NRT M-factor delivery document 30 Nov 2009

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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: 24 Nov 2009– 30 Nov 2009
- Prediction: 01 Dec 2009–07 Dec 2009

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			
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b0d4bbff7de9fa3d0063c9b237e80f64	SCI_MF1_AXNIFE20091130_225439_20091124_183648_20091126_183648			
07cb09ccecb62f3b63733661ec3bc10d	SCI_MF1_AXNIFE20091130_225439_20091125_194547_20091127_194547			
a19b070ffc777af04e505992f0e0cbdc	SCI_MF1_AXNIFE20091130_225439_20091126_191410_20091128_191410			
8cd5c26092d066b72ff267ce8240107d	SCI_MF1_AXNIFE20091130_225439_20091128_181056_20091130_184056			
47e736f38ae0093327b3edaa44022d7e	SCI_MF1_AXNIFE20091130_225439_20091129_191955_20091201_191955			
392e95b79faf4624d917c45cc2ad5084	SCI_MF1_AXNIFE20091130_225439_20091120_184818_20091202_184818			
bf86901b518136540ad130a14680f3e0	SCI_MF1_AXNIFE20091130_225439_20091201_181641_20091203_181641			
fa925fb8d54f14eb0e7f085faf9b334c	SCI_MF1_AXNIFE20091130_225439_20091201_1925403_20091204_192540			
ecbba00841934a8309964b662b415050	SCI_MF1_AXNIFE20091130_225439_20091203_185403_20091204_192540			
380e9ca1ea1439a7e80428a0cca0f1d5	SCI_MF1_AXNIFE20091130_225439_20091204_185403_20091205_185403			
fe33b53c7eab8f79de3ab6fd61222888	SCI_MF1_AXNIFE20091130_225439_20091204_182226_20091206_182226			
80ef3095f5a71bd2f2047180858368c5	SCI_MF1_AXNIFE20091130_225439_20091205_193125_20091207_193125			
af040ae3d146537a2f1a00941cfb57c2	SCI_MF1_AXNIFE20091130_225439_20091206_185948_20091208_185948			
764d87a59f4007a9a4f401de889512b6	SCI_MF1_AXNIFE20091130_225439_20091207_182811_20100104_182811			

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

validity identifier	M_CAL	M_DL	M_DN
20091124_183648_20091126_183648	meas.	meas.	interp.
20091125_194547_20091127_194547	meas.	meas.	meas.
20091126_191410_20091128_191410	meas.	meas.	interp.
20091127_184233_20091129_184233	meas.	meas.	interp.
20091128_181056_20091130_181056	meas.	meas.	interp.
20091129_191955_20091201_191955	meas.	meas.	meas.
20091130_184818_20091202_184818	meas.	pred.	meas.
20091201_181641_20091203_181641	pred.	pred.	pred.
20091202_192540_20091204_192540	pred.	pred.	pred.
20091203_185403_20091205_185403	pred.	pred.	pred.
20091204_182226_20091206_182226	pred.	pred.	pred.
20091205_193125_20091207_193125	pred.	pred.	pred.
20091206_185948_20091208_185948	pred.	pred.	pred.
20091207_182811_20100104_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. ratio (ch. $6/7$: median)			mean ratio					
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status	
1	1.0180	1.0167	1.0107	1.0004	1.0066	0.9980	1.0400	OK	
2	1.0023	1.0102	1.0026	1.0004	1.0038	0.9996	1.0200	OK	
3	1.0012	1.0040	1.0022	0.9997	1.0009	1.0001	1.0100	OK	
4	1.0015	1.0011	1.0028	0.9993	1.0003	1.0001	1.0100	OK	
5	1.0036	1.0014	1.0030	0.9986	1.0002	0.9998	1.0120	OK	
6	1.0028	1.0030	1.0045	0.9993	1.0015	1.0015	1.0100	OK	
$\overline{7}$	1.0008	1.0026	1.0034	_	_	_	1.0070	OK	
8	1.0038	1.0022	1.0030	_	_	_	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 23 Nov 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20091125_081327_20091123_190826_20091125_190826 .

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 (24 Nov 2009– 07 Dec 2009) to the corresponding m-factor of the previous delivery day (23 Nov 2009). The grey boxes visualize the maximum ratio allowed.