NRT M-factor delivery document 10 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: 04 Jan 2011– 10 Jan 2011
- Prediction: 11 Jan 2011– 17 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
9d611d0426aae4f2d80ab55dda40afe2	SCI_MF1_AXNIFE20110111_044244_20110104_193901_20110106_193901
113e86deb81a229e524913bd0d7b7425	SCI_MF1_AXNIFE20110111_044244_20110105_190215_20110107_190215
838867e7b43afcacd59891dd359a1321	SCI_MF1_AXNIFE20110111_044244_20110106_182530_20110108_182530
413da66de9a4724ca0b6f08ef3aa1c64	SCI_MF1_AXNIFE20110111_044244_20110107_192858_20110109_192858
2c8fd6d86116a3648dcb587ce65fb6ce	SCI_MF1_AXNIFE20110111_044244_20110108_185213_20110110_185213
9a6a2e34c8c9be903cd2f682bd1c2960	SCI_MF1_AXNIFE20110111_044244_20110109_181527_20110111_181527
e68ea4c7932e168a2879c9b88d7d71f0	SCI_MF1_AXNIFE20110111_044244_20110110_191856_20110112_191856
1f70e336cb85910a4b8e0a98ec67c66b	SCI_MF1_AXNIFE20110111_044244_20110111_184210_20110113_184210
3a1c32f496d4db12c12dc908c3d2ff08	SCI_MF1_AXNIFE20110111_044244_20110112_194539_20110114_194539
f00e0032913db9f6eb78f1ed0ade5ef5	SCI_MF1_AXNIFE20110111_044244_20110113_190853_20110115_190853
bfe0ce6e8c3efbaee53f958b22ff81ab	SCI_MF1_AXNIFE20110111_044244_20110114_183208_20110116_183208
455510171eab1a257a7bf5459f2dc0fe	SCI_MF1_AXNIFE20110111_044244_20110115_193536_20110117_193536
87dc14f9220fb3e102b8bb89d42345f5	SCI_MF1_AXNIFE20110111_044244_20110116_185851_20110118_185851
bad1dc223976ae1bc049ca0d1c190a1b	SCI_MF1_AXNIFE20110111_044244_20110117_182205_20110214_182205

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

validity identifier	M_CAL	M_DL	M_DN
20110104_193901_20110106_193901	meas.	meas.	meas.
20110105_190215_20110107_190215	meas.	meas.	interp.
20110106_182530_20110108_182530	meas.	meas.	interp.
20110107_192858_20110109_192858	meas.	meas.	interp.
20110108_185213_20110110_185213	meas.	meas.	meas.
20110109_181527_20110111_181527	meas.	meas.	pred.
20110110_191856_20110112_191856	pred.	meas.	pred.
20110111_184210_20110113_184210	pred.	pred.	pred.
20110112_194539_20110114_194539	pred.	pred.	pred.
20110113_190853_20110115_190853	pred.	pred.	pred.
20110114_183208_20110116_183208	pred.	pred.	pred.
20110115_193536_20110117_193536	pred.	pred.	pred.
20110116_185851_20110118_185851	pred.	pred.	pred.
20110117_182205_20110214_182205	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	1.0091	1.0196	1.0163	1.0005	1.0065	0.9953	1.0400	OK
2	1.0016	1.0069	1.0033	1.0004	1.0027	0.9989	1.0200	OK
3	1.0021	1.0011	1.0023	0.9992	1.0002	0.9997	1.0100	OK
4	1.0021	1.0006	1.0013	0.9990	1.0001	1.0005	1.0100	OK
5	1.0024	1.0031	1.0021	0.9992	1.0011	1.0008	1.0120	OK
6	1.0044	1.0020	1.0014	0.9988	1.0010	1.0005	1.0100	OK
7	1.0013	1.0009	1.0017	–	–	–	1.0070	OK
8	1.0020	1.0035	1.0049	–	–	–	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 03 Jan 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110104_044305_20110103_183532_20110105_183532` .

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

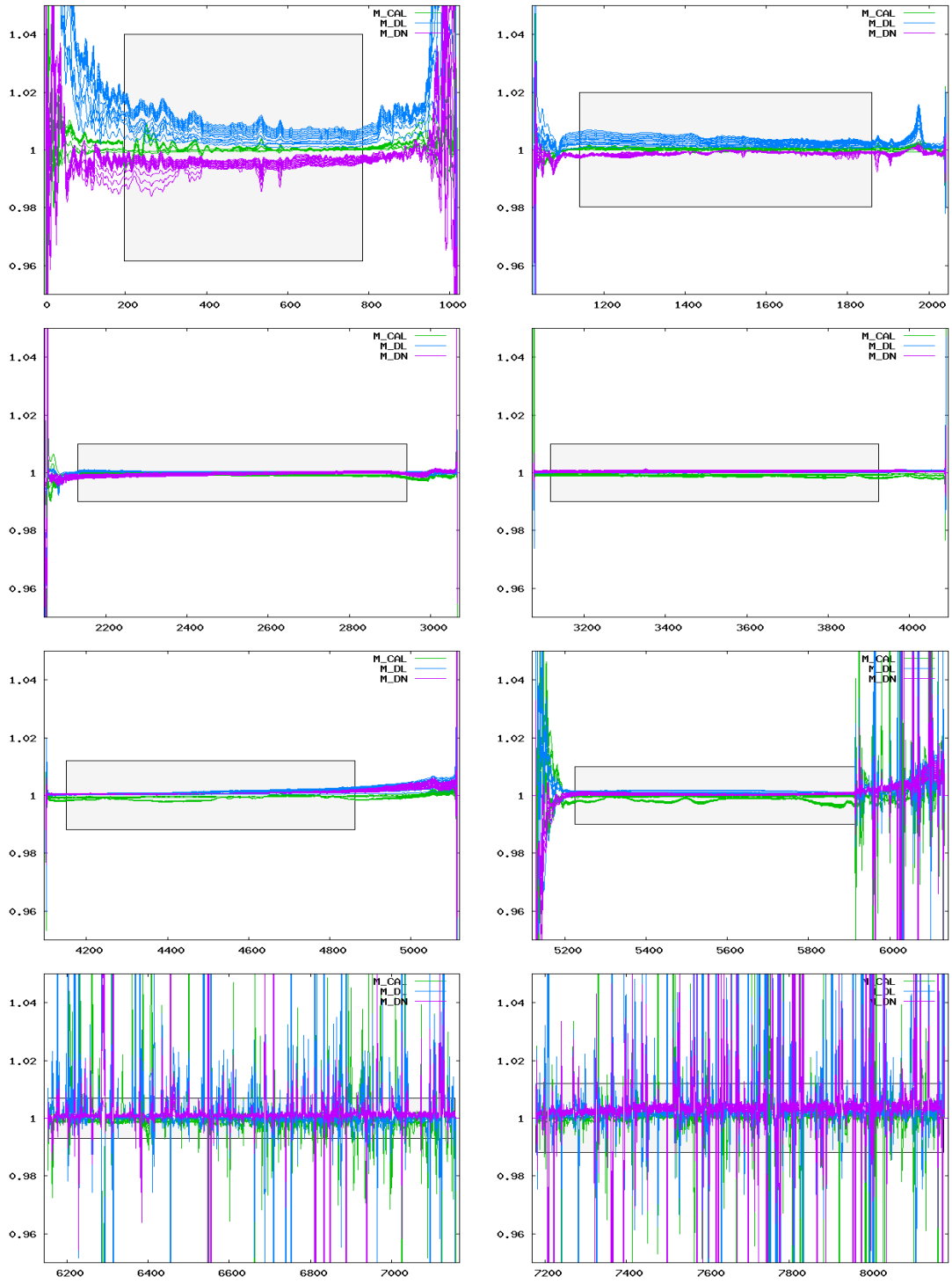

Figure 1: Ratio of delivered m-factors (04 Jan 2011– 17 Jan 2011) to the corresponding m-factor of the previous delivery day (03 Jan 2011). The grey boxes visualize the maximum ratio allowed.