NRT M-factor delivery document 04 Jul 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: 28 Jun 2011–04 Jul 2011
- Prediction: 05 Jul 2011–11 Jul 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			
mdb-sum f244c1bd4494fc7569d4421a9009d520 218884a15675f52f2284fec7a100f8ed 00cfd3ea883440efcec5eea4c96dd459 06f5ae764e8a38363f01afb80925666b f0b2df4c68e6b09eb5c552931578bc54 d197c22ca39c40372fd5d395fb9d145d ab24f3b127fed59b48ae6d00b118f1c8 0c534e8687fccf37893a406ced5f5374 183393d3ef60fcb643a44d47cba6f30 865cae89132932ee154591feaca9f084 d2b9408818227e1e43b96e2a32baf5f5 a5f667e7f85611a375b462ce7bcefb24	m-factor auxiliary file SCI_MF1_AXNIFE20110704_195921_20110628_192114_20110630_192114 SCI_MF1_AXNIFE20110704_195921_20110630_180744_20110702_180744 SCI_MF1_AXNIFE20110704_195921_20110701_191112_20110703_191112 SCI_MF1_AXNIFE20110704_195921_20110703_193755_20110704_183426 SCI_MF1_AXNIFE20110704_195921_20110703_193755_20110705_193755 SCI_MF1_AXNIFE20110704_195921_20110704_190109_20110706_190109 SCI_MF1_AXNIFE20110704_195921_20110705_182424_20110707_182424 SCI_MF1_AXNIFE20110704_195921_20110706_192752_20110708_192752 SCI_MF1_AXNIFE20110704_195921_20110706_192752_20110709_185107 SCI_MF1_AXNIFE20110704_195921_20110708_181422_20110709_181422 SCI_MF1_AXNIFE20110704_195921_20110708_181422_20110711_191750			
3e55c437e80f3c66be2807886ee4118b 60cacd3a0e928e666f36ca3992b36ea0	SCI_MF1_AXNIFE20110704_195921_20110710_184104_20110712_184104 SCI_MF1_AXNIFE20110704_195921_20110711_194433_20110808_194433			

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

validity identifier	M_CAL	M_DL	M_DN
20110628_192114_20110630_192114	meas.	meas.	interp.
20110629_184429_20110701_184429	meas.	meas.	interp.
20110630_180744_20110702_180744	meas.	meas.	interp.
20110701_191112_20110703_191112	meas.	meas.	meas.
20110702_183426_20110704_183426	meas.	meas.	pred.
20110703_193755_20110705_193755	meas.	meas.	pred.
20110704_190109_20110706_190109	meas.	pred.	pred.
20110705_182424_20110707_182424	pred.	pred.	pred.
20110706_192752_20110708_192752	pred.	pred.	pred.
20110707_185107_20110709_185107	pred.	pred.	pred.
20110708_181422_20110710_181422	pred.	pred.	pred.
20110709_191750_20110711_191750	pred.	pred.	pred.
20110710_184104_20110712_184104	pred.	pred.	pred.
20110711_194433_20110808_194433	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	1.0028	1.0104	1.0170	1.0005	0.9986	1.0027	1.0400	OK	
2	1.0021	1.0012	1.0036	1.0010	1.0003	1.0008	1.0200	OK	
3	1.0019	1.0017	1.0015	1.0005	1.0004	1.0007	1.0100	OK	
4	1.0013	1.0009	1.0022	1.0006	1.0004	1.0011	1.0100	OK	
5	1.0019	1.0009	1.0031	1.0009	0.9999	1.0014	1.0120	OK	
6	1.0020	1.0016	1.0012	1.0010	0.9995	1.0005	1.0100	OK	
$\overline{7}$	1.0016	1.0003	1.0008	_	_	_	1.0070	OK	
8	1.0039	1.0021	1.0041	_	—	—	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 27 Jun 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110628_034322_20110627_181746_20110629_181746 .

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 (28 Jun 2011– 11 Jul 2011) to the corresponding m-factor of the previous delivery day (27 Jun 2011). The grey boxes visualize the maximum ratio allowed.