NRT M-factor delivery document 03 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: 28 Dec 2010– 03 Jan 2011
- Prediction: 04 Jan 2011– 10 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
5aaf892a504557de1d4b8ff34f0739a6	SCI_MF1_AXNIFE20110104_044305_20101228_185537_20101230_185537
b02c9aff50063f940994ecfc285de548	SCI_MF1_AXNIFE20110104_044305_20101229_181852_20101231_181852
ec910d36a5496193ff57b94d2e7b3e20	SCI_MF1_AXNIFE20110104_044305_20101230_192220_20110101_192220
5c1e340747bcfc94261ae1d80a314e0a	SCI_MF1_AXNIFE20110104_044305_20101231_184535_20110102_184535
663991fb9ec84a3be9ebf52eea11bbbc	SCI_MF1_AXNIFE20110104_044305_20110101_194903_20110103_194903
31bfda436e3d07152ee0ccfdcb347e5a	SCI_MF1_AXNIFE20110104_044305_20110102_191218_20110104_191218
3c438aed094145fb02cfc0a4276ad957	SCI_MF1_AXNIFE20110104_044305_20110103_183532_20110105_183532
1682e3c76b7eeffef88000e9292cec44	SCI_MF1_AXNIFE20110104_044305_20110104_193901_20110106_193901
c603b12b79fab6e84e296ed9fa9833a7	SCI_MF1_AXNIFE20110104_044305_20110105_190215_20110107_190215
d5eb5ee5876dfa59687110fbe92de73d	SCI_MF1_AXNIFE20110104_044305_20110106_182530_20110108_182530
acd89aaceb0c13775c5998ef0ee11517	SCI_MF1_AXNIFE20110104_044305_20110107_192858_20110109_192858
c1a7aad3aafb9adcdbbf7b25226ad3e3	SCI_MF1_AXNIFE20110104_044305_20110108_185213_20110110_185213
923a83805c63b1123e4813ad34841c50	SCI_MF1_AXNIFE20110104_044305_20110109_181527_20110111_181527
50501b915dcb2c3e0c1a079e9c4c2c46	SCI_MF1_AXNIFE20110104_044305_20110110_191856_20110207_191856

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

validity identifier	M_CAL	M_DL	M_DN
20101228_185537_20101230_185537	meas.	meas.	interp.
20101229_181852_20101231_181852	meas.	meas.	interp.
20101230_192220_20110101_192220	meas.	meas.	interp.
20101231_184535_20110102_184535	meas.	meas.	meas.
20110101_194903_20110103_194903	meas.	meas.	pred.
20110102_191218_20110104_191218	meas.	meas.	pred.
20110103_183532_20110105_183532	meas.	meas.	pred.
20110104_193901_20110106_193901	pred.	pred.	pred.
20110105_190215_20110107_190215	pred.	pred.	pred.
20110106_182530_20110108_182530	pred.	pred.	pred.
20110107_192858_20110109_192858	pred.	pred.	pred.
20110108_185213_20110110_185213	pred.	pred.	pred.
20110109_181527_20110111_181527	pred.	pred.	pred.
20110110_191856_20110207_191856	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	1.0082	1.0142	1.0039	0.9993	1.0005	0.9991	1.0400	OK
2	1.0016	1.0060	1.0017	1.0005	1.0020	0.9998	1.0200	OK
3	1.0010	1.0012	1.0037	0.9997	1.0000	0.9979	1.0100	OK
4	1.0006	1.0005	1.0041	0.9998	0.9998	0.9977	1.0100	OK
5	1.0016	1.0019	1.0023	1.0004	1.0004	0.9994	1.0120	OK
6	1.0012	1.0016	1.0014	0.9998	1.0000	1.0005	1.0100	OK
7	1.0006	1.0006	1.0013	–	–	–	1.0070	OK
8	1.0049	1.0039	1.0035	–	–	–	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 27 Dec 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101228_044302_20101227_193223_20101229_193223` .

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

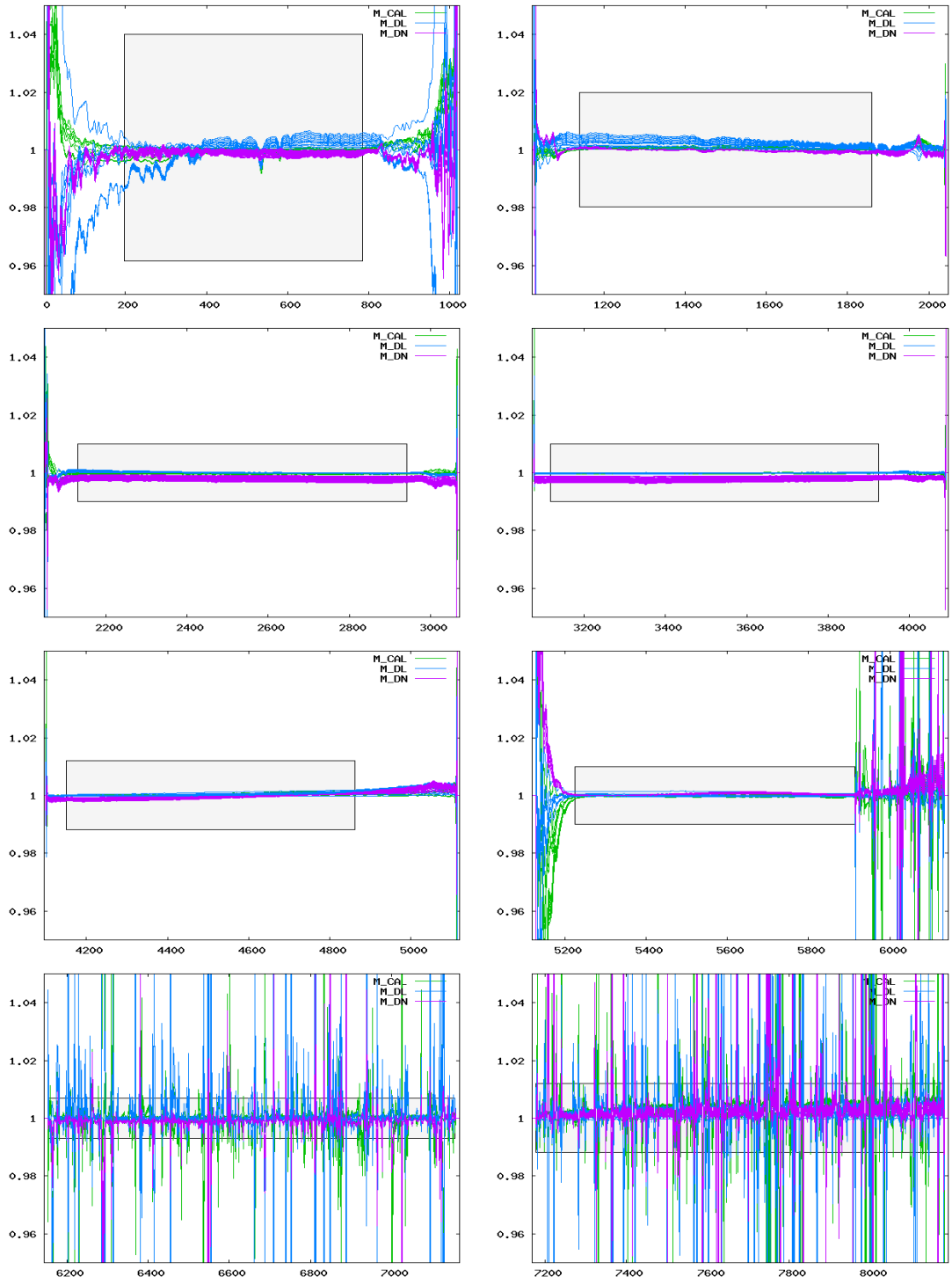

Figure 1: Ratio of delivered m-factors (28 Dec 2010– 10 Jan 2011) to the corresponding m-factor of the previous delivery day (27 Dec 2010). The grey boxes visualize the maximum ratio allowed.