NRT M-factor delivery document 16 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: 10 May 2011–16 May 2011
- Prediction: 17 May 2011–23 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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dbd1aa274760a07eb7922eb316775ef6	SCI_MF1_AXNIFE20110517_070353_20110510_191812_20110512_191812			
2941f91a3a95fecb46a6e322e69c2c81	SCI_MF1_AXNIFE20110517_070353_20110511_184126_20110513_184126			
ead1e1a9217677801121b8012906992f	SCI_MF1_AXNIFE20110517_070353_20110512_194455_20110514_194455			
fb11bef6c993bab62b51912553fbadbf	SCI_MF1_AXNIFE20110517_070353_20110514_183124_20110516_183124			
57741f871a47b1b4b89bbf4253169062	SCI_MF1_AXNIFE20110517_070353_20110515_193452_20110516_183124			
889e95c74514173cb458a0927cb2e734	SCI_MF1_AXNIFE20110517_070353_20110516_185807_20110518_185807			
33269fee951a258ab2c2788f5a6f2a32	SCI_MF1_AXNIFE20110517_070353_20110517_182121_20110518_185807			
cc52f8e0a7cfa8a9f2e0bbcc02d30656	SCI_MF1_AXNIFE20110517_070353_20110517_182121_20110519_182121			
33990edb78279c08eb9221a2dc0f852e	SCI_MF1_AXNIFE20110517_070353_20110518_192450_20110520_192450			
0141211559f07a9ea25f7628752529c8	<pre>SCI_MF1_AXNIFE20110517_070353_20110519_184804_20110521_184804</pre>			
def69668d35b66496f396630a0d69e88	SCI_MF1_AXNIFE20110517_070353_20110520_181119_20110522_181119			
0122f6972535f5bba7c9d8317de3f55e	SCI_MF1_AXNIFE20110517_070353_20110521_191447_20110523_191447			
e8dc1ddc364043ac4841cfb005cc88cd	SCI_MF1_AXNIFE20110517_070353_20110522_183802_20110524_183802			
daf8748c9983a789f0c1951f51cdef17	SCI_MF1_AXNIFE20110517_070353_20110523_194130_20110620_194130			

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

validity identifier	M_CAL	M_DL	M_DN
20110510_191812_20110512_191812	meas.	meas.	interp.
20110511_184126_20110513_184126	meas.	meas.	meas.
20110512_194455_20110514_194455	meas.	meas.	interp.
20110513_190809_20110515_190809	meas.	meas.	interp.
20110514_183124_20110516_183124	meas.	meas.	meas.
20110515_193452_20110517_193452	meas.	meas.	pred.
20110516_185807_20110518_185807	meas.	meas.	pred.
20110517_182121_20110519_182121	pred.	pred.	pred.
20110518_192450_20110520_192450	pred.	pred.	pred.
20110519_184804_20110521_184804	pred.	pred.	pred.
20110520_181119_20110522_181119	pred.	pred.	pred.
20110521_191447_20110523_191447	pred.	pred.	pred.
20110522_183802_20110524_183802	pred.	pred.	pred.
20110523_194130_20110620_194130	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 rat				
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status	
1	1.0121	1.0206	1.0135	1.0000	0.9928	0.9989	1.0400	OK	
2	1.0016	1.0125	1.0069	1.0000	0.9968	0.9999	1.0200	OK	
3	1.0011	1.0037	1.0046	0.9999	0.9994	1.0023	1.0100	OK	
4	1.0005	1.0006	1.0041	1.0000	0.9998	1.0030	1.0100	OK	
5	1.0017	1.0013	1.0033	0.9997	0.9997	1.0025	1.0120	OK	
6	1.0017	1.0012	1.0034	1.0002	1.0000	1.0019	1.0100	OK	
7	1.0004	1.0007	1.0022	_	_	_	1.0070	OK	
8	1.0022	1.0022	1.0011	_	—	_	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 09 May 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110510_035830_20110509_181443_20110511_181443 .

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 (10 May 2011– 23 May 2011) to the corresponding m-factor of the previous delivery day (09 May 2011). The grey boxes visualize the maximum ratio allowed.