NRT M-factor delivery document 23 May 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: 17 May 2011–23 May 2011
- Prediction: 24 May 2011– 30 May 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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4b6fe1855b3bd8529d4eb38b44d1758e	SCI_MF1_AXNIFE20110524_034257_20110517_182121_20110519_182121			
69fcac88b26a076a83adb20bfd034769	SCI_MF1_AXNIFE20110524_034257_20110518_192450_20110520_192450			
e079ae9b6a75f91f768318935967f563	SCI_MF1_AXNIFE20110524_034257_20110520_181119_20110522_181119			
9aa8cb5b4d2e8c50734248c6e5fd2a4c	SCI_MF1_AXNIFE20110524_034257_20110521_191447_20110523_191447			
db15cda3b1d1ffec1cf0b88b9c401c0c	SCI_MF1_AXNIFE20110524_034257_20110522_183802_20110524_183802			
381f9e6be2dd9b56de188bf32f12f5a4	SCI_MF1_AXNIFE20110524_034257_20110523_194130_20110525_194130			
b2ccb749ff303eecdbdd4ea82620685e	SCI_MF1_AXNIFE20110524_034257_20110524_190445_20110526_190445			
08d2f28c1b8e5cb4b4295c2fc2a0c2ed	SCI_MF1_AXNIFE20110524_034257_20110525_182759_20110526_190445			
0154be0877cad38989866aa709c48652	SCI_MF1_AXNIFE20110524_034257_20110525_182759_20110527_182759			
a3b6b882ee30b96a5f7813b63920a3b7	SCI_MF1_AXNIFE20110524_034257_20110526_193128_20110528_193128			
0e20bf73a5bd23de3f025022ba7fba52	SCI_MF1_AXNIFE20110524_034257_20110526_193128_20110528_193128			
a9528a36316eb65ee3212eb7ae92daa9	SCI_MF1_AXNIFE20110524_034257_20110528_181757_20110530_181757			
9ad8538437d1069aaccc56e184654f95	SCI_MF1_AXNIFE20110524_034257_20110529_192125_20110531_192125			
da5f6c3b98d80182884f893bb700cbd4	SCI_MF1_AXNIFE20110524_034257_20110530_184440_20110627_184440			

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

validity identifier	M_CAL	M_DL	M_DN
20110517_182121_20110519_182121	meas.	meas.	interp.
20110518_192450_20110520_192450	meas.	meas.	interp.
20110519_184804_20110521_184804	meas.	meas.	interp.
20110520_181119_20110522_181119	meas.	meas.	meas.
20110521_191447_20110523_191447	meas.	meas.	pred.
20110522_183802_20110524_183802	pred.	meas.	pred.
20110523_194130_20110525_194130	pred.	meas.	pred.
20110524_190445_20110526_190445	pred.	pred.	pred.
20110525_182759_20110527_182759	pred.	pred.	pred.
20110526_193128_20110528_193128	pred.	pred.	pred.
20110527_185442_20110529_185442	pred.	pred.	pred.
20110528_181757_20110530_181757	pred.	pred.	pred.
20110529_192125_20110531_192125	pred.	pred.	pred.
20110530_184440_20110627_184440	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	1.0221	1.0156	1.0073	0.9981	0.9949	1.0011	1.0400	OK		
2	1.0014	1.0084	1.0027	1.0000	0.9986	1.0010	1.0200	OK		
3	1.0015	1.0038	1.0008	1.0000	0.9996	0.9998	1.0100	OK		
4	1.0012	1.0013	1.0016	1.0003	1.0000	0.9995	1.0100	OK		
5	1.0022	1.0018	1.0006	1.0010	1.0002	0.9998	1.0120	OK		
6	1.0019	1.0017	1.0016	1.0010	0.9995	0.9991	1.0100	OK		
$\overline{7}$	1.0017	1.0009	1.0014	_	_	_	1.0070	OK		
8	1.0052	1.0026	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 16 May 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110517_070353_20110516_185807_20110518_185807 .

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 (17 May 2011– 30 May 2011) to the corresponding m-factor of the previous delivery day (16 May 2011). The grey boxes visualize the maximum ratio allowed.