NRT M-factor delivery document 04 Apr 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: 29 Mar 2011–04 Apr 2011
- Prediction: 05 Apr 2011–11 Apr 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			
ec9bfcefe7f492792cfa17f41053ae61	SCI_MF1_AXNIFE20110405_074016_20110329_181819_20110331_181819			
7ff1988da4cd735b0c4fb850bf838c17	SCI_MF1_AXNIFE20110405_074016_20110330_192147_20110401_192147			
71804a43e2d8b1abbec7967c7ac32430	SCI_MF1_AXNIFE20110405_074016_20110331_184502_20110402_184502			
764382066eccbcc4e83a5ecef828810f	SCI_MF1_AXNIFE20110405_074016_20110401_180816_20110403_180816			
78585523992066270fe84f2be22d1625	SCI_MF1_AXNIFE20110405_074016_20110402_191145_20110404_191145			
29619ffa2394c5af4cb8659c6ea001c3	SCI_MF1_AXNIFE20110405_074016_20110403_183459_20110405_183459			
7ef1625d5537d1a18cb856cf05917f27	SCI_MF1_AXNIFE20110405_074016_20110404_193828_20110406_193828			
ebe73506d69f0fa9ac3fa86e94b08aa0	SCI_MF1_AXNIFE20110405_074016_20110405_190142_20110407_190142			
22c76bdd9f2478de81f3e1a47d5192a5	SCI_MF1_AXNIFE20110405_074016_20110406_182457_20110408_182457			
1a5fb3b258dae154f80569b96f9fe06c	<pre>SCI_MF1_AXNIFE20110405_074016_20110407_192825_20110409_192825</pre>			
b5bcb5dc171d36c890e6bd81fb4b2400	SCI_MF1_AXNIFE20110405_074016_20110408_185140_20110410_185140			
cdf0b755eca3ee74e1924d5736a2c177	SCI_MF1_AXNIFE20110405_074016_20110409_181454_20110411_181454			
7734ed2385ffe5d8a1c91fa5536200fe	SCI_MF1_AXNIFE20110405_074016_20110410_191823_20110412_191823			
9747b554c614f40727020581760056ee	SCI_MF1_AXNIFE20110405_074016_20110411_184137_20110509_184137			

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

validity identifier	M_CAL	M_DL	M_DN
20110329_181819_20110331_181819	meas.	meas.	interp.
20110330_192147_20110401_192147	meas.	meas.	meas.
20110331_184502_20110402_184502	meas.	meas.	pred.
20110401_180816_20110403_180816	meas.	meas.	pred.
20110402_191145_20110404_191145	meas.	meas.	pred.
20110403_183459_20110405_183459	pred.	meas.	pred.
20110404_193828_20110406_193828	pred.	pred.	pred.
20110405_190142_20110407_190142	pred.	pred.	pred.
20110406_182457_20110408_182457	pred.	pred.	pred.
20110407_192825_20110409_192825	pred.	pred.	pred.
20110408_185140_20110410_185140	pred.	pred.	pred.
20110409_181454_20110411_181454	pred.	pred.	pred.
20110410_191823_20110412_191823	pred.	pred.	pred.
20110411_184137_20110509_184137	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	1.0083	1.0427	1.0347	0.9971	0.9802	0.9920	1.0500	OK	
2	1.0031	1.0187	1.0044	0.9986	0.9925	1.0002	1.0200	OK	
3	1.0016	1.0063	1.0038	0.9995	0.9981	1.0019	1.0100	OK	
4	1.0014	1.0017	1.0026	1.0001	0.9993	1.0016	1.0100	OK	
5	1.0007	1.0038	1.0017	0.9999	0.9987	1.0003	1.0120	OK	
6	1.0021	1.0019	1.0016	1.0009	0.9992	1.0004	1.0100	OK	
$\overline{7}$	1.0013	1.0017	1.0010	_	_	_	1.0070	OK	
8	1.0014	1.0046	1.0046	_	—	_	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 28 Mar 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110329_085709_20110328_185504_20110330_185504 .

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