NRT M-factor delivery document 07 Feb 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: 01 Feb 2011– 07 Feb 2011
- Prediction: 08 Feb 2011– 14 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
df6e2a9fdf040e8a26fb4ad1d67044ec	SCI_MF1_AXNIFE20110208_044308_20110201_191207_20110203_191207
d002a7ee9a23c37df3112f611d76ae99	SCI_MF1_AXNIFE20110208_044308_20110202_183521_20110204_183521
5bc77087b0ed10c5ea3d03b78f1a44b5	SCI_MF1_AXNIFE20110208_044308_20110203_193850_20110205_193850
d4b26f7e660f83be1f7090ddb0f053bd	SCI_MF1_AXNIFE20110208_044308_20110204_190204_20110206_190204
a01ec52364387aeec4272bcc56b746e9	SCI_MF1_AXNIFE20110208_044308_20110205_182519_20110207_182519
1d86e99aae004d9673ac944efa7851d2	SCI_MF1_AXNIFE20110208_044308_20110206_192847_20110208_192847
7ffbb821a34a642c5087284675a86c96	SCI_MF1_AXNIFE20110208_044308_20110207_185202_20110209_185202
55d4335fd2453fe2e9cbb3dd400aeecd	SCI_MF1_AXNIFE20110208_044308_20110208_181516_20110210_181516
89a9258c342ecf79809c54dd5419bd6a	SCI_MF1_AXNIFE20110208_044308_20110209_191845_20110211_191845
c6d3d0d742106e15987d843ebe2d222c	SCI_MF1_AXNIFE20110208_044308_20110210_184159_20110212_184159
7972d1946d34eac9f955ef7824e1e01b	SCI_MF1_AXNIFE20110208_044308_20110211_194528_20110213_194528
7823c8992d72496d9d7968b24d28132d	SCI_MF1_AXNIFE20110208_044308_20110212_190842_20110214_190842
c0c23d506ae28764eb4d055cdf0c7ea4	SCI_MF1_AXNIFE20110208_044308_20110213_183157_20110215_183157
b3425c737acbc289d7d24a3267df2ed2	SCI_MF1_AXNIFE20110208_044308_20110214_193525_20110314_193525

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

validity identifier	M_CAL	M_DL	M_DN
20110201_191207_20110203_191207	meas.	meas.	interp.
20110202_183521_20110204_183521	meas.	meas.	meas.
20110203_193850_20110205_193850	meas.	meas.	interp.
20110204_190204_20110206_190204	meas.	meas.	interp.
20110205_182519_20110207_182519	interp.	meas.	interp.
20110206_192847_20110208_192847	meas.	meas.	interp.
20110207_185202_20110209_185202	meas.	meas.	meas.
20110208_181516_20110210_181516	pred.	pred.	pred.
20110209_191845_20110211_191845	pred.	pred.	pred.
20110210_184159_20110212_184159	pred.	pred.	pred.
20110211_194528_20110213_194528	pred.	pred.	pred.
20110212_190842_20110214_190842	pred.	pred.	pred.
20110213_183157_20110215_183157	pred.	pred.	pred.
20110214_193525_20110314_193525	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	1.0235	1.0151	1.0266	0.9996	1.0005	1.0007	1.0400	OK
2	1.0008	1.0037	1.0037	1.0001	1.0008	1.0008	1.0200	OK
3	1.0009	1.0005	1.0023	0.9996	0.9999	0.9991	1.0100	OK
4	1.0009	1.0005	1.0024	0.9998	0.9998	0.9986	1.0100	OK
5	1.0011	1.0009	1.0016	1.0000	0.9997	0.9993	1.0120	OK
6	1.0008	1.0011	1.0008	1.0000	0.9994	0.9998	1.0100	OK
7	1.0005	1.0006	1.0015	–	–	–	1.0070	OK
8	1.0015	1.0010	1.0007	–	–	–	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 31 Jan 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110201_044326_20110131_194852_20110202_194852` .

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

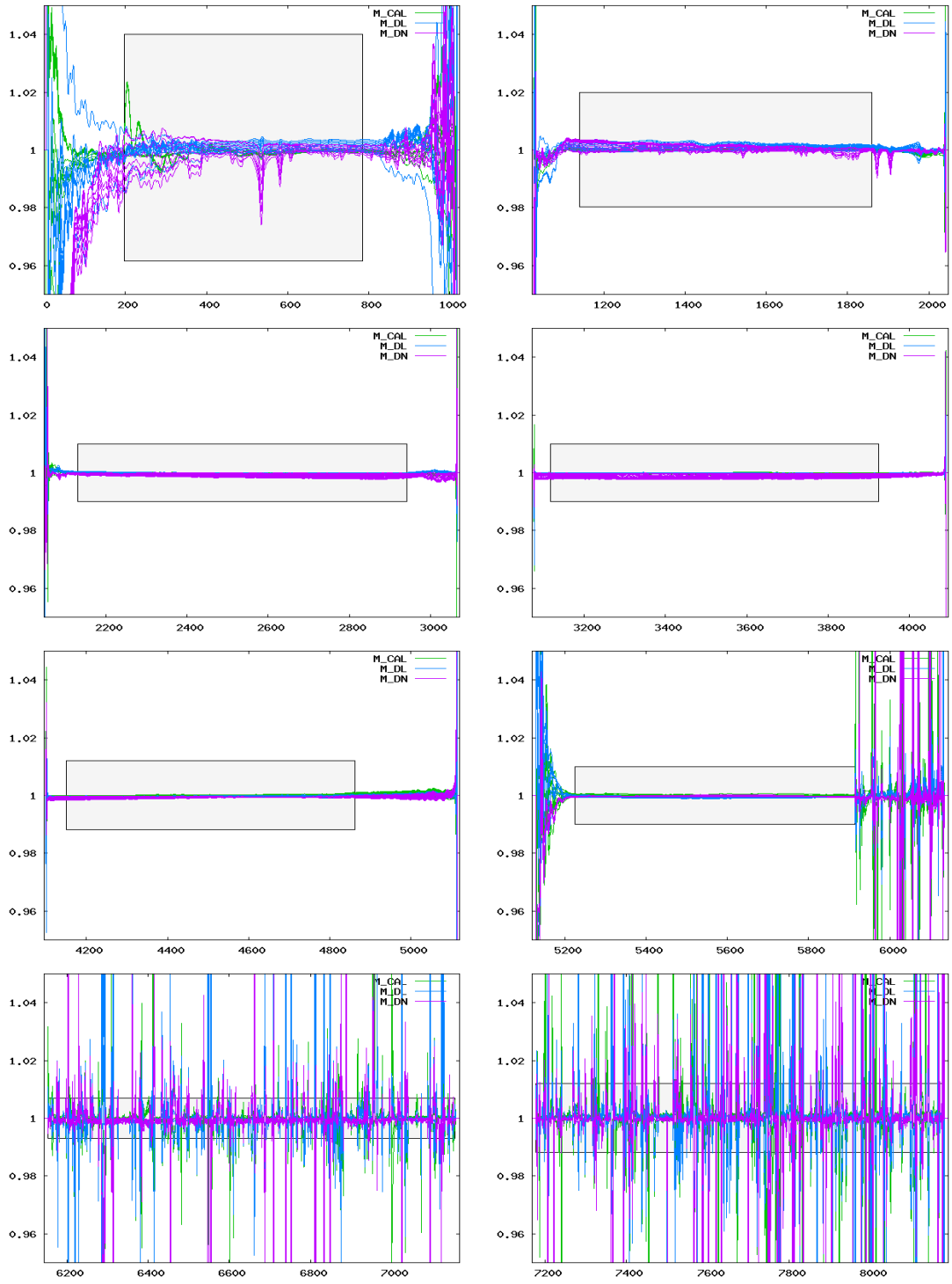

Figure 1: Ratio of delivered m-factors (01 Feb 2011– 14 Feb 2011) to the corresponding m-factor of the previous delivery day (31 Jan 2011). The grey boxes visualize the maximum ratio allowed.