NRT M-factor delivery document 22 Aug 2011

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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: 16 Aug 2011– 22 Aug 2011
- Prediction: 23 Aug 2011– 29 Aug 2011

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
7492ade290dedac7388add63960ac8fb	SCI_MF1_AXNIFE20110823_074427_20110816_192417_20110818_192417
c03bee815cd8200cc0a28de9757cb907	SCI_MF1_AXNIFE20110823_074427_20110817_184732_20110819_184732
656812c93caf5480a53f1d4dc606497f	SCI_MF1_AXNIFE20110823_074427_20110818_181046_20110820_181046
57c04d238e0e40d993fc28ea77d86fec	SCI_MF1_AXNIFE20110823_074427_20110819_191414_20110821_191414
e5f5eb397f362c5ce02ae760ac3861e5	SCI_MF1_AXNIFE20110823_074427_20110820_183729_20110822_183729
00db00fecbf6600dac3a770203a71056	SCI_MF1_AXNIFE20110823_074427_20110821_194057_20110823_194057
dae0b8b057f9b5d7bab98bce04c40a7b	SCI_MF1_AXNIFE20110823_074427_20110822_190412_20110824_190412
81920391c040cd6ea9542618a27ab7e6	SCI_MF1_AXNIFE20110823_074427_20110823_182727_20110825_182727
8cfc00d71f13ee146045c34118ef86df	SCI_MF1_AXNIFE20110823_074427_20110824_193055_20110826_193055
7736bed30127c1ce52e4e294622089cd	SCI_MF1_AXNIFE20110823_074427_20110825_185410_20110827_185410
70a07d5c05de19f9c49bb61f8c300e4d	SCI_MF1_AXNIFE20110823_074427_20110826_181724_20110828_181724
a9803ac883bcd57b0844d9a5fbaae538	SCI_MF1_AXNIFE20110823_074427_20110827_192052_20110829_192052
efaf9c82d392d6bf76ed4a09b290b791	SCI_MF1_AXNIFE20110823_074427_20110828_184407_20110830_184407
c324ea1db670f719665e5c0b1d31f511	SCI_MF1_AXNIFE20110823_074427_20110829_180722_20110926_180722

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

validity identifier	M_CAL	M_DL	M_DN
20110816_192417_20110818_192417	meas.	meas.	interp.
20110817_184732_20110819_184732	meas.	meas.	meas.
20110818_181046_20110820_181046	meas.	meas.	interp.
20110819_191414_20110821_191414	meas.	meas.	interp.
20110820_183729_20110822_183729	meas.	meas.	interp.
20110821_194057_20110823_194057	meas.	meas.	meas.
20110822_190412_20110824_190412	pred.	meas.	pred.
20110823_182727_20110825_182727	pred.	pred.	pred.
20110824_193055_20110826_193055	pred.	pred.	pred.
20110825_185410_20110827_185410	pred.	pred.	pred.
20110826_181724_20110828_181724	pred.	pred.	pred.
20110827_192052_20110829_192052	pred.	pred.	pred.
20110828_184407_20110830_184407	pred.	pred.	pred.
20110829_180722_20110926_180722	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	1.0154	1.0083	1.0474	1.0004	0.9990	0.9939	1.0600	OK
2	1.0025	1.0020	1.0037	1.0012	1.0009	1.0008	1.0200	OK
3	1.0018	1.0010	1.0015	1.0006	1.0004	1.0001	1.0100	OK
4	1.0016	1.0013	1.0030	1.0006	1.0002	0.9990	1.0100	OK
5	1.0020	1.0019	1.0023	1.0011	1.0006	0.9991	1.0120	OK
6	1.0015	1.0020	1.0008	1.0010	1.0010	1.0000	1.0100	OK
7	1.0012	1.0014	1.0007	–	–	–	1.0070	OK
8	1.0039	1.0034	1.0027	–	–	–	1.0120	OK

certain limit l:

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

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 15 Aug 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110816_040659_20110815_182049_20110817_182049` .

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

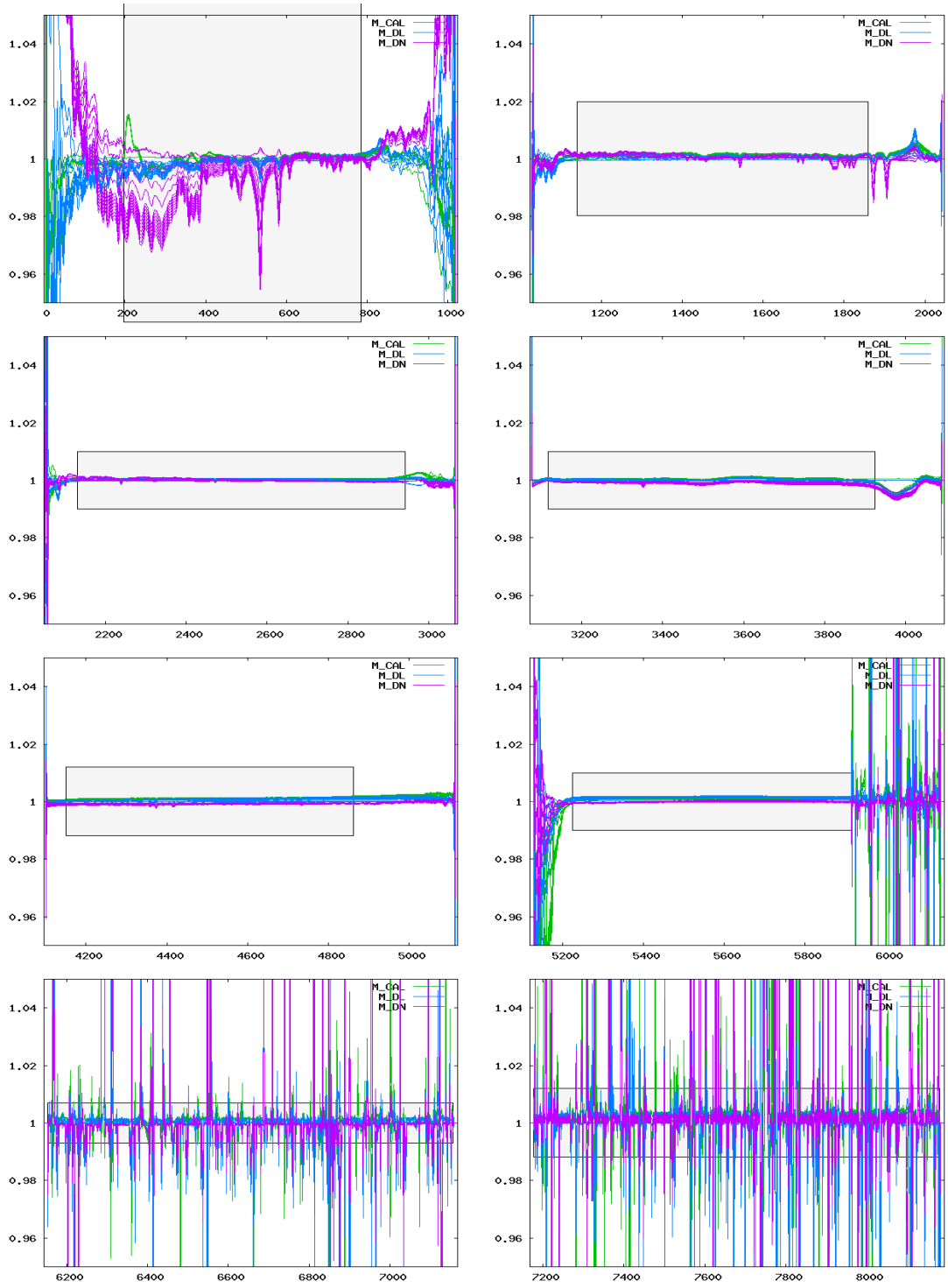

Figure 1: Ratio of delivered m-factors (16 Aug 2011– 29 Aug 2011) to the corresponding m-factor of the previous delivery day (15 Aug 2011). The grey boxes visualize the maximum ratio allowed.