NRT M-factor delivery document 21 Feb 2011

Klaus Bramstedt, ife Bremen

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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: 15 Feb 2011–21 Feb 2011
- Prediction: 22 Feb 2011-28 Feb 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			
md5-sum 3ee6e9b9ad3b86418fd2f76e37ec43a8 1684d5e47ec434b941763e1895331e34 ba84acd64b135554dc09533414f55498 712176197208f0920fc0fc831cb9e21f a7da2da8a656eecbfa3d956ec3395b46 e33343aa8b97d595eebe53a1fd4cac45 08efa9aaf27aae999b201b9cd8fba8a4 87984a3e5bc6e81ee2bed93ed26b5aae ff1c236cb734785a49bc2d58a13bd2b7 0b7f79e775d5a414ec2a2c1f022071d5 2b0f7b7d24f08deaaadc528f8f73d7ca	m-factor auxiliary file SCI_MF1_AXNIFE20110222_044351_20110215_185840_20110217_185840 SCI_MF1_AXNIFE20110222_044351_20110216_182154_20110218_182154 SCI_MF1_AXNIFE20110222_044351_20110218_184837_20110220_184837 SCI_MF1_AXNIFE20110222_044351_20110219_181152_20110221_181152 SCI_MF1_AXNIFE20110222_044351_20110220_191520_20110222_191520 SCI_MF1_AXNIFE20110222_044351_20110220_191520_20110222_191520 SCI_MF1_AXNIFE20110222_044351_20110222_194203_20110224_194203 SCI_MF1_AXNIFE20110222_044351_20110222_194203_20110224_194203 SCI_MF1_AXNIFE20110222_044351_20110223_190518_20110225_190518 SCI_MF1_AXNIFE20110222_044351_20110224_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110224_193201_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190518_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190201820110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190201820110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190201820110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190201820110226_182832 SCI_MF1_AXNIFE20110222_044351_20110225_190201820110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832 SCI_MF1_AXNIFE20110222_044351_20110226_182832 SCI_MF1_AXNIFE201102020_044261_00100026_1828545 SCI_MF1_AXNIFE201102020_044261_00100			
725870fc48d38b2bb522f7796fc510ce 603be5a3cf8ec1a1c7b230338250faa4 fa55ae581a5cf28f70cb138150db52ea	SCI_MF1_AXNIFE20110222_044351_20110226_185515_20110228_185515 SCI_MF1_AXNIFE20110222_044351_20110227_181830_20110301_181830 SCI_MF1_AXNIFE20110222_044351_20110228_192158_20110328_192158			

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

validity identifier	M_CAL	M_DL	M_DN
20110215_185840_20110217_185840	meas.	meas.	interp.
20110216_182154_20110218_182154	meas.	meas.	meas.
20110217_192523_20110219_192523	meas.	meas.	interp.
20110218_184837_20110220_184837	meas.	meas.	interp.
20110219_181152_20110221_181152	meas.	meas.	interp.
20110220_191520_20110222_191520	meas.	meas.	meas.
20110221_183835_20110223_183835	meas.	meas.	pred.
20110222_194203_20110224_194203	pred.	pred.	pred.
20110223_190518_20110225_190518	pred.	pred.	pred.
20110224_182832_20110226_182832	pred.	pred.	pred.
20110225_193201_20110227_193201	pred.	pred.	pred.
20110226_185515_20110228_185515	pred.	pred.	pred.
20110227_181830_20110301_181830	pred.	pred.	pred.
20110228_192158_20110328_192158	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	1.0092	1.0120	1.0165	0.9984	0.9983	1.0049	1.0400	OK	
2	1.0011	1.0023	1.0048	0.9997	0.9994	1.0021	1.0200	OK	
3	1.0012	1.0012	1.0018	0.9996	0.9996	1.0010	1.0100	OK	
4	1.0012	1.0016	1.0018	0.9998	0.9998	1.0011	1.0100	OK	
5	1.0015	1.0020	1.0012	0.9998	0.9988	1.0007	1.0120	OK	
6	1.0020	1.0021	1.0011	0.9998	0.9986	1.0002	1.0100	OK	
$\overline{7}$	1.0019	1.0012	1.0007	_	_	_	1.0070	OK	
8	1.0031	1.0014	1.0008	_	_	_	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 14 Feb 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110215_044244_20110214_193525_20110216_193525 .

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 (15 Feb 2011– 28 Feb 2011) to the corresponding m-factor of the previous delivery day (14 Feb 2011). The grey boxes visualize the maximum ratio allowed.