NRT M-factor delivery document 09 Aug 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: 03 Aug 2010– 09 Aug 2010
- Prediction: 10 Aug 2010–16 Aug 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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b2157abb42f91b63a68c1780fae44ff7	SCI_MF1_AXNIFE20100810_034223_20100803_181641_20100805_181641			
137ad0a09f31d949344f8ccf8966ed3b	SCI_MF1_AXNIFE20100810_034223_20100804_192540_20100806_192540			
9704c7ba7c50c91994615a33b164e879	SCI_MF1_AXNIFE20100810_034223_20100806_182226_20100808_182226			
3e99912f6dec9a1060cbfe7d4cb367c3	SCI_MF1_AXNIFE20100810_034223_20100806_182948_20100810_185948			
329cdf5c22b521e7f896c98547bdbd3f	SCI_MF1_AXNIFE20100810_034223_20100808_185948_20100810_185948			
121a5367cfae805c39484f9c97447e39	SCI_MF1_AXNIFE20100810_034223_20100809_182811_20100811_182811			
3936393d3081ea743197086c80efdccc	SCI_MF1_AXNIFE20100810_034223_20100810_193710_20100812_193710			
487aeeab14bbda766cba5bb68425ab93	SCI_MF1_AXNIFE20100810_034223_20100811_190533_20100813_190533			
dfae78499ed1ef10d62edd2436ea137a	SCI_MF1_AXNIFE20100810_034223_20100811_190533_20100813_190533			
3f08bcd22cad865f84d2718d8068a70b	SCI_MF1_AXNIFE20100810_034223_20100813_194254_20100814_183356			
f019c9c27d688699647a59ffb5c775f7	SCI_MF1_AXNIFE20100810_034223_20100813_194254_20100815_194254			
96e10a86f052655c9cb20c47e45747b6	SCI_MF1_AXNIFE20100810_034223_20100814_191117_20100816_191117			
16af5c7e17dc4b1299afe4f06f3a156b	SCI_MF1_AXNIFE20100810_034223_20100815_183940_20100817_183940			
63285e71273aa0e7d2109f1eb909b32f	SCI_MF1_AXNIFE20100810_034223_20100816_194839_20100913_194839			

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

validity identifier	M_CAL	M_DL	M_DN
20100803_181641_20100805_181641	meas.	meas.	interp.
20100804_192540_20100806_192540	meas.	meas.	interp.
20100805_185403_20100807_185403	meas.	meas.	interp.
20100806_182226_20100808_182226	meas.	meas.	meas.
20100807_193125_20100809_193125	meas.	meas.	pred.
20100808_185948_20100810_185948	meas.	meas.	pred.
20100809_182811_20100811_182811	pred.	meas.	pred.
20100810_193710_20100812_193710	pred.	pred.	pred.
20100811_190533_20100813_190533	pred.	pred.	pred.
20100812_183356_20100814_183356	pred.	pred.	pred.
20100813_194254_20100815_194254	pred.	pred.	pred.
20100814_191117_20100816_191117	pred.	pred.	pred.
20100815_183940_20100817_183940	pred.	pred.	pred.
20100816_194839_20100913_194839	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	1.0104	1.0056	1.0080	0.9988	1.0013	1.0015	1.0400	OK		
2	1.0013	1.0051	1.0029	1.0002	1.0017	1.0010	1.0200	OK		
3	1.0007	1.0012	1.0006	0.9998	1.0002	1.0002	1.0100	OK		
4	1.0008	1.0004	1.0006	0.9999	1.0001	1.0003	1.0100	OK		
5	1.0017	1.0026	1.0025	1.0002	1.0008	1.0007	1.0120	OK		
6	1.0015	1.0020	1.0018	1.0002	1.0010	1.0007	1.0100	OK		
$\overline{7}$	1.0015	1.0029	1.0010	_	_	_	1.0070	OK		
8	1.0016	1.0020	1.0022	_	_	_	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 02 Aug 2010, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20100803_034108_20100802_184818_20100804_184818 .

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 (03 Aug 2010– 16 Aug 2010) to the corresponding m-factor of the previous delivery day (02 Aug 2010). The grey boxes visualize the maximum ratio allowed.