NRT M-factor delivery document 03 Nov 2008

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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 06.01.

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 Oct 2008– 03 Nov 2008
- Prediction: 04 Nov 2008– 10 Nov 2008

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
c4677a06e3a50104214ebf6c7ad58031	SCI_MF1_AXNIFE20081111_204845_20081028_185656_20081030_185656
91d17e4c1b9650e5a848e5d1a71d4a69	SCI_MF1_AXNIFE20081111_204845_20081029_182519_20081031_182519
d63704f933e45e3b1f90a5c2e218e000	SCI_MF1_AXNIFE20081111_204845_20081030_193418_20081101_193418
be687647a2fb37eb2d9e4af680aa7fc1	SCI_MF1_AXNIFE20081111_204845_20081031_190241_20081102_190241
d49fc57d5da3228357d362a037808b67	SCI_MF1_AXNIFE20081111_204845_20081101_183104_20081103_183104
03e6a48be1a3f534324dd793889da16f	SCI_MF1_AXNIFE20081111_204845_20081102_194003_20081104_194003
848385ee4da38882955a4f94cf413445	SCI_MF1_AXNIFE20081111_204845_20081103_190826_20081105_190826
266733d0775ec1a29dd6ce0228d7ae62	SCI_MF1_AXNIFE20081111_204845_20081104_183649_20081106_183649
7d0c3f2cdf81d97e591e7e668460c698	SCI_MF1_AXNIFE20081111_204845_20081105_194548_20081107_194548
9e373b5b78983fd300a04cb49293ac67	SCI_MF1_AXNIFE20081111_204845_20081106_191411_20081108_191411
c628fa7a2690c82290fee5753a9699c2	SCI_MF1_AXNIFE20081111_204845_20081107_184234_20081109_184234
01ed778689f8521ce4eae293e00b334a	SCI_MF1_AXNIFE20081111_204845_20081108_181057_20081110_181057
2fbe8c81221bbc424d0ce9827dd1bad7	SCI_MF1_AXNIFE20081111_204845_20081109_191956_20081111_191956
9fca810469d33f32dee8a91b4f0bdecb	SCI_MF1_AXNIFE20081111_204845_20081110_184819_20081208_184819

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

validity identifier	M_CAL	M_DL	M_DN
20081028_185656_20081030_185656	meas.	meas.	interp.
20081029_182519_20081031_182519	meas.	meas.	interp.
20081030_193418_20081101_193418	meas.	meas.	meas.
20081031_190241_20081102_190241	meas.	meas.	interp.
20081101_183104_20081103_183104	meas.	meas.	interp.
20081102_194003_20081104_194003	meas.	meas.	interp.
20081103_190826_20081105_190826	pred.	meas.	meas.
20081104_183649_20081106_183649	pred.	pred.	pred.
20081105_194548_20081107_194548	pred.	pred.	pred.
20081106_191411_20081108_191411	pred.	pred.	pred.
20081107_184234_20081109_184234	pred.	pred.	pred.
20081108_181057_20081110_181057	pred.	pred.	pred.
20081109_191956_20081111_191956	pred.	pred.	pred.
20081110_184819_20081208_184819	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	1.0114	1.0136	1.0104	0.9999	1.0048	1.0033	1.0400	OK
2	1.0015	1.0047	1.0036	1.0006	1.0014	1.0012	1.0200	OK
3	1.0006	1.0015	1.0013	1.0001	1.0001	1.0002	1.0100	OK
4	1.0004	1.0002	1.0009	1.0001	1.0000	1.0003	1.0100	OK
5	1.0013	1.0010	1.0021	1.0004	1.0000	1.0007	1.0120	OK
6	1.0018	1.0018	1.0021	1.0003	1.0007	1.0010	1.0100	OK
7	1.0002	1.0000	1.0000	–	–	–	1.0070	OK
8	1.0049	1.0021	1.0021	–	–	–	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 Oct 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20081027_225524_20081027_192833_20081029_192833` .

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

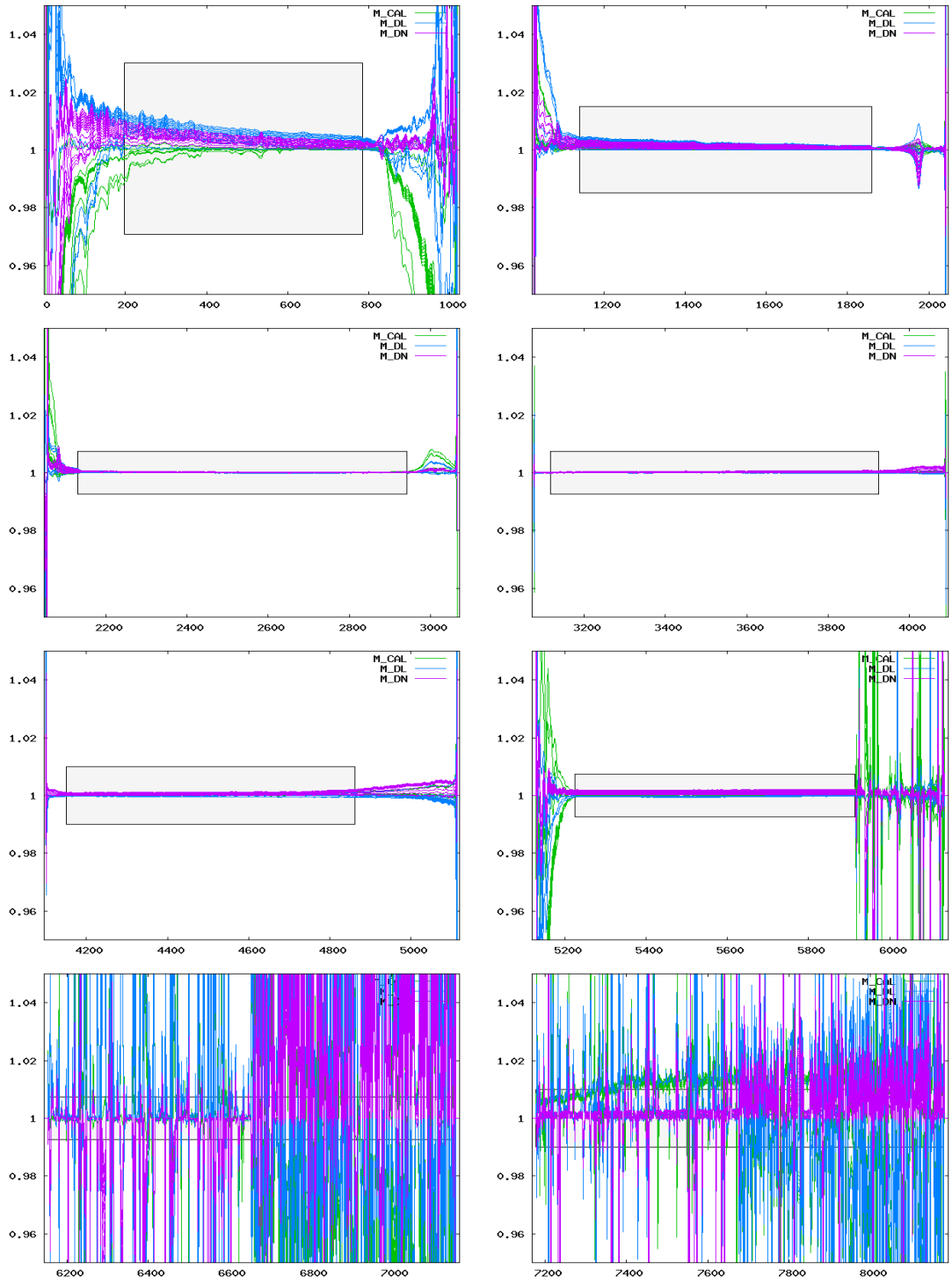

Figure 1: Ratio of delivered m-factors (28 Oct 2008– 10 Nov 2008) to the corresponding m-factor of the previous delivery day (27 Oct 2008). The grey boxes visualize the maximum ratio allowed.