NRT M-factor delivery document 06 Jun 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: 31 May 2011–06 Jun 2011
- Prediction: 07 Jun 2011–13 Jun 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			
24aaee549d6c1fbe60d348c04baddaa1 a8d802be8ad0044a887d920ff90aa3ff 69b60514327846c52984ab6bcba594fc 14d7a4fee19fccdc0e69caea49f50a56 4fbd4d354a12890a83263fd27ec13b58	SCI_MF1_AXNIFE20110607_073101_20110531_180754_20110602_180754 SCI_MF1_AXNIFE20110607_073101_20110601_191123_20110603_191123 SCI_MF1_AXNIFE20110607_073101_20110602_183437_20110604_183437 SCI_MF1_AXNIFE20110607_073101_20110603_193806_20110605_193806 SCI_MF1_AXNIFE20110607_073101_20110604_190120_20110606_190120			
4310ff2001cdfc44498c9fc8be0a7804 21d12242898ad0b240bee4a86acd26dd 6ba27177d52c7ae657bf2399d628e2e9 fe8f47e49af28578c3bc3e449f191271 5f76a668e854f810923b2b15accac0e8 eb92cdbd5117d5b00ab19e166cf2774f 7d363efe306f31d3acd713149cfc8990 1cc6005179120d123f5b131a33c81343	SCI_MF1_AXNIFE20110607_073101_20110605_182435_20110607_182435 SCI_MF1_AXNIFE20110607_073101_20110606_192803_20110608_192803 SCI_MF1_AXNIFE20110607_073101_20110607_185118_20110609_185118 SCI_MF1_AXNIFE20110607_073101_20110608_181432_20110610_181432 SCI_MF1_AXNIFE20110607_073101_20110609_191801_20110611_191801 SCI_MF1_AXNIFE20110607_073101_20110610_184115_20110612_184115 SCI_MF1_AXNIFE20110607_073101_20110611_194444_20110613_194444 SCI_MF1_AXNIFE20110607_073101_20110611_194444_20110613_194444 SCI_MF1_AXNIFE20110607_073101_20110612_190758_20110614_190758			

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

validity identifier	M_CAL	M_DL	M_DN
20110531_180754_20110602_180754	meas.	meas.	interp.
20110601_191123_20110603_191123	meas.	meas.	meas.
20110602_183437_20110604_183437	meas.	meas.	interp.
20110603_193806_20110605_193806	meas.	meas.	interp.
20110604_190120_20110606_190120	meas.	meas.	interp.
20110605_182435_20110607_182435	meas.	meas.	meas.
20110606_192803_20110608_192803	meas.	meas.	pred.
20110607_185118_20110609_185118	pred.	pred.	pred.
20110608_181432_20110610_181432	pred.	pred.	pred.
20110609_191801_20110611_191801	pred.	pred.	pred.
20110610_184115_20110612_184115	pred.	pred.	pred.
20110611_194444_20110613_194444	pred.	pred.	pred.
20110612_190758_20110614_190758	pred.	pred.	pred.
20110613_183113_20110711_183113	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	1.0100	1.0584	1.0278	0.9965	0.9871	0.9916	1.0800	OK		
2	1.0018	1.0100	1.0067	0.9995	0.9968	0.9977	1.0200	OK		
3	1.0013	1.0031	1.0014	0.9998	0.9994	0.9997	1.0100	OK		
4	1.0012	1.0006	1.0013	0.9999	0.9998	0.9997	1.0100	OK		
5	1.0014	1.0017	1.0016	0.9998	1.0001	0.9994	1.0120	OK		
6	1.0016	1.0020	1.0012	1.0001	1.0005	1.0004	1.0100	OK		
$\overline{7}$	1.0011	1.0015	1.0003	_	_	_	1.0070	OK		
8	1.0015	1.0021	1.0015	_	—	—	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 30 May 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110531_065116_20110530_184440_20110601_184440 .

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 (31 May 2011– 13 Jun 2011) to the corresponding m-factor of the previous delivery day (30 May 2011). The grey boxes visualize the maximum ratio allowed.