NRT M-factor delivery document 10 May 2010

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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: 04 May 2010– 10 May 2010
- Prediction: 11 May 2010–17 May 2010

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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2409629899937d476b30163a8d7a89a5	SCI_MF1_AXNIFE20100511_034226_20100504_191703_20100506_191703			
1a019a91038912c9e3cade5ac7b48a0d	SCI_MF1_AXNIFE20100511_034226_20100505_184526_20100507_184526			
9b53a7d13ff5c5fe75c0b1c9a0c241e1	SCI_MF1_AXNIFE20100511_034226_20100507_192247_20100509_192247			
430bf93868e761c46219c944875fb86f	SCI_MF1_AXNIFE20100511_034226_20100508_185110_20100510_185110			
f7e98cd6b90ae7f201df3e314a452b12	SCI_MF1_AXNIFE20100511_034226_20100509_181933_20100511_181933			
f4886365a97a89351e6e179bab1e47d1	SCI_MF1_AXNIFE20100511_034226_20100510_192832_20100512_192832			
988af1a2b357af21752a0d51775fe45a	SCI_MF1_AXNIFE20100511_034226_20100511_185655_20100513_185655			
f59f8df3a617070069fded7dd86d2cf4	SCI_MF1_AXNIFE20100511_034226_20100512_182518_20100514_182518			
c0508ca154fc17f5144ffd6b1e3b430c	SCI_MF1_AXNIFE20100511_034226_20100513_193417_20100515_193417			
e071f8ac8c13e360427637c449594f0b	SCI_MF1_AXNIFE20100511_034226_20100514_190240_20100516_190240			
7f2c6101c737e5f0c92073ca57a0edf0	SCI_MF1_AXNIFE20100511_034226_20100514_190240_20100516_190240			
ee8ccdca21f0a439f5c4815cc7f7712e	SCI_MF1_AXNIFE20100511_034226_20100514_180240_20100516_190240			
d0ca00803d2a9bd70330d346a30f15b1	SCI_MF1_AXNIFE20100511_034226_20100516_194002_20100518_194002			
139d30980191fe8b00bc33bc99f28575	SCI_MF1_AXNIFE20100511_034226_20100517_190825_20100614_190825			

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

validity identifier	M_CAL	M_DL	M_DN
20100504_191703_20100506_191703	meas.	meas.	interp.
20100505_184526_20100507_184526	meas.	meas.	interp.
20100506_181349_20100508_181349	meas.	meas.	meas.
20100507_192247_20100509_192247	meas.	meas.	interp.
20100508_185110_20100510_185110	meas.	meas.	interp.
20100509_181933_20100511_181933	meas.	meas.	interp.
20100510_192832_20100512_192832	meas.	meas.	meas.
20100511_185655_20100513_185655	pred.	pred.	pred.
20100512_182518_20100514_182518	pred.	pred.	pred.
20100513_193417_20100515_193417	pred.	pred.	pred.
20100514_190240_20100516_190240	pred.	pred.	pred.
20100515_183103_20100517_183103	pred.	pred.	pred.
20100516_194002_20100518_194002	pred.	pred.	pred.
20100517_190825_20100614_190825	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/	7: median)		mean rat					
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0024	1.0125	1.0213	1.0000	1.0050	1.0082	1.0400	OK		
2	1.0019	1.0077	1.0120	1.0009	1.0031	1.0047	1.0200	OK		
3	1.0010	1.0027	1.0051	1.0005	1.0008	1.0019	1.0100	OK		
4	1.0019	1.0017	1.0034	1.0005	1.0005	1.0016	1.0100	OK		
5	1.0019	1.0012	1.0023	1.0008	1.0002	1.0013	1.0120	OK		
6	1.0020	1.0011	1.0017	1.0007	0.9996	1.0003	1.0100	OK		
$\overline{7}$	1.0017	1.0006	1.0011	_	_	_	1.0070	OK		
8	1.0025	1.0025	1.0019	_	_	_	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 03 May 2010, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20100504_034244_20100503_194840_20100505_194840 .

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 (04 May 2010–17 May 2010) to the corresponding m-factor of the previous delivery day (03 May 2010). The grey boxes visualize the maximum ratio allowed.