NRT M-factor delivery document 22 Sep 2008

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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 06.01.

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: 16 Sep 2008–22 Sep 2008
- Prediction: 23 Sep 2008–29 Sep 2008

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			
c80c0b512daf5bd521a0c89540722fe9 e2c90ffb82c86d4dcd25b2b5f73bfdb6 9608aabfdccd89b98758a2e2b8765c32 92ad8408500ccd6a79f67bf2f0600387 be9184b0b691716d8f1f4264cd315109 a9361dd9c7729a75624c52a93b6ec429 ee9413c3d86d5d40814eccc8530279d3 96383feac4d3b6246aef3af5495c11a3 d612350077785cc8b1272e918909a7eb 1ebfacf4344b173eb4833a401daa346a 9dbac7f327f90af4521b8b0c75ce7d00 2f48ccd17e865c9abb348bba21205bcb	SCI_MF1_AXNIFE20081014_094245_20080916_191704_20080918_191704 SCI_MF1_AXNIFE20081014_094245_20080917_184527_20080919_184527 SCI_MF1_AXNIFE20081014_094245_20080918_181350_20080920_181350 SCI_MF1_AXNIFE20081014_094245_20080919_192249_20080921_192249 SCI_MF1_AXNIFE20081014_094245_20080920_185112_20080922_185112 SCI_MF1_AXNIFE20081014_094245_20080921_181935_20080923_181935 SCI_MF1_AXNIFE20081014_094245_20080922_192834_20080924_192834 SCI_MF1_AXNIFE20081014_094245_20080923_185657_20080925_185657 SCI_MF1_AXNIFE20081014_094245_20080924_182520_20080926_182520 SCI_MF1_AXNIFE20081014_094245_20080926_190241_82080927_193418 SCI_MF1_AXNIFE20081014_094245_20080925_193418_20080928_190241 SCI_MF1_AXNIFE20081014_094245_20080927_183104_20080929_183104 SCI_MF1_AXNIFE20081014_094245_20080927_183104_20080929_183104			
ab1877347f15962d6a9d3116d9b49198	SCI_MF1_AXNIFE20081014_094245_20080929_190826_20081027_190826			

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

validity identifier	M_CAL	M_DL	M_DN
20080916_191704_20080918_191704	meas.	meas.	interp.
20080917_184527_20080919_184527	meas.	meas.	interp.
20080918_181350_20080920_181350	meas.	meas.	meas.
20080919_192249_20080921_192249	meas.	meas.	interp.
20080920_185112_20080922_185112	meas.	meas.	interp.
20080921_181935_20080923_181935	meas.	meas.	interp.
20080922_192834_20080924_192834	meas.	meas.	meas.
20080923_185657_20080925_185657	pred.	pred.	pred.
20080924_182520_20080926_182520	pred.	pred.	pred.
20080925_193418_20080927_193418	pred.	pred.	pred.
20080926_190241_20080928_190241	pred.	pred.	pred.
20080927_183104_20080929_183104	pred.	pred.	pred.
20080928_194003_20080930_194003	pred.	pred.	pred.
20080929_190826_20081027_190826	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	1.0108	1.0118	1.0059	1.0009	1.0038	1.0017	1.0400	OK		
2	1.0017	1.0048	1.0023	1.0006	1.0016	1.0007	1.0200	OK		
3	1.0005	1.0010	1.0014	1.0002	1.0001	1.0004	1.0100	OK		
4	1.0006	1.0004	1.0017	1.0002	1.0000	1.0007	1.0100	OK		
5	1.0006	1.0010	1.0016	1.0001	1.0003	1.0005	1.0120	OK		
6	1.0014	1.0024	1.0029	1.0006	1.0012	1.0013	1.0100	OK		
7	0.9994	1.0000	1.0010	_	_	_	1.0070	OK		
8	0.9999	1.0002	1.0005	_	—	_	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 15 Sep 2008, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20081014_093737_20080915_194841_20080917_194841_.

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 (16 Sep 2008– 29 Sep 2008) to the corresponding m-factor of the previous delivery day (15 Sep 2008). The grey boxes visualize the maximum ratio allowed.