NRT M-factor delivery document 12 Apr 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: 06 Apr 2010– 12 Apr 2010
- Prediction: 13 Apr 2010–19 Apr 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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7c216df5f4b63c60229f47cc5313b034	SCI_MF1_AXNIFE20100413_073146_20100406_185655_20100408_185655			
9a34402f9d2ebb0d446025bb7823190	SCI_MF1_AXNIFE20100413_073146_20100407_182518_20100409_182518			
b84bde57c3cc092ba83b05f80b7d18bd	SCI_MF1_AXNIFE20100413_073146_20100408_193417_20100410_193417			
322f0610495220939f28b9258132e4bd	SCI_MF1_AXNIFE20100413_073146_20100410_183103_20100412_183103			
a2068752cfeb933e294454d854c7834b	SCI_MF1_AXNIFE20100413_073146_20100411_194002_20100413_194002			
69c8a60eff8c2596ef75a904b396ad8e	SCI_MF1_AXNIFE20100413_073146_20100412_190825_20100414_190825			
e55dc03b0ef5a4abdcf9657731356af0	SCI_MF1_AXNIFE20100413_073146_20100413_183648_20100415_183648			
713fd7d55c245aeb5c3253049076e20f	SCI_MF1_AXNIFE20100413_073146_20100414_194547_20100416_194547			
bc0c1e1e2b30cd2f43773475ae23d47a	SCI_MF1_AXNIFE20100413_073146_20100415_191410_20100417_191410			
5298a4d2cd9a0ae37159286338ca0486	SCI_MF1_AXNIFE20100413_073146_20100415_191410_20100417_191410			
eb7b4185a03541721bf36fc536edc8ae	SCI_MF1_AXNIFE20100413_073146_20100416_184233_20100418_184233			
5d9c91713ec36253b5832375da28af19	SCI_MF1_AXNIFE20100413_073146_20100417_181056_20100419_181056			
f2973354dd5901170f80a3522be56614	SCI_MF1_AXNIFE20100413_073146_20100418_191955_20100420_191955			
d0c387f3eeda0d190c7e19ce8a14e02e	SCI_MF1_AXNIFE20100413_073146_20100419_184818_20100517_184818			

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

validity identifier	M_CAL	M_DL	M_DN
20100406_185655_20100408_185655	meas.	meas.	interp.
20100407_182518_20100409_182518	meas.	meas.	interp.
20100408_193417_20100410_193417	meas.	meas.	interp.
20100409_190240_20100411_190240	meas.	meas.	meas.
20100410_183103_20100412_183103	meas.	meas.	pred.
20100411_194002_20100413_194002	meas.	meas.	pred.
20100412_190825_20100414_190825	meas.	meas.	pred.
20100413_183648_20100415_183648	pred.	pred.	pred.
20100414_194547_20100416_194547	pred.	pred.	pred.
20100415_191410_20100417_191410	pred.	pred.	pred.
20100416_184233_20100418_184233	pred.	pred.	pred.
20100417_181056_20100419_181056	pred.	pred.	pred.
20100418_191955_20100420_191955	pred.	pred.	pred.
20100419_184818_20100517_184818	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. rat	io (ch. 6/	7: median)		mean rat					
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0899	1.0818	1.0296	0.9969	1.0015	1.0114	1.0900	OK		
2	1.0012	1.0047	1.0139	0.9997	1.0015	1.0052	1.0200	OK		
3	1.0006	1.0021	1.0059	1.0000	1.0003	1.0022	1.0100	OK		
4	1.0017	1.0012	1.0035	1.0001	1.0000	1.0017	1.0100	OK		
5	1.0014	1.0037	1.0018	0.9997	0.9987	1.0004	1.0120	OK		
6	1.0421	1.0394	1.0409	1.0405	1.0384	1.0394	1.0600	OK		
$\overline{7}$	1.0216	1.0395	1.0401	-	_	_	1.0500	OK		
8	1.0101	1.0189	1.0191	_	_	_	1.0300	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 05 Apr 2010, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20100406_034151_20100405_192832_20100407_192832_.

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 (06 Apr 2010– 19 Apr 2010) to the corresponding m-factor of the previous delivery day (05 Apr 2010). The grey boxes visualize the maximum ratio allowed.