NRT M-factor delivery document 04 Jan 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: 29 Dec 2009–04 Jan 2010
- Prediction: 05 Jan 2010– 11 Jan 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			
md5-sum 066f3a8a2e8aafb0440c33724b47a042 022c05baa5bd8c01ac38ce312c93655e 6dd8797d2b5af70cb88729e9f15db41a d9b5a58448a76ffbe1ca963a15cde72e f29d8f1169655f7ff7febbbcdc6f09e9 afc604dd52fe77e0c280c84f384b34ea 2bfa9d3589bb7cb16b6096575fca1008 b3b10bc8fbad667b7ae91f16599bd306 f008ee01eb2121c671f31af04593fcdc beb987ffc826e15cd99183c5e801156b 51b12bd131a54577a3c88ee264183de2 97b265a28a0f3a5e355c5736b18ef922	m-factor auxiliary file SCI_MF1_AXNIFE20100107_124050_20091229_183648_20091231_183648 SCI_MF1_AXNIFE20100107_124050_20091230_194547_20100101_194547 SCI_MF1_AXNIFE20100107_124050_20091231_191410_20100102_191410 SCI_MF1_AXNIFE20100107_124050_20100101_184233_20100103_184233 SCI_MF1_AXNIFE20100107_124050_20100103_191955_20100104_181056 SCI_MF1_AXNIFE20100107_124050_20100104_184818_20100106_184818 SCI_MF1_AXNIFE20100107_124050_20100105_181641_20100106_184818 SCI_MF1_AXNIFE20100107_124050_20100106_192540_20100108_192540 SCI_MF1_AXNIFE20100107_124050_20100107_185403_20100109_185403 SCI_MF1_AXNIFE20100107_124050_20100108_182226_20100110_182226 SCI_MF1_AXNIFE20100107_124050_20100108_182226_20100111_193125			
c36349b80249efa9ff76f5166c93ecd0 04b84df1c8814cdcbba8b0c6ed7c6ced	SCI_MF1_AXNIFE20100107_124050_20100110_185948_20100112_185948 SCI_MF1_AXNIFE20100107_124050_20100111_182811_20100208_182811			

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

validity identifier	M_CAL	M_DL	M_DN
20091229_183648_20091231_183648	meas.	meas.	interp.
20091230_194547_20100101_194547	meas.	meas.	meas.
20091231_191410_20100102_191410	meas.	meas.	interp.
20100101_184233_20100103_184233	meas.	meas.	interp.
20100102_181056_20100104_181056	meas.	meas.	interp.
20100103_191955_20100105_191955	meas.	meas.	meas.
20100104_184818_20100106_184818	meas.	meas.	pred.
20100105_181641_20100107_181641	pred.	pred.	pred.
20100106_192540_20100108_192540	pred.	pred.	pred.
20100107_185403_20100109_185403	pred.	pred.	pred.
20100108_182226_20100110_182226	pred.	pred.	pred.
20100109_193125_20100111_193125	pred.	pred.	pred.
20100110_185948_20100112_185948	pred.	pred.	pred.
20100111_182811_20100208_182811	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 ratio						
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status		
1	1.0111	1.0150	1.0062	1.0016	1.0060	1.0004	1.0400	OK		
2	1.0028	1.0085	1.0033	1.0011	1.0031	1.0006	1.0200	OK		
3	1.0006	1.0020	1.0016	0.9998	1.0004	0.9989	1.0100	OK		
4	1.0018	1.0011	1.0020	0.9997	1.0001	0.9989	1.0100	OK		
5	1.0010	1.0011	1.0013	1.0001	1.0005	0.9996	1.0120	OK		
6	1.0021	1.0010	1.0013	0.9996	1.0004	0.9997	1.0100	OK		
$\overline{7}$	1.0009	1.0007	1.0010	-	_	_	1.0070	OK		
8	1.0017	1.0010	1.0021	—	—	_	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 28 Dec 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20100107_094139_20091228_190825_20091230_190825 .

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 (29 Dec 2009–11 Jan 2010) to the corresponding m-factor of the previous delivery day (28 Dec 2009). The grey boxes visualize the maximum ratio allowed.