NRT M-factor delivery document 25 May 2009

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25 May 2009

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 06.01.

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: 19 May 2009–25 May 2009
- Prediction: 26 May 2009-01 Jun 2009

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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31b516bacd6e46d166e3612a6e95db79	SCI_MF1_AXNIFE20090525_215454_20090519_191703_20090521_191703			
a30d0f9e1a4cc9e14256a68aecd360c6	SCI_MF1_AXNIFE20090525_215454_20090520_184526_20090522_184526			
a4bbc2ee3844fff17d74d7556b48ebdb	SCI_MF1_AXNIFE20090525_215454_20090522_192248_20090523_181349			
dc7f0369d8b2637afe0dafe7775f2211	SCI_MF1_AXNIFE20090525_215454_20090522_192248_20090524_192248			
9e8ca9e10ede04d7590f4bd3eed63757	SCI_MF1_AXNIFE20090525_215454_20090523_185111_20090525_185111			
4caadf06d807f43ff889441d9f562c7e	SCI_MF1_AXNIFE20090525_215454_20090524_181934_20090526_181934			
df784a527843906e5ce50a992ccd2d7e	SCI_MF1_AXNIFE20090525_215454_20090525_192833_20090527_192833			
15e94005d78a5cbce80f9c31d5c8c791	SCI_MF1_AXNIFE20090525_215454_20090526_185656_20090528_185656			
a3fe6584e86888f253a0f963368e7643	<pre>SCI_MF1_AXNIFE20090525_215454_20090527_182519_20090529_182519</pre>			
cc68bd0b9eb0be3c0a7dd4bc7b821854	SCI_MF1_AXNIFE20090525_215454_20090528_193418_20090530_193418			
5d50d7c6be7f0ed7b23c486bf19cd9bb	SCI_MF1_AXNIFE20090525_215454_20090529_190241_20090531_190241			
d1e69370cad1659354501a4770377493	SCI_MF1_AXNIFE20090525_215454_20090530_183104_20090601_183104			
f25c370b3423b463694a93854300c880	SCI_MF1_AXNIFE20090525_215454_20090531_194003_20090602_194003			
b88d82444a659bf28172016ea8b3f82b	SCI_MF1_AXNIFE20090525_215454_20090601_190826_20090629_190826			

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

validity identifier	M_CAL	M_DL	M_DN
20090519_191703_20090521_191703	meas.	meas.	interp.
20090520_184526_20090522_184526	meas.	meas.	meas.
20090521_181349_20090523_181349	meas.	meas.	interp.
20090522_192248_20090524_192248	meas.	meas.	interp.
20090523_185111_20090525_185111	meas.	meas.	interp.
20090524_181934_20090526_181934	meas.	meas.	meas.
20090525_192833_20090527_192833	pred.	pred.	pred.
20090526_185656_20090528_185656	pred.	pred.	pred.
20090527_182519_20090529_182519	pred.	pred.	pred.
20090528_193418_20090530_193418	pred.	pred.	pred.
20090529_190241_20090531_190241	pred.	pred.	pred.
20090530_183104_20090601_183104	pred.	pred.	pred.
20090531_194003_20090602_194003	pred.	pred.	pred.
20090601_190826_20090629_190826	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	1.0073	1.0205	1.0267	1.0022	1.0074	1.0085	1.0400	OK	
2	1.0040	1.0093	1.0116	1.0016	1.0031	1.0037	1.0200	OK	
3	1.0025	1.0036	1.0036	1.0007	1.0008	1.0006	1.0100	OK	
4	1.0021	1.0013	1.0012	1.0005	1.0003	0.9998	1.0100	OK	
5	1.0009	1.0019	1.0022	1.0003	0.9993	0.9993	1.0120	OK	
6	1.0034	1.0018	1.0019	1.0009	0.9994	0.9992	1.0100	OK	
$\overline{7}$	1.0012	1.0001	1.0010	_	_	_	1.0070	OK	
8	1.0037	1.0020	1.0016	_	—	_	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 18 May 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20090518_215526_20090518_194840_20090520_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 (19 May 2009– 01 Jun 2009) to the corresponding m-factor of the previous delivery day (18 May 2009). The grey boxes visualize the maximum ratio allowed.