NRT M-factor delivery document 30 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: 24 May 2011– 30 May 2011
- Prediction: 31 May 2011–06 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			
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03a87f5ba319b83120a31cd945276880	SCI_MF1_AXNIFE20110531_065116_20110524_190445_20110526_190445			
b6b0b441c9b34e4dd133bcfa5bd0796d	SCI_MF1_AXNIFE20110531_065116_20110525_182759_20110527_182759			
58c261e59998d705c6fa41155f4c7fc7	SCI_MF1_AXNIFE20110531_065116_20110527_185442_20110529_185442			
9b99e3ae0c1a67ef702d90f2fb513fcb	SCI_MF1_AXNIFE20110531_065116_20110528_181757_20110530_181757			
c6862808d2e6d3d99378c49420738fcd	SCI_MF1_AXNIFE20110531_065116_20110529_192125_20110531_192125			
2ebef4033aa6be0cf1f4a20643a1dd11	SCI_MF1_AXNIFE20110531_065116_20110530_184440_20110601_184440			
4722d2ac0db37ec97638e782f4e626fd	SCI_MF1_AXNIFE20110531_065116_20110530_184440_20110601_184440			
71628ca22a484afd891dd18f554c9ce0	SCI_MF1_AXNIFE20110531_065116_20110531_180754_20110602_180754			
5462461aa3d17c8e40892f7fb3395fd7	<pre>SCI_MF1_AXNIFE20110531_065116_20110601_191123_20110603_191123</pre>			
aed2a8369314662e11299425afdf85dd	SCI_MF1_AXNIFE20110531_065116_20110602_183437_20110604_183437			
dca1922d1d5245bfb7913d57daf7ec75	SCI_MF1_AXNIFE20110531_065116_20110603_193806_20110605_193806			
29511f4e5d8b6018f34ea3401dd00f8a	SCI_MF1_AXNIFE20110531_065116_20110604_190120_20110606_190120			
d0013bdfe5096ef1196cf2041b4aa046	SCI_MF1_AXNIFE20110531_065116_20110605_182435_20110607_182435			
e068a82428b9125700d81cf325719d71	SCI_MF1_AXNIFE20110531_065116_20110606_192803_20110704_192803			

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

validity identifier	$M_{-}CAL$	M_DL	M_DN
20110524_190445_20110526_190445	meas.	meas.	meas.
20110525_182759_20110527_182759	meas.	meas.	pred.
20110526_193128_20110528_193128	interp.	interp.	pred.
20110527_185442_20110529_185442	interp.	interp.	pred.
20110528_181757_20110530_181757	interp.	interp.	pred.
20110529_192125_20110531_192125	meas.	meas.	pred.
20110530_184440_20110601_184440	meas.	meas.	pred.
20110531_180754_20110602_180754	pred.	pred.	pred.
20110601_191123_20110603_191123	pred.	pred.	pred.
20110602_183437_20110604_183437	pred.	pred.	pred.
20110603_193806_20110605_193806	pred.	pred.	pred.
20110604_190120_20110606_190120	pred.	pred.	pred.
20110605_182435_20110607_182435	pred.	pred.	pred.
20110606_192803_20110704_192803	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	1.0077	1.0198	1.0133	0.9992	0.9946	0.9970	1.0400	OK	
2	1.0009	1.0099	1.0041	0.9999	0.9968	0.9994	1.0200	OK	
3	1.0011	1.0029	1.0009	1.0001	0.9995	1.0003	1.0100	OK	
4	1.0011	1.0010	1.0012	1.0001	0.9998	1.0006	1.0100	OK	
5	1.0022	1.0032	1.0011	0.9996	0.9990	1.0007	1.0120	OK	
6	1.0026	1.0014	1.0014	1.0009	1.0003	1.0006	1.0100	OK	
7	1.0009	1.0006	1.0005	_	_	_	1.0070	OK	
8	1.0015	1.0030	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 23 May 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110524_034257_20110523_194130_20110525_194130 .

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 (24 May 2011– 06 Jun 2011) to the corresponding m-factor of the previous delivery day (23 May 2011). The grey boxes visualize the maximum ratio allowed.