NRT M-factor delivery document 31 Jan 2011

Klaus Bramstedt, ife Bremen

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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: 25 Jan 2011– 31 Jan 2011
- Prediction: 01 Feb 2011– 07 Feb 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
d1b83a2ec12d33d648f2e06caa1ab0d4	SCI_MF1_AXNIFE20110201_044326_20110125_182843_20110127_182843
928f688768415951c11accde969a2a50	SCI_MF1_AXNIFE20110201_044326_20110126_193212_20110128_193212
3ba2ea0a0621303b425b5855c27d81bf	SCI_MF1_AXNIFE20110201_044326_20110127_185526_20110129_185526
ecf266e85c460954e5decd5540090a79	SCI_MF1_AXNIFE20110201_044326_20110128_181841_20110130_181841
15d1927991a26b5d911da65c95e016ba	SCI_MF1_AXNIFE20110201_044326_20110129_192209_20110131_192209
8efbf48db4c232fefe7e813733e7c71b	SCI_MF1_AXNIFE20110201_044326_20110130_184524_20110201_184524
9c71ce18b2ed3ea1e1c5dacfcf75deb7	SCI_MF1_AXNIFE20110201_044326_20110131_194852_20110202_194852
d43c1051777d9a99f35c8b59dc7bdc2c	SCI_MF1_AXNIFE20110201_044326_20110201_191207_20110203_191207
9e888ff5f3e6bebda8506fee418a91b3	SCI_MF1_AXNIFE20110201_044326_20110202_183521_20110204_183521
03013b57458bf5f45ba33147a2267ec0	SCI_MF1_AXNIFE20110201_044326_20110203_193850_20110205_193850
5cd2dae5b137d156efc6da9976b13419	SCI_MF1_AXNIFE20110201_044326_20110204_190204_20110206_190204
1d9c117c2dc2dd789c023ebc82498575	SCI_MF1_AXNIFE20110201_044326_20110205_182519_20110207_182519
073ca57524d0ec5e5d37c506a4afac56	SCI_MF1_AXNIFE20110201_044326_20110206_192847_20110208_192847
d0015a6bacfb718fbdf4b2dc38eef77c	SCI_MF1_AXNIFE20110201_044326_20110207_185202_20110307_185202

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

validity identifier	M_CAL	M_DL	M_DN
20110125_182843_20110127_182843	meas.	meas.	interp.
20110126_193212_20110128_193212	meas.	meas.	meas.
20110127_185526_20110129_185526	meas.	meas.	interp.
20110128_181841_20110130_181841	meas.	meas.	interp.
20110129_192209_20110131_192209	meas.	meas.	interp.
20110130_184524_20110201_184524	meas.	meas.	meas.
20110131_194852_20110202_194852	meas.	meas.	pred.
20110201_191207_20110203_191207	pred.	pred.	pred.
20110202_183521_20110204_183521	pred.	pred.	pred.
20110203_193850_20110205_193850	pred.	pred.	pred.
20110204_190204_20110206_190204	pred.	pred.	pred.
20110205_182519_20110207_182519	pred.	pred.	pred.
20110206_192847_20110208_192847	pred.	pred.	pred.
20110207_185202_20110307_185202	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	1.0149	1.0141	1.0086	1.0005	1.0039	0.9992	1.0400	OK
2	1.0028	1.0078	1.0020	1.0010	1.0027	1.0007	1.0200	OK
3	1.0004	1.0017	1.0011	1.0000	1.0003	0.9998	1.0100	OK
4	1.0017	1.0015	1.0014	1.0002	1.0001	1.0001	1.0100	OK
5	1.0019	1.0023	1.0020	1.0008	1.0006	1.0006	1.0120	OK
6	1.0017	1.0014	1.0013	1.0008	1.0004	1.0007	1.0100	OK
7	1.0016	1.0004	1.0004	–	–	–	1.0070	OK
8	1.0044	1.0029	1.0037	–	–	–	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 24 Jan 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110125_044314_20110124_190529_20110126_190529` .

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

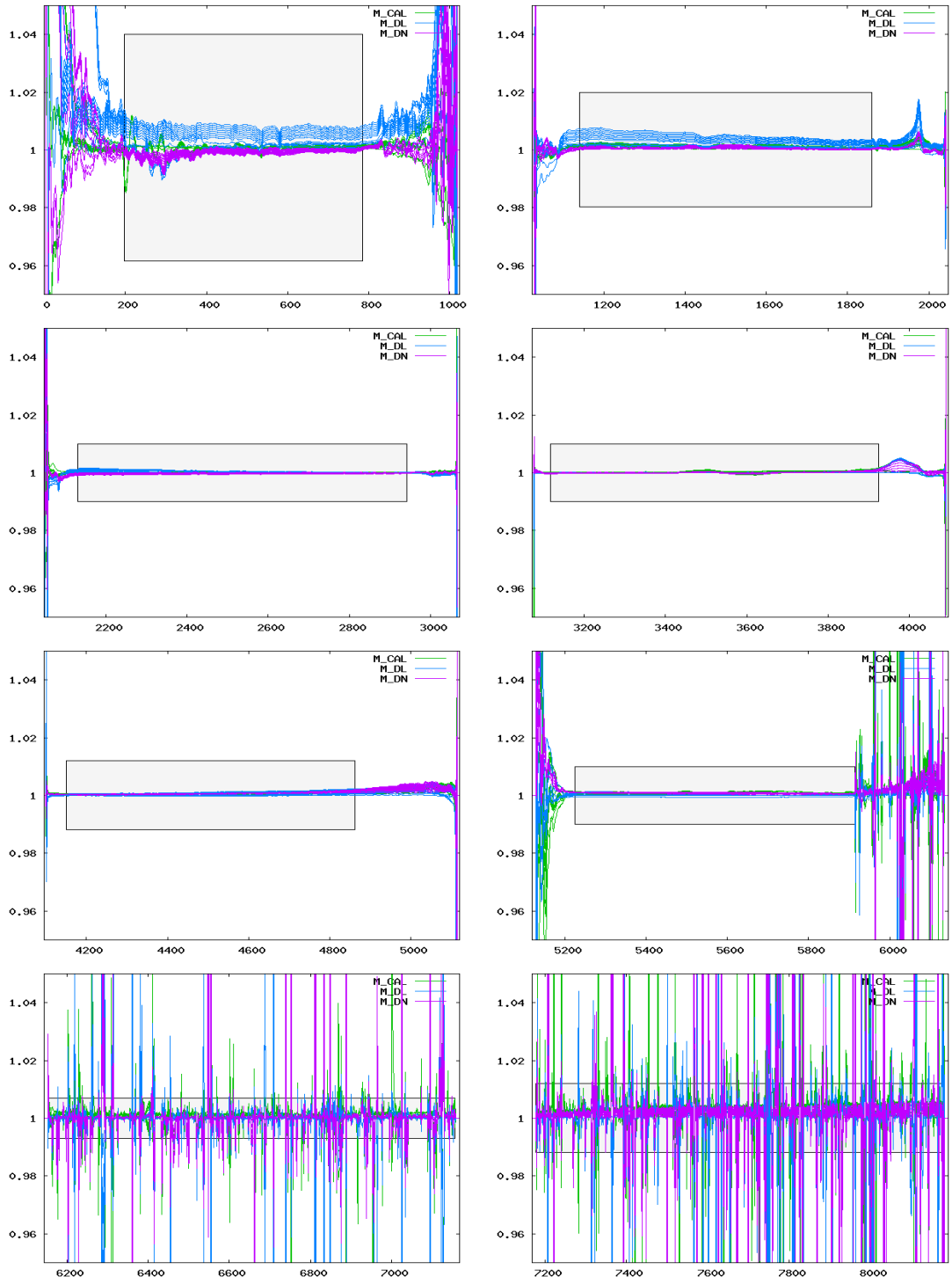

Figure 1: Ratio of delivered m-factors (25 Jan 2011– 07 Feb 2011) to the corresponding m-factor of the previous delivery day (24 Jan 2011). The grey boxes visualize the maximum ratio allowed.