NRT M-factor delivery document 17 Oct 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: 11 Oct 2011–17 Oct 2011
- Prediction: 18 Oct 2011–24 Oct 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 Odfa666f95c00924f59be5f858a6e3c4 2f3098e94ac54b6a20924f644d4243e2 175d1e738bcec00fa5df67af1708d98c 5da19b0106a638e3829ca3f726f9a65c a6560620b72bc3f8a15e60d849a77e3b 907e04c11c785bf833e4e5b3c89ccbfa ad6fe5c5d350bf1685fbda781a87a19b 2fe4d956b9b42433ce9b0bb4742dead6 69924ff0c854e5116b0f884f42b984c1 e5ab86f367a90f3718aba62a578fdbd2	m-factor auxiliary file SCI_MF1_AXNIFE20111018_071050_20111011_183029_20111013_183029 SCI_MF1_AXNIFE20111018_071050_20111012_193358_20111014_193358 SCI_MF1_AXNIFE20111018_071050_20111013_185712_20111015_185712 SCI_MF1_AXNIFE20111018_071050_20111014_182027_20111016_182027 SCI_MF1_AXNIFE20111018_071050_20111015_192355_20111017_192355 SCI_MF1_AXNIFE20111018_071050_20111016_184710_20111018_184710 SCI_MF1_AXNIFE20111018_071050_20111017_181024_20111019_181024 SCI_MF1_AXNIFE20111018_071050_20111018_191353_20111021_183707 SCI_MF1_AXNIFE20111018_071050_20111002_194036_20111022_184036			
2c89f018a3ba22212bce9235cf471553 007cb50a78143755bb99f1b08fbfa5bd d2a534ff66c87aec17d97e81bfbb8548 f69cea9418d7b2ce0de7feabe9d7179c	SCI_MF1_AXNIFE20111018_071050_20111021_190350_20111023_190350 SCI_MF1_AXNIFE20111018_071050_20111022_182705_20111024_182705 SCI_MF1_AXNIFE20111018_071050_20111023_193033_20111025_193033 SCI_MF1_AXNIFE20111018_071050_20111024_185348_20111121_185348			

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

validity identifier	M_CAL	M_DL	M_DN
20111011_183029_20111013_183029	meas.	meas.	meas.
20111012_193358_20111014_193358	meas.	meas.	interp.
20111013_185712_20111015_185712	meas.	meas.	interp.
20111014_182027_20111016_182027	meas.	meas.	interp.
20111015_192355_20111017_192355	meas.	meas.	meas.
20111016_184710_20111018_184710	meas.	meas.	pred.
20111017_181024_20111019_181024	meas.	meas.	pred.
20111018_191353_20111020_191353	pred.	pred.	pred.
20111019_183707_20111021_183707	pred.	pred.	pred.
20111020_194036_20111022_194036	pred.	pred.	pred.
20111021_190350_20111023_190350	pred.	pred.	pred.
20111022_182705_20111024_182705	pred.	pred.	pred.
20111023_193033_20111025_193033	pred.	pred.	pred.
20111024_185348_20111121_185348	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	1.0179	1.0868	1.0978	0.9968	0.9668	0.9740	1.1000	OK		
2	1.0012	1.0398	1.0241	0.9998	0.9874	0.9961	1.0400	OK		
3	1.0007	1.0115	1.0066	1.0001	0.9975	1.0043	1.0200	OK		
4	1.0011	1.0019	1.0069	1.0000	0.9993	1.0051	1.0100	OK		
5	1.0010	1.0014	1.0075	0.9997	0.9996	1.0053	1.0120	OK		
6	1.0009	1.0019	1.0079	0.9999	1.0007	1.0052	1.0100	OK		
7	1.0010	1.0016	1.0064	_	_	_	1.0070	OK		
8	1.0019	1.0028	1.0064	_	—	—	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 10 Oct 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20111011_073646_20111010_190715_20111012_190715 .

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 (11 Oct 2011– 24 Oct 2011) to the corresponding m-factor of the previous delivery day (10 Oct 2011). The grey boxes visualize the maximum ratio allowed.