NRT M-factor delivery document 29 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: 23 Sep 2008–29 Sep 2008
- Prediction: 30 Sep 2008–06 Oct 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			
md5-sum	m-factor auxiliary file SCI_MF1_AXNIFE20081014_094746_20080923_185657_20080925_185657 SCI_MF1_AXNIFE20081014_094746_20080924_182520_20080926_182520 SCI_MF1_AXNIFE20081014_094746_20080925_193418_20080927_193418 SCI_MF1_AXNIFE20081014_094746_20080925_190241_20080928_190241 SCI_MF1_AXNIFE20081014_094746_20080927_183104_20080929_183104 SCI_MF1_AXNIFE20081014_094746_20080928_194003_20080930_194003 SCI_MF1_AXNIFE20081014_094746_20080929_190826_20081001_190826 SCI_MF1_AXNIFE20081014_094746_20080930_183649_20081002_183649 SCI_MF1_AXNIFE20081014_094746_20081001_194548_20081003_194548 SCI_MF1_AXNIFE20081014_094746_20081002_191411_20081004_191411 SCI_MF1_AXNIFE20081014_094746_20081003_184234_20081005_184234			
d0ee4e58472164b63d63b8436306a15d 02c6a437228ae18cee89bcf7646268cd 856a2b76c1ab7cee899aba424f97cbff	SCI_MF1_AXNIFE20081014_094746_20081004_181057_20081006_181057 SCI_MF1_AXNIFE20081014_094746_20081005_191956_20081007_191956 SCI_MF1_AXNIFE20081014_094746_20081006_184819_20081103_184819			

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

validity identifier	M_CAL	M_DL	M_DN
20080923_185657_20080925_185657	meas.	meas.	interp.
20080924_182520_20080926_182520	meas.	meas.	interp.
20080925_193418_20080927_193418	meas.	meas.	interp.
20080926_190241_20080928_190241	meas.	meas.	meas.
20080927_183104_20080929_183104	meas.	meas.	pred.
20080928_194003_20080930_194003	meas.	meas.	pred.
20080929_190826_20081001_190826	meas.	meas.	pred.
20080930_183649_20081002_183649	pred.	pred.	pred.
20081001_194548_20081003_194548	pred.	pred.	pred.
20081002_191411_20081004_191411	pred.	pred.	pred.
20081003_184234_20081005_184234	pred.	pred.	pred.
20081004_181057_20081006_181057	pred.	pred.	pred.
20081005_191956_20081007_191956	pred.	pred.	pred.
20081006_184819_20081103_184819	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	1.0059	1.0065	1.0102	1.0009	1.0018	1.0035	1.0400	OK		
2	1.0018	1.0032	1.0042	1.0007	1.0010	1.0016	1.0200	OK		
3	1.0009	1.0013	1.0011	1.0002	1.0002	1.0002	1.0100	OK		
4	1.0006	1.0005	1.0010	1.0001	1.0001	1.0001	1.0100	OK		
5	1.0012	1.0017	1.0011	0.9998	0.9994	1.0003	1.0120	OK		
6	1.0014	1.0014	1.0023	1.0004	1.0000	1.0010	1.0100	OK		
7	0.9992	0.9996	0.9999	_	_	_	1.0070	OK		
8	1.0001	1.0012	1.0003	_	—	_	1.0120	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 22 Sep 2008, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20081014_094245_20080922_192834_20080924_192834 .

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 (23 Sep 2008– 06 Oct 2008) to the corresponding m-factor of the previous delivery day (22 Sep 2008). The grey boxes visualize the maximum ratio allowed.