NRT M-factor delivery document 25 Oct 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: 19 Oct 2010– 25 Oct 2010
- Prediction: 26 Oct 2010– 01 Nov 2010

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
124a2bee1f9282559720d4672ebe9f06	SCI_MF1_AXNIFE20101025_123817_20101019_193709_20101021_193709
2442dd088563334f255728ff126dbe58	SCI_MF1_AXNIFE20101025_123817_20101020_190532_20101022_190532
2f0e50daa1b9e94e41e3b730fc4e904c	SCI_MF1_AXNIFE20101025_123817_20101021_183355_20101023_183355
f7e7dc103df674e05f49068e814edb8a	SCI_MF1_AXNIFE20101025_123817_20101022_194254_20101024_194254
07b05a017526e905bd3750493acba3ac	SCI_MF1_AXNIFE20101025_123817_20101023_191117_20101025_191117
71924bae3f5e99f41aaa251143ebb068	SCI_MF1_AXNIFE20101025_123817_20101024_065529_20101026_065529
65c062f0316088f092a8848c9b4a5261	SCI_MF1_AXNIFE20101025_123817_20101024_183940_20101026_183940
e7f7c446fa8a65537176b77f316e563a	SCI_MF1_AXNIFE20101025_123817_20101025_062352_20101027_062352
f7b48dd7b4bb56a21739a77cc1bcc0e2	SCI_MF1_AXNIFE20101025_123817_20101026_054411_20101028_054411
36a42c655842a69fe5122feec056fbce	SCI_MF1_AXNIFE20101025_123817_20101027_064739_20101029_064739
b1b449683affca23d48c2e92d962cd51	SCI_MF1_AXNIFE20101025_123817_20101028_061054_20101030_061054
1a269fd6005502a81ee25db0c78883f9	SCI_MF1_AXNIFE20101025_123817_20101029_053408_20101031_053408
ac62ed25676771f137d717b7d6ec9067	SCI_MF1_AXNIFE20101025_123817_20101030_063737_20101101_063737
085bfde7510a2c94014701398ca950bf	SCI_MF1_AXNIFE20101025_123817_20101031_060051_20101128_060051

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

validity identifier	M_CAL	M_DL	M_DN
20101019_193709_20101021_193709	meas.	meas.	meas.
20101020_190532_20101022_190532	meas.	meas.	meas.
20101021_183355_20101023_183355	meas.	meas.	pred.
20101022_194254_20101024_194254	pred.	pred.	pred.
20101023_191117_20101025_191117	pred.	pred.	pred.
20101024_065529_20101026_065529	pred.	pred.	pred.
20101024_183940_20101026_183940	pred.	pred.	pred.
20101025_062352_20101027_062352	pred.	pred.	pred.
20101026_054411_20101028_054411	pred.	pred.	pred.
20101027_064739_20101029_064739	pred.	pred.	pred.
20101028_061054_20101030_061054	pred.	pred.	pred.
20101029_053408_20101031_053408	pred.	pred.	pred.
20101030_063737_20101101_063737	pred.	pred.	pred.
20101031_060051_20101128_060051	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	1.0223	1.2555	1.0128	0.9991	1.0235	1.0024	1.4000	OK
2	1.0008	1.0046	1.0060	1.0000	1.0016	1.0023	1.0200	OK
3	1.0008	1.0020	1.0038	1.0001	1.0004	1.0020	1.0100	OK
4	1.0015	1.0005	1.0032	0.9999	1.0002	1.0022	1.0100	OK
5	1.0013	1.0011	1.0029	0.9994	0.9997	1.0016	1.0120	OK
6	1.0014	1.0014	1.0046	0.9998	1.0005	1.0026	1.0100	OK
7	1.0006	1.0020	1.0044	–	–	–	1.0070	OK
8	1.0024	1.0017	1.0010	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 18 Oct 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101019_105929_20101018_182810_20101020_182810` .

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

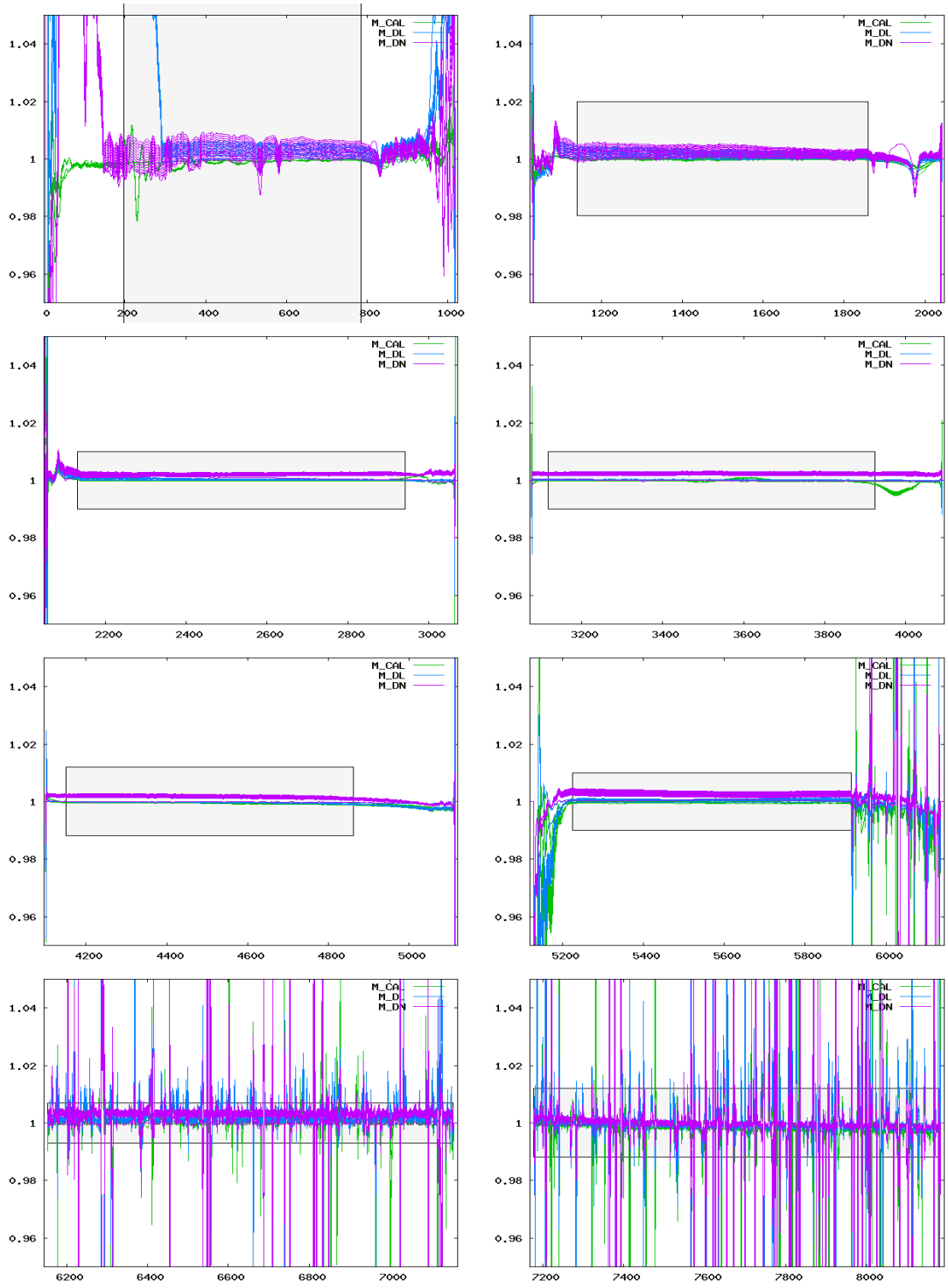

Figure 1: Ratio of delivered m-factors (19 Oct 2010– 01 Nov 2010) to the corresponding m-factor of the previous delivery day (18 Oct 2010). The grey boxes visualize the maximum ratio allowed.