NRT M-factor delivery document 31 Aug 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: 25 Aug 2009– 31 Aug 2009
- Prediction: 01 Sep 2009– 07 Sep 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
5d8a5e1a1b9d0e4ae1df5d8c445e0935	SCI_MF1_AXNIFE20090831_215431_20090825_193710_20090827_193710
6b987cfcc93183c3b374089f26bf85b3	SCI_MF1_AXNIFE20090831_215431_20090826_190533_20090828_190533
004715755a499bd7269e6317125b5273	SCI_MF1_AXNIFE20090831_215431_20090827_183356_20090829_183356
039afded010ed1f866976538151e355c	SCI_MF1_AXNIFE20090831_215431_20090828_194255_20090830_194255
c772eb693b9be45ede67240ef05f48a1	SCI_MF1_AXNIFE20090831_215431_20090829_191118_20090831_191118
57dd4d7501ce4c2671ac5c05bd7c17c5	SCI_MF1_AXNIFE20090831_215431_20090830_183941_20090901_183941
cc84e3e1945c22b3d135c78f0be34dc7	SCI_MF1_AXNIFE20090831_215431_20090831_194840_20090902_194840
3cfaee6e0ddfed84377d2bcdaf7b9215	SCI_MF1_AXNIFE20090831_215431_20090901_191703_20090903_191703
9352f99b9c0de929a5d40a82ae595dc1	SCI_MF1_AXNIFE20090831_215431_20090902_184526_20090904_184526
152e90bbcede6709099f2ac74d4ca287	SCI_MF1_AXNIFE20090831_215431_20090903_181349_20090905_181349
af3e1de238f2484127f8a0086f874369	SCI_MF1_AXNIFE20090831_215431_20090904_192248_20090906_192248
79253d06711a3fee36fcbe7ae47cf09c	SCI_MF1_AXNIFE20090831_215431_20090905_185111_20090907_185111
a51c5197cf624b7f0cd8c4d8ace24fc5	SCI_MF1_AXNIFE20090831_215431_20090906_181934_20090908_181934
c58ecc307318c2e95bb39bb0802b5d2d	SCI_MF1_AXNIFE20090831_215431_20090907_192833_20091005_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090825_193710_20090827_193710	meas.	meas.	meas.
20090826_190533_20090828_190533	meas.	meas.	interp.
20090827_183356_20090829_183356	meas.	meas.	interp.
20090828_194255_20090830_194255	meas.	meas.	interp.
20090829_191118_20090831_191118	meas.	meas.	meas.
20090830_183941_20090901_183941	meas.	meas.	pred.
20090831_194840_20090902_194840	pred.	pred.	pred.
20090901_191703_20090903_191703	pred.	pred.	pred.
20090902_184526_20090904_184526	pred.	pred.	pred.
20090903_181349_20090905_181349	pred.	pred.	pred.
20090904_192248_20090906_192248	pred.	pred.	pred.
20090905_185111_20090907_185111	pred.	pred.	pred.
20090906_181934_20090908_181934	pred.	pred.	pred.
20090907_192833_20091005_192833	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. SCIAMACHY 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	197	1140	2131	3117	4151	5226	6154	7178
range	784	1859	2943	3925	4863	5914	7157	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	1.0118	1.0114	1.0049	1.0001	1.0044	1.0009	1.0400	OK
2	1.0028	1.0074	1.0030	1.0009	1.0024	1.0006	1.0200	OK
3	1.0005	1.0016	1.0020	1.0000	1.0002	0.9993	1.0100	OK
4	1.0007	1.0004	1.0022	1.0001	1.0000	0.9993	1.0100	OK
5	1.0013	1.0012	1.0019	1.0004	1.0001	0.9996	1.0120	OK
6	1.0035	1.0019	1.0026	1.0007	1.0007	1.0008	1.0100	OK
7	1.0007	1.0013	1.0019	–	–	–	1.0070	OK
8	1.0091	1.0094	1.0087	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 24 Aug 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090825_075712_20090824_182811_20090826_182811` .

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

[1] 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

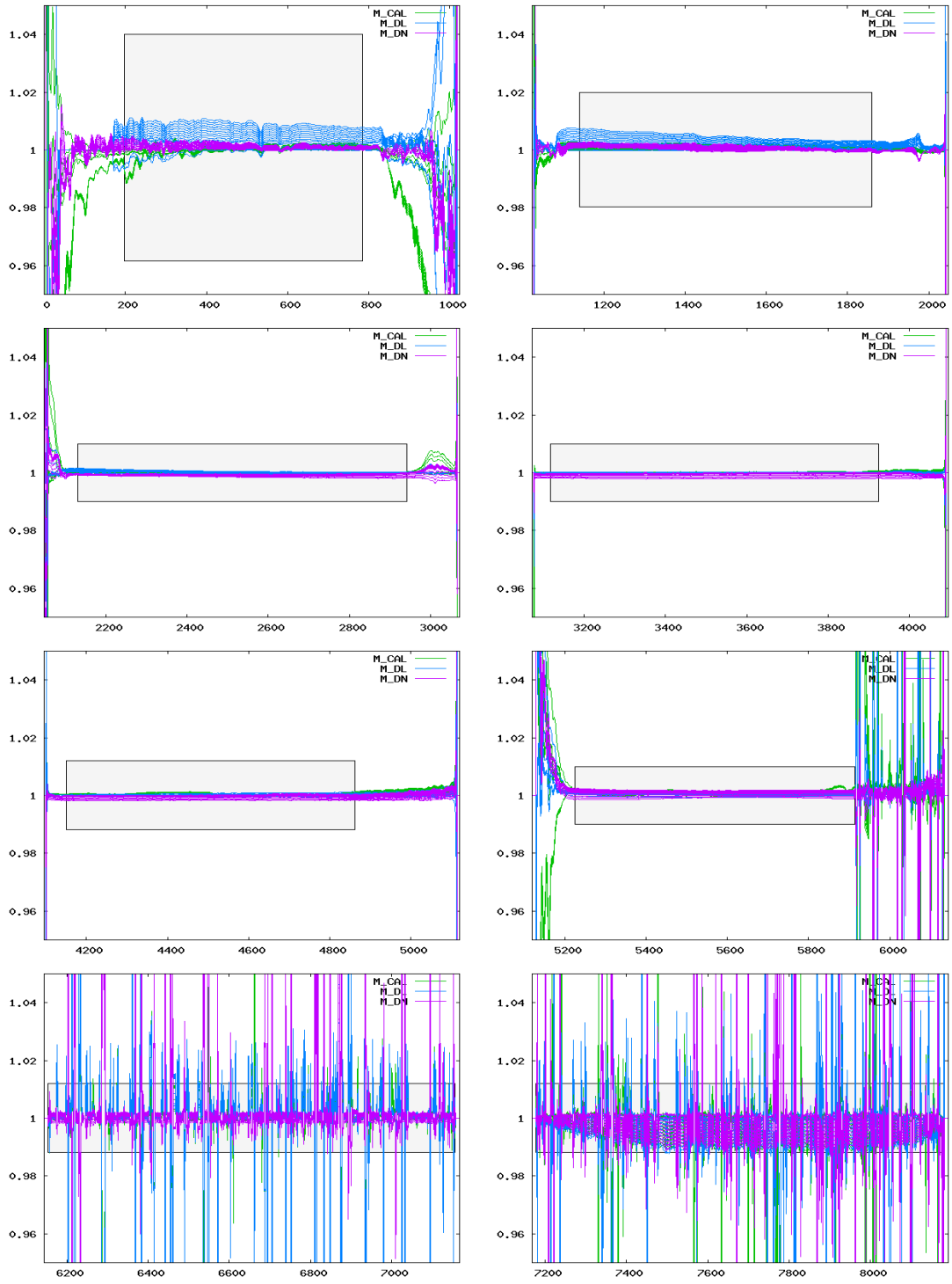

Figure 1: Ratio of delivered m-factors (25 Aug 2009– 07 Sep 2009) to the corresponding m-factor of the previous delivery day (24 Aug 2009). The grey boxes visualize the maximum ratio allowed.