NRT M-factor delivery document 11 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: 05 Jul 2011– 11 Jul 2011
- Prediction: 12 Jul 2011–18 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			
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ccfb017a8c52c2defaf08283ddc11b4b	SCI_MF1_AXNIFE20110712_041332_20110705_182424_20110707_182424			
daac6e05ac000c2090eae93b0edfa4a7	SCI_MF1_AXNIFE20110712_041332_20110706_192752_20110708_192752			
260b1cd81842b1fd1f5b4a2d45d125de	SCI_MF1_AXNIFE20110712_041332_20110708_181422_20110709_185107			
52e0a82f1e38edb461114fd3846a9054	SCI_MF1_AXNIFE20110712_041332_20110709_191750_20110711_191750			
ed9dfce3bd53872c64289ba54176656b	SCI_MF1_AXNIFE20110712_041332_20110710_184104_20110712_184104			
deecfe985261869513a14f0cb1e0d5c5	SCI_MF1_AXNIFE20110712_041332_20110711_194433_20110713_194433			
6403dc884cb5cbbc7036d0ee32fbca9	SCI_MF1_AXNIFE20110712_041332_20110711_194433_20110713_194433			
2a1398e2f429041f779616bbbf3c6141	SCI_MF1_AXNIFE20110712_041332_20110713_183102_20110714_190747			
58a8765b861943067d0ad046bdcf784e	SCI_MF1_AXNIFE20110712_041332_20110713_183102_20110715_183102			
080209eeea418bdc658f24bc2efff9a0	SCI_MF1_AXNIFE20110712_041332_20110714_193430_20110715_183102			
ccfbf1d6d66fb4a37e20bbc84c7a5f93	SCI_MF1_AXNIFE20110712_041332_20110715_185745_20110717_185745			
768d32e39b50b6b699e2e761aae13511	SCI_MF1_AXNIFE20110712_041332_20110716_182100_20110718_182100			
fb909e0fd90f613e79bd442c54998f4d	SCI_MF1_AXNIFE20110712_041332_20110717_192428_20110719_192428			
20d654f882212ac0d6176d11cc93fb8b	SCI_MF1_AXNIFE20110712_041332_20110718_184742_20110815_184742			

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

validity identifier	M_CAL	M_DL	M_DN
20110705_182424_20110707_182424	meas.	meas.	meas.
20110706_192752_20110708_192752	meas.	meas.	interp.
20110707_185107_20110709_185107	meas.	meas.	interp.
20110708_181422_20110710_181422	meas.	meas.	interp.
20110709_191750_20110711_191750	meas.	meas.	meas.
20110710_184104_20110712_184104	meas.	meas.	pred.
20110711_194433_20110713_194433	meas.	meas.	pred.
20110712_190747_20110714_190747	pred.	pred.	pred.
20110713_183102_20110715_183102	pred.	pred.	pred.
20110714_193430_20110716_193430	pred.	pred.	pred.
20110715_185745_20110717_185745	pred.	pred.	pred.
20110716_182100_20110718_182100	pred.	pred.	pred.
20110717_192428_20110719_192428	pred.	pred.	pred.
20110718_184742_20110815_184742	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	1.0045	1.0045	1.0089	1.0011	1.0002	0.9972	1.0400	OK		
2	1.0016	1.0019	1.0033	1.0007	1.0003	0.9995	1.0200	OK		
3	1.0006	1.0006	1.0018	0.9997	1.0000	1.0003	1.0100	OK		
4	1.0006	1.0006	1.0009	0.9997	1.0001	1.0007	1.0100	OK		
5	1.0009	1.0017	1.0009	1.0001	1.0003	1.0005	1.0120	OK		
6	1.0014	1.0019	1.0018	0.9994	1.0002	1.0009	1.0100	OK		
$\overline{7}$	1.0011	1.0006	1.0018	_	_	_	1.0070	OK		
8	1.0017	1.0032	1.0034	_	_	_	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 04 Jul 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110704_195921_20110704_190109_20110706_190109 .

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 (05 Jul 2011– 18 Jul 2011) to the corresponding m-factor of the previous delivery day (04 Jul 2011). The grey boxes visualize the maximum ratio allowed.