NRT M-factor delivery document 17 Jan 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: 11 Jan 2011– 17 Jan 2011
- Prediction: 18 Jan 2011– 24 Jan 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
b9d35f062b9e7a9784b80493cded2a70	SCI_MF1_AXNIFE20110118_044254_20110111_184210_20110113_184210
ddc5734a2ff9255f13b58a64d7797526	SCI_MF1_AXNIFE20110118_044254_20110112_194539_20110114_194539
f27fd4b269337be96fea77d684a0a4ee	SCI_MF1_AXNIFE20110118_044254_20110113_190853_20110115_190853
ea4cf6d42fbf179606ea0c69134d095e	SCI_MF1_AXNIFE20110118_044254_20110114_183208_20110116_183208
4b13ebd7570b52df26c06b892a20c11d	SCI_MF1_AXNIFE20110118_044254_20110115_193536_20110117_193536
eb7181531b5acd7ae5b93d2cee6cfc0f	SCI_MF1_AXNIFE20110118_044254_20110116_185851_20110118_185851
d32675ba8089e7dc58b1157dc27b955f	SCI_MF1_AXNIFE20110118_044254_20110117_182205_20110119_182205
84c11ae875897a65bf009801e2617105	SCI_MF1_AXNIFE20110118_044254_20110118_192534_20110120_192534
9df9f8812b03b8b22827cba946bcdbb1	SCI_MF1_AXNIFE20110118_044254_20110119_184848_20110121_184848
acee72f01dc158b58ce24624f458009f	SCI_MF1_AXNIFE20110118_044254_20110120_181203_20110122_181203
cd94628da0f7e2422f92b5f7036bf69b	SCI_MF1_AXNIFE20110118_044254_20110121_191531_20110123_191531
466304531260e705f09bb0d3d782e1ad	SCI_MF1_AXNIFE20110118_044254_20110122_183846_20110124_183846
a6fb46e27c2ec55f42fa7fb40a0f0356	SCI_MF1_AXNIFE20110118_044254_20110123_194214_20110125_194214
b2b1f6eb178dbcd8f23db4b98d49e18a	SCI_MF1_AXNIFE20110118_044254_20110124_190529_20110221_190529

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

validity identifier	M_CAL	M_DL	M_DN
20110111_184210_20110113_184210	meas.	meas.	interp.
20110112_194539_20110114_194539	meas.	meas.	meas.
20110113_190853_20110115_190853	meas.	meas.	interp.
20110114_183208_20110116_183208	meas.	meas.	interp.
20110115_193536_20110117_193536	meas.	meas.	interp.
20110116_185851_20110118_185851	meas.	meas.	meas.
20110117_182205_20110119_182205	pred.	meas.	pred.
20110118_192534_20110120_192534	pred.	pred.	pred.
20110119_184848_20110121_184848	pred.	pred.	pred.
20110120_181203_20110122_181203	pred.	pred.	pred.
20110121_191531_20110123_191531	pred.	pred.	pred.
20110122_183846_20110124_183846	pred.	pred.	pred.
20110123_194214_20110125_194214	pred.	pred.	pred.
20110124_190529_20110221_190529	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	1.0049	1.0100	1.0054	1.0018	1.0040	0.9989	1.0400	OK
2	1.0030	1.0089	1.0026	1.0014	1.0035	1.0002	1.0200	OK
3	1.0007	1.0025	1.0034	1.0000	1.0005	0.9978	1.0100	OK
4	1.0011	1.0003	1.0037	0.9998	1.0000	0.9975	1.0100	OK
5	1.0016	1.0022	1.0029	1.0000	1.0005	0.9987	1.0120	OK
6	1.0033	1.0015	1.0024	0.9989	1.0005	0.9993	1.0100	OK
7	1.0032	1.0004	1.0028	–	–	–	1.0070	OK
8	1.0021	1.0028	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 10 Jan 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110111_044244_20110110_191856_20110112_191856` .

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

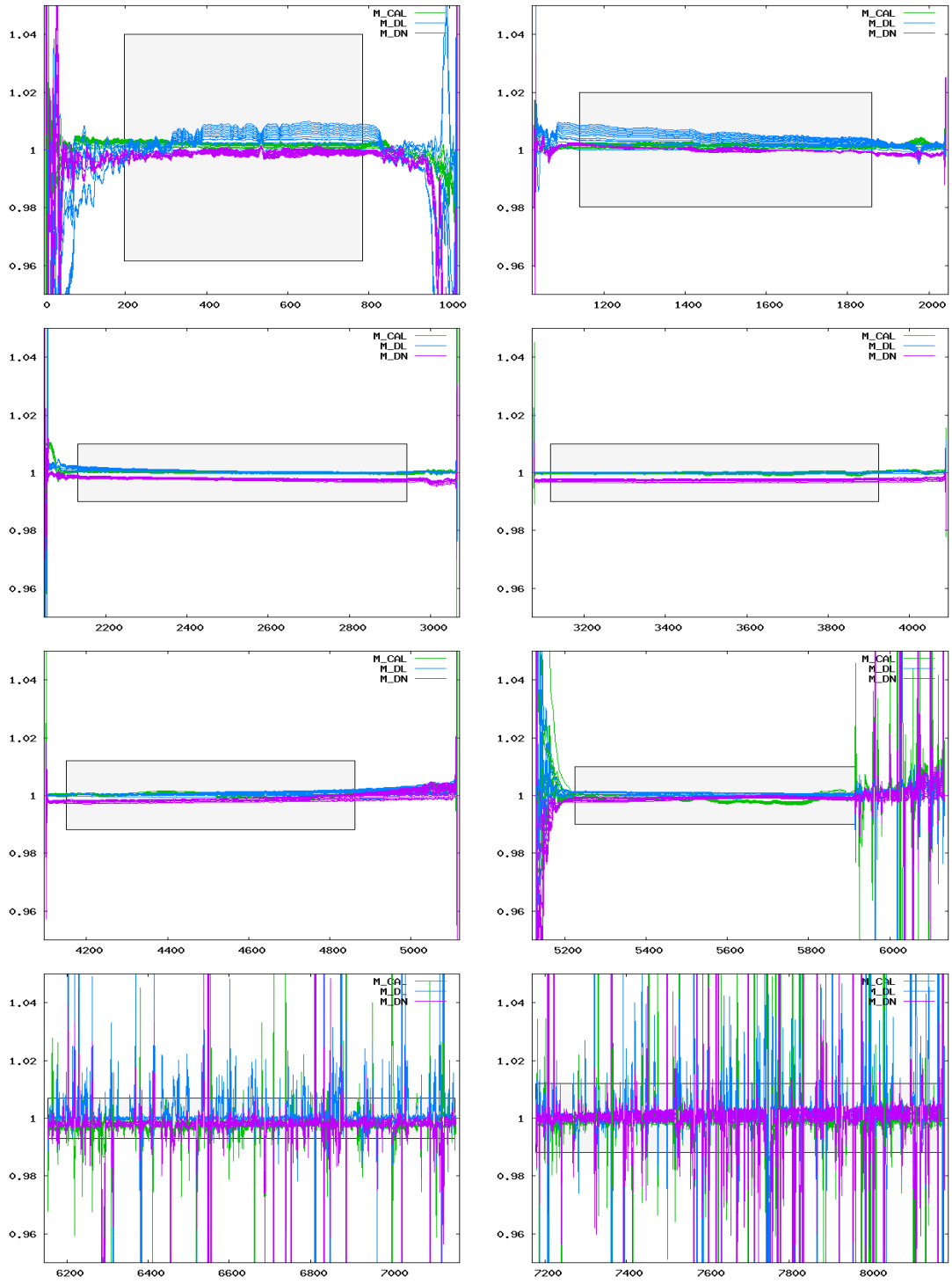

Figure 1: Ratio of delivered m-factors (11 Jan 2011– 24 Jan 2011) to the corresponding m-factor of the previous delivery day (10 Jan 2011). The grey boxes visualize the maximum ratio allowed.