# NRT M-factor delivery document 01 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: 26 Jul 2011–01 Aug 2011
- Prediction: 02 Aug 2011–08 Aug 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			
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a25d841c19a31ba1c4463e7d001b99f0	SCI_MF1_AXNIFE20110802_040246_20110726_185420_20110728_185420			
7b1f2360be99118605a9b6d8d3958943	SCI_MF1_AXNIFE20110802_040246_20110727_181735_20110730_192103			
fcfee4dba49f3959493be8dcc4f14958	SCI_MF1_AXNIFE20110802_040246_20110729_184418_20110731_184418			
42b2345ebc12a64591d665902e146997	SCI_MF1_AXNIFE20110802_040246_20110730_180733_20110801_180733			
0b6d0f05d03344ad06afe923fbac24eb	SCI_MF1_AXNIFE20110802_040246_20110731_191101_20110802_191101			
fbdf8390353b00218442d0d20ec00dfb	SCI_MF1_AXNIFE20110802_040246_20110731_191101_20110802_191101			
7692a1fb137aab4ef96d79baa2246310	SCI_MF1_AXNIFE20110802_040246_20110801_183416_20110803_183416			
7c51064223396729e1c97ea6c13025dc	SCI_MF1_AXNIFE20110802_040246_20110802_193744_20110804_193744			
f1e3910debf156f3216d3f039afff43a	SCI_MF1_AXNIFE20110802_040246_20110803_190058_20110805_190058			
ad5887b8d7aba9ec90dec6c1ee5c39b3	SCI_MF1_AXNIFE20110802_040246_20110804_182413_20110806_182413			
06c27e370b873e5d7ad5a3f2df4d820	SCI_MF1_AXNIFE20110802_040246_20110805_192741_20110807_192741			
f0b35ea95a183a10b73ed9b2672c72ac	SCI_MF1_AXNIFE20110802_040246_20110806_185056_20110808_185056			
a3087c79adeec90cc38e75f48f46bb8b	SCI_MF1_AXNIFE20110802_040246_20110807_181411_20110809_181411			
eb29471201b73e2782d222889a03df7a	SCI_MF1_AXNIFE20110802_040246_20110808_191739_20110905_191739			

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

validity identifier	M_CAL	M_DL	M_DN
20110726_185420_20110728_185420	meas.	meas.	interp.
20110727_181735_20110729_181735	meas.	meas.	meas.
20110728_192103_20110730_192103	meas.	meas.	interp.
20110729_184418_20110731_184418	meas.	meas.	interp.
20110730_180733_20110801_180733	meas.	meas.	interp.
20110731_191101_20110802_191101	meas.	meas.	meas.
20110801_183416_20110803_183416	meas.	meas.	pred.
20110802_193744_20110804_193744	pred.	pred.	pred.
20110803_190058_20110805_190058	pred.	pred.	pred.
20110804_182413_20110806_182413	pred.	pred.	pred.
20110805_192741_20110807_192741	pred.	pred.	pred.
20110806_185056_20110808_185056	pred.	pred.	pred.
20110807_181411_20110809_181411	pred.	pred.	pred.
20110808_191739_20110905_191739	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	$\begin{array}{c} 197\\784\end{array}$	$1140 \\ 1859$	$2131 \\ 2943$	$3117 \\ 3925$	$\begin{array}{c} 4151 \\ 4863 \end{array}$	$5226 \\ 5914$	$6154 \\ 7157$	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	1.0225	1.0158	1.0192	0.9998	0.9989	0.9984	1.0400	OK		
2	1.0040	1.0032	1.0028	1.0020	1.0018	1.0005	1.0200	OK		
3	1.0026	1.0024	1.0024	1.0012	1.0013	0.9989	1.0100	OK		
4	1.0017	1.0018	1.0029	1.0008	1.0011	0.9980	1.0100	OK		
5	1.0024	1.0029	1.0022	1.0011	1.0014	0.9990	1.0120	OK		
6	1.0016	1.0022	1.0018	1.0007	1.0013	1.0003	1.0100	OK		
$\overline{7}$	1.0009	1.0014	1.0020	_	_	_	1.0070	OK		
8	1.0037	1.0043	1.0030	_	—	—	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 25 Jul 2011, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20110726\_070624\_20110725\_193106\_20110727\_193106 .

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 (26 Jul 2011– 08 Aug 2011) to the corresponding m-factor of the previous delivery day (25 Jul 2011). The grey boxes visualize the maximum ratio allowed.