# NRT M-factor delivery document 13 Oct 2008

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13 Oct 2008

### 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: 07 Oct 2008–13 Oct 2008
- Prediction: 14 Oct 2008–20 Oct 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.

m-factor auxiliary file			
m-factor auxiliary file SCI_MF1_AXNIFE20081014_095753_20081007_181642_20081009_181642 SCI_MF1_AXNIFE20081014_095753_20081008_192541_20081010_192541 SCI_MF1_AXNIFE20081014_095753_20081010_182227_20081011_185404 SCI_MF1_AXNIFE20081014_095753_20081011_193126_20081013_193126 SCI_MF1_AXNIFE20081014_095753_20081011_185949_20081014_185949 SCI_MF1_AXNIFE20081014_095753_20081013_182812_20081015_182812 SCI_MF1_AXNIFE20081014_095753_20081013_182812_20081015_182812 SCI_MF1_AXNIFE20081014_095753_20081014_193711_20081016_193711 SCI_MF1_AXNIFE20081014_095753_20081015_190534_20081017_190534 SCI_MF1_AXNIFE20081014_095753_20081016_183357_20081018_183357 SCI_MF1_AXNIFE20081014_095753_20081017_194256_20081019_194256 SCI_MF1_AXNIFE20081014_095753_20081017_194256_20081019_194256			
SCI_MF1_AXNIFE20081014_095753_20081018_191119_20081020_191119 SCI_MF1_AXNIFE20081014_095753_20081019_183942_20081021_183942 SCI_MF1_AXNIFE20081014_095753_20081020_194841_20081117_194841			

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

validity identifier	M_CAL	M_DL	M_DN
20081007_181642_20081009_181642	meas.	meas.	interp.
20081008_192541_20081010_192541	meas.	meas.	meas.
20081009_185404_20081011_185404	meas.	meas.	interp.
20081010_182227_20081012_182227	meas.	meas.	interp.
20081011_193126_20081013_193126	meas.	meas.	interp.
20081012_185949_20081014_185949	meas.	meas.	meas.
20081013_182812_20081015_182812	meas.	meas.	pred.
20081014_193711_20081016_193711	pred.	pred.	pred.
20081015_190534_20081017_190534	pred.	pred.	pred.
20081016_183357_20081018_183357	pred.	pred.	pred.
20081017_194256_20081019_194256	pred.	pred.	pred.
20081018_191119_20081020_191119	pred.	pred.	pred.
20081019_183942_20081021_183942	pred.	pred.	pred.
20081020_194841_20081117_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. rat	io (ch. 6/	(ch. 6/7: median) mean ratio			tio				
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0047	1.0084	1.0075	0.9999	1.0023	1.0028	1.0400	OK		
2	1.0014	1.0034	1.0036	1.0002	1.0009	1.0015	1.0200	OK		
3	1.0007	1.0014	1.0024	0.9998	0.9999	1.0011	1.0100	OK		
4	1.0007	1.0005	1.0031	0.9998	0.9999	1.0016	1.0100	OK		
5	1.0014	1.0012	1.0053	0.9997	0.9995	1.0024	1.0120	OK		
6	1.0013	1.0013	1.0039	1.0003	0.9999	1.0027	1.0100	OK		
$\overline{7}$	0.9998	0.9997	1.0011	-	_	_	1.0070	OK		
8	1.0001	1.0010	1.0023	_	—	—	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 06 Oct 2008, therefore  $M_{t_0}$  is taken from the m-factor file SCI\_MF1\_AXNIFE20081014\_095258\_20081006\_184819\_20081008\_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 (07 Oct 2008– 20 Oct 2008) to the corresponding m-factor of the previous delivery day (06 Oct 2008). The grey boxes visualize the maximum ratio allowed.