# NRT M-factor delivery document 19 Oct 2009

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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: 13 Oct 2009–19 Oct 2009
- Prediction: 20 Oct 2009-26 Oct 2009

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 125936fd76193d7a59e53cacfde97abf 3acd694c85550188ad7c481bb591f52f d4933a337f4780a74029b340064d41ce 698e4dd393e20e77e3255702b7956f1f 7bbc9cfc635448ea59cc3f8cb8e00584 13c78fad4ceef69a270c078e9aaba0b1 8c06b69cc72bf8966cb434c19b141153 5024574d4c2fc2ac069275dee8650a4f 5e877c6952654a51216ba130ddc813e6 0e236c21327c97acebe6a6e62e9f5072 f9a597b6cb0196e8d56785c81e2919fe a6de3d8f9a91fa21903a0bc505cf0883 c21761e659e54ac9968438c19cacd50	M-Iactor auxiliary file SCI_MF1_AXNIFE20091019_215801_20091013_185656_20091015_185656 SCI_MF1_AXNIFE20091019_215801_20091014_182519_20091016_182519 SCI_MF1_AXNIFE20091019_215801_20091015_193418_20091017_193418 SCI_MF1_AXNIFE20091019_215801_20091016_190241_20091018_190241 SCI_MF1_AXNIFE20091019_215801_20091018_194003_20091020_194003 SCI_MF1_AXNIFE20091019_215801_20091018_194003_20091020_194003 SCI_MF1_AXNIFE20091019_215801_20091019_190826_20091021_190826 SCI_MF1_AXNIFE20091019_215801_20091020_183649_20091022_183649 SCI_MF1_AXNIFE20091019_215801_20091021_194547_20091023_194547 SCI_MF1_AXNIFE20091019_215801_20091023_184233_20091024_191410 SCI_MF1_AXNIFE20091019_215801_20091023_184233_20091026_184233 SCI_MF1_AXNIFE20091019_215801_20091024_181056_20091026_181056 SCI_MF1_AXNIFE20091019_215801_20091025_191455_20091026_181056			
9dd6c1175ee57773b9e2f5cf2efec990	SCI_MF1_AXNIFE20091019_215801_20091026_184818_20091123_184818			

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

validity identifier	$M_{-}CAL$	M_DL	M_DN
20091013_185656_20091015_185656	meas.	meas.	pred.
20091014_182519_20091016_182519	meas.	meas.	pred.
20091015_193418_20091017_193418	pred.	meas.	pred.
20091016_190241_20091018_190241	pred.	pred.	pred.
20091017_183104_20091019_183104	pred.	pred.	pred.
20091018_194003_20091020_194003	pred.	pred.	pred.
20091019_190826_20091021_190826	pred.	pred.	pred.
20091020_183649_20091022_183649	pred.	pred.	pred.
20091021_194547_20091023_194547	pred.	pred.	pred.
20091022_191410_20091024_191410	pred.	pred.	pred.
20091023_184233_20091025_184233	pred.	pred.	pred.
20091024_181056_20091026_181056	pred.	pred.	pred.
20091025_191955_20091027_191955	pred.	pred.	pred.
20091026_184818_20091123_184818	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	1.0100	1.0126	1.0147	1.0017	1.0054	1.0050	1.0400	OK		
2	1.0032	1.0079	1.0068	1.0012	1.0029	1.0024	1.0200	OK		
3	1.0010	1.0027	1.0017	1.0002	1.0005	1.0005	1.0100	OK		
4	1.0031	1.0012	1.0007	1.0006	1.0001	1.0003	1.0100	OK		
5	1.0026	1.0007	1.0005	1.0011	1.0002	1.0001	1.0120	OK		
6	1.0050	1.0024	1.0022	1.0016	1.0011	1.0009	1.0100	OK		
$\overline{7}$	1.0008	1.0017	1.0020	_	_	_	1.0070	OK		
8	1.0014	1.0008	1.0006	_	—	—	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 12 Oct 2009, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20091012\_215420\_20091012\_192833\_20091014\_192833 .

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 (13 Oct 2009– 26 Oct 2009) to the corresponding m-factor of the previous delivery day (12 Oct 2009). The grey boxes visualize the maximum ratio allowed.