.0084	0.9979	0.9851	1.0021	1.0400	OK		
2	1.0020	1.0190	1.0052	0.9996	0.9939	1.0021	1.0200	OK		
3	1.0007	1.0056	1.0022	1.0002	0.9988	1.0000	1.0100	OK		
4	1.0011	1.0013	1.0026	1.0005	0.9996	0.9986	1.0100	OK		
5	1.0013	1.0036	1.0041	1.0001	0.9988	0.9983	1.0120	OK		
6	1.0034	1.0027	1.0039	1.0013	0.9989	0.9985	1.0100	OK		
$\overline{7}$	1.0014	1.0026	1.0040	_	_	_	1.0070	OK		
8	1.0009	1.0055	1.0052	_	_	_	1.0120	OK		

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{to}}$$
 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 11 Apr 2011, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20110412\_075215\_20110411\_184137\_20110413\_184137 .

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 (12 Apr 2011– 25 Apr 2011) to the corresponding m-factor of the previous delivery day (11 Apr 2011). The grey boxes visualize the maximum ratio allowed.