# NRT M-factor delivery document 08 Sep 2008

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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: 02 Sep 2008–08 Sep 2008
- Prediction: 09 Sep 2008–15 Sep 2008

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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e63d284724bbf16c68df02fe12400eb0	SCI_MF1_AXNIFE20081014_093110_20080902_181642_20080904_181642			
80e5a1c1087f9cbe5ad550b1db49d4aa	SCI_MF1_AXNIFE20081014_093110_20080903_192541_20080905_192541			
0fee05ff4b993faa4321c2942696e65f	SCI_MF1_AXNIFE20081014_093110_20080904_185404_20080906_185404			
24f64d3624eb79d5b9da7520c52fcfbd	SCI_MF1_AXNIFE20081014_093110_20080905_182227_20080907_182227			
0734f3c0c77f0cfc34c6797d770f895	SCI_MF1_AXNIFE20081014_093110_20080906_193126_20080908_193126			
0b87c49c5c0dc2633190f0a62276e124	SCI_MF1_AXNIFE20081014_093110_20080907_185949_20080909_185949			
5ce284e6c48dfcfc246995ae76011f39	SCI_MF1_AXNIFE20081014_093110_20080908_182812_20080910_182812			
4add338dc68ba5a496d47f798e1eddd4	SCI_MF1_AXNIFE20081014_093110_20080909_193711_20080911_193711			
da4d401076ddbed3c6a107eaa5f89d60	SCI_MF1_AXNIFE20081014_093110_20080910_190534_20080912_190534			
43dfae8aadc5b9682f2339701fe7d6c39	SCI_MF1_AXNIFE20081014_093110_20080911_183357_20080913_183357			
98fed76bcab6ac3deb270c3e0c6ba5a8	SCI_MF1_AXNIFE20081014_093110_20080913_191119_20080915_191119			
1c6fa715d8343652845fc3bd7cf1cdb2	SCI_MF1_AXNIFE20081014_093110_20080914_183942_20080916_183942			
6e8c3384e9093db66534aadeef529bb9	SCI_MF1_AXNIFE20081014_093110_20080915_194841_20081013_194841			

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

validity identifier	M_CAL	M_DL	M_DN
20080902_181642_20080904_181642	meas.	meas.	interp.
20080903_192541_20080905_192541	meas.	meas.	interp.
20080904_185404_20080906_185404	interp.	meas.	meas.
20080905_182227_20080907_182227	meas.	meas.	interp.
20080906_193126_20080908_193126	meas.	meas.	interp.
20080907_185949_20080909_185949	meas.	meas.	interp.
20080908_182812_20080910_182812	meas.	meas.	meas.
20080909_193711_20080911_193711	pred.	pred.	pred.
20080910_190534_20080912_190534	pred.	pred.	pred.
20080911_183357_20080913_183357	pred.	pred.	pred.
20080912_194256_20080914_194256	pred.	pred.	pred.
20080913_191119_20080915_191119	pred.	pred.	pred.
20080914_183942_20080916_183942	pred.	pred.	pred.
20080915_194841_20081013_194841	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 ratio						
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0058	1.0188	1.0089	1.0012	1.0061	1.0020	1.0400	OK		
2	1.0033	1.0065	1.0023	1.0008	1.0022	1.0008	1.0200	OK		
3	1.0009	1.0014	1.0014	1.0001	1.0002	1.0007	1.0100	OK		
4	1.0007	1.0009	1.0017	1.0001	1.0000	1.0010	1.0100	OK		
5	1.0007	1.0019	1.0013	1.0001	1.0008	1.0009	1.0120	OK		
6	1.0012	1.0036	1.0029	1.0002	1.0020	1.0017	1.0100	OK		
$\overline{7}$	0.9984	0.9996	1.0005	-	_	_	1.0070	OK		
8	1.0000	1.0000	1.0009	_	_	_	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 01 Sep 2008, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20080901\_215542\_20080901\_184819\_20080903\_184819 .

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 (02 Sep 2008– 15 Sep 2008) to the corresponding m-factor of the previous delivery day (01 Sep 2008). The grey boxes visualize the maximum ratio allowed.