# NRT M-factor delivery document 11 Jan 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 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: 05 Jan 2010– 11 Jan 2010
- Prediction: 12 Jan 2010–18 Jan 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			
md5-sum d8e92862b1f3169e94c8224ad8ab7469 987747a87c0ba4025a3e4f27674d6de6 c470f17f21942f6d92c9674497cc6627 8f8dbe67a927be34095a661f995bfade d48e7d28744670048b771fbcacfbb48b 6c63dda426d73ea68e0baecc4184d62 a4b63dfecfcfcbe7f3a645916eb79d80 41d721a5477fc486d62c8506222a0857 234ffb16c6c0ce80ef4ba06611769723 9f19bf728f5e8e66aad5a55918c318c9 5bd8977e7787396b0351dfd4b6395848 482545c33bfc90e5b8b8a5b7e6eed132	m-factor auxiliary file SCI_MF1_AXNIFE20100111_225422_20100105_181641_20100107_181641 SCI_MF1_AXNIFE20100111_225422_20100106_192540_20100108_192540 SCI_MF1_AXNIFE20100111_225422_20100108_182226_20100110_182226 SCI_MF1_AXNIFE20100111_225422_20100109_193125_20100111_193125 SCI_MF1_AXNIFE20100111_225422_20100110_185948_20100112_185948 SCI_MF1_AXNIFE20100111_225422_20100111_182811_20100113_182811 SCI_MF1_AXNIFE20100111_225422_20100111_193710_20100114_193710 SCI_MF1_AXNIFE20100111_225422_20100113_190533_20100115_190533 SCI_MF1_AXNIFE20100111_225422_20100114_183356_20100116_183356 SCI_MF1_AXNIFE20100111_225422_20100115_194255_20100117_194255 SCI_MF1_AXNIFE20100111_225422_20100115_191118_20100118_191118			
7726b5d60d8bf92751fbcc473c20387c bf4bea40d992b52e425b17b961f8d559	SCI_MF1_AXNIFE20100111_225422_20100117_183941_20100119_183941 SCI_MF1_AXNIFE20100111_225422_20100118_194840_20100215_194840			

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

validity identifier	M_CAL	M_DL	M_DN
20100105_181641_20100107_181641	meas.	meas.	interp.
20100106_192540_20100108_192540	meas.	meas.	interp.
20100107_185403_20100109_185403	meas.	meas.	meas.
20100108_182226_20100110_182226	meas.	meas.	pred.
20100109_193125_20100111_193125	meas.	meas.	pred.
20100110_185948_20100112_185948	meas.	meas.	pred.
20100111_182811_20100113_182811	pred.	pred.	pred.
20100112_193710_20100114_193710	pred.	pred.	pred.
20100113_190533_20100115_190533	pred.	pred.	pred.
20100114_183356_20100116_183356	pred.	pred.	pred.
20100115_194255_20100117_194255	pred.	pred.	pred.
20100116_191118_20100118_191118	pred.	pred.	pred.
20100117_183941_20100119_183941	pred.	pred.	pred.
20100118_194840_20100215_194840	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. rat	mean ratio							
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status	
1	1.0128	1.0127	1.0075	1.0008	1.0052	0.9979	1.0400	OK	
2	1.0035	1.0103	1.0015	1.0012	1.0037	0.9999	1.0200	OK	
3	1.0010	1.0022	1.0017	0.9997	1.0004	0.9997	1.0100	OK	
4	1.0019	1.0003	1.0004	0.9993	1.0000	1.0001	1.0100	OK	
5	1.0016	1.0031	1.0019	0.9991	1.0009	1.0004	1.0120	OK	
6	1.0045	1.0018	1.0021	0.9980	1.0008	1.0007	1.0100	OK	
7	1.0033	1.0007	1.0015	_	_	_	1.0070	OK	
8	1.0011	1.0040	1.0042	_	—	_	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 04 Jan 2010, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20100104\_225441\_20100104\_184818\_20100106\_184818 .

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 (05 Jan 2010– 18 Jan 2010) to the corresponding m-factor of the previous delivery day (04 Jan 2010). The grey boxes visualize the maximum ratio allowed.