NRT M-factor delivery document 27 Dec 2010

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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: 21 Dec 2010– 27 Dec 2010
- Prediction: 28 Dec 2010– 03 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
bb6be3c6e07fb04c5952a428e6ce1780	SCI_MF1_AXNIFE20101228_044302_20101221_181214_20101223_181214
4c6e74453874ef45cd65772cc8584d1f	SCI_MF1_AXNIFE20101228_044302_20101222_191542_20101224_191542
15407e25630833f96bfd9f093eed4720	SCI_MF1_AXNIFE20101228_044302_20101223_183857_20101225_183857
850e02018c48e7335984970b7cdcde8f	SCI_MF1_AXNIFE20101228_044302_20101224_194225_20101226_194225
c89345174ba834b508ab9fc00f450815	SCI_MF1_AXNIFE20101228_044302_20101225_190540_20101227_190540
e6bb711c73d188e183ca06c45d686b0f	SCI_MF1_AXNIFE20101228_044302_20101226_182854_20101228_182854
a82345a9467b40acd4aee67523620829	SCI_MF1_AXNIFE20101228_044302_20101227_193223_20101229_193223
a8746011e0f10ca48ef755f6ca85fc7c	SCI_MF1_AXNIFE20101228_044302_20101228_185537_20101230_185537
7fb431011fa29071ed283cec45c100f9	SCI_MF1_AXNIFE20101228_044302_20101229_181852_20101231_181852
899b1cb5cf9d3a065e31c11815026b4f	SCI_MF1_AXNIFE20101228_044302_20101230_192220_20110101_192220
683d9ba2273347561d64d13f5847b199	SCI_MF1_AXNIFE20101228_044302_20101231_184535_20110102_184535
5a6379c2c6d0e4e3f6fd1ab4f8fad57a	SCI_MF1_AXNIFE20101228_044302_20110101_194903_20110103_194903
74ae1ea8b2cf4a92d0308acd6c173f64	SCI_MF1_AXNIFE20101228_044302_20110102_191218_20110104_191218
85c37ddfd6c0f3d1f68e319a957d1c0a	SCI_MF1_AXNIFE20101228_044302_20110103_183532_20110131_183532

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

validity identifier	M_CAL	M_DL	M_DN
20101221_181214_20101223_181214	meas.	meas.	interp.
20101222_191542_20101224_191542	meas.	meas.	interp.
20101223_183857_20101225_183857	meas.	meas.	meas.
20101224_194225_20101226_194225	meas.	meas.	pred.
20101225_190540_20101227_190540	meas.	meas.	pred.
20101226_182854_20101228_182854	meas.	meas.	pred.
20101227_193223_20101229_193223	pred.	meas.	pred.
20101228_185537_20101230_185537	pred.	pred.	pred.
20101229_181852_20101231_181852	pred.	pred.	pred.
20101230_192220_20110101_192220	pred.	pred.	pred.
20101231_184535_20110102_184535	pred.	pred.	pred.
20110101_194903_20110103_194903	pred.	pred.	pred.
20110102_191218_20110104_191218	pred.	pred.	pred.
20110103_183532_20110131_183532	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	1.0121	1.0163	1.0057	1.0022	1.0062	0.9980	1.0400	OK
2	1.0027	1.0078	1.0018	1.0013	1.0032	1.0003	1.0200	OK
3	1.0006	1.0023	1.0019	1.0001	1.0006	1.0011	1.0100	OK
4	1.0017	1.0008	1.0023	1.0000	1.0004	1.0017	1.0100	OK
5	1.0024	1.0019	1.0015	1.0002	1.0006	1.0009	1.0120	OK
6	1.0039	1.0016	1.0015	0.9996	1.0006	1.0004	1.0100	OK
7	1.0013	1.0020	1.0026	–	–	–	1.0070	OK
8	1.0015	1.0047	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 20 Dec 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101221_044258_20101220_184859_20101222_184859` .

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

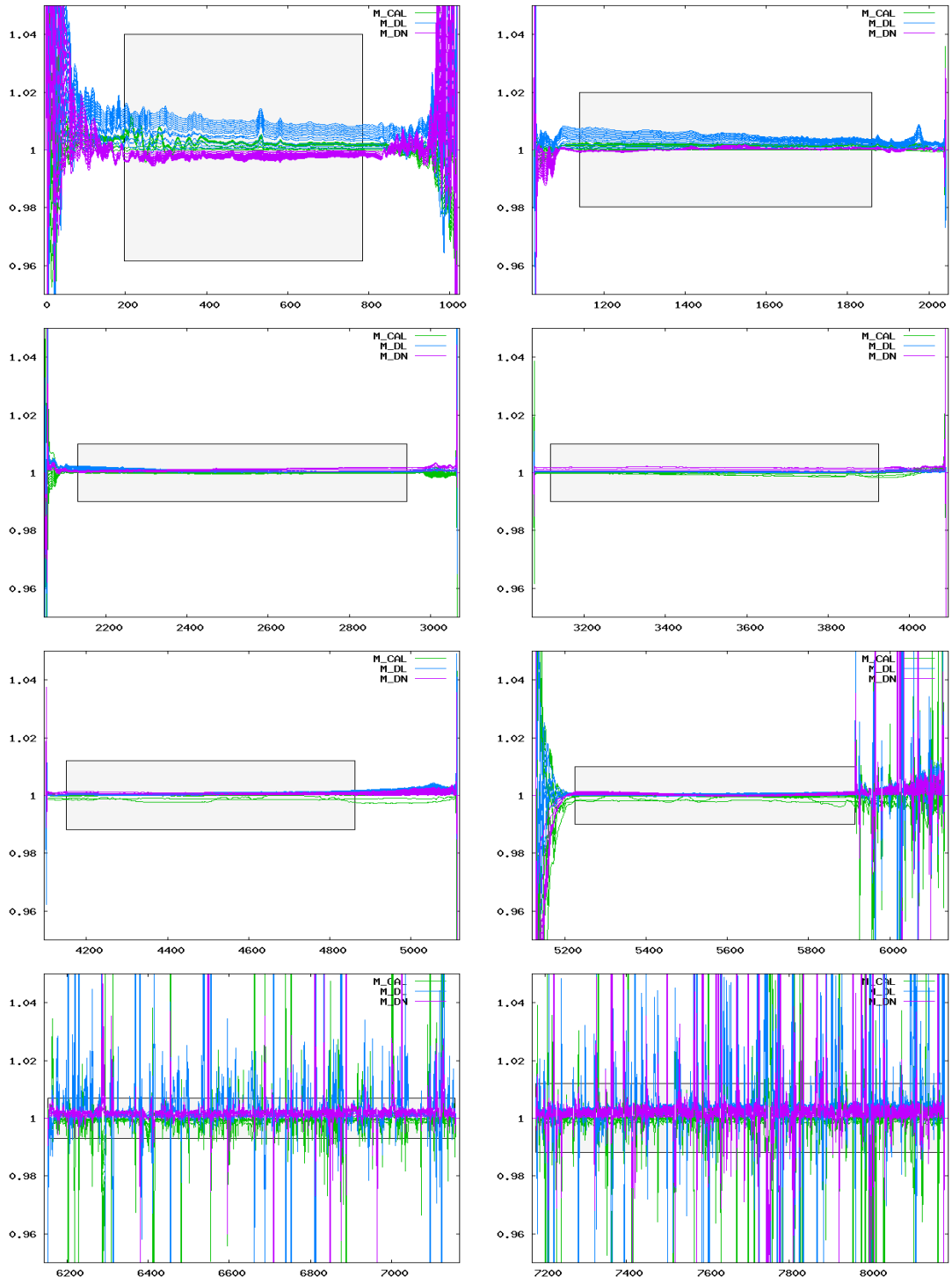

Figure 1: Ratio of delivered m-factors (21 Dec 2010– 03 Jan 2011) to the corresponding m-factor of the previous delivery day (20 Dec 2010). The grey boxes visualize the maximum ratio allowed.