NRT M-factor delivery document 31 Oct 2011

Klaus Bramstedt, ife Bremen

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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: 25 Oct 2011– 31 Oct 2011
- Prediction: 01 Nov 2011– 07 Nov 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
6aff2d900cd412fed3eb8b3410659ad0	SCI_MF1_AXNIFE20111101_104231_20111025_181702_20111027_181702
9dcbcd8ce23267e926218beb4badcce1	SCI_MF1_AXNIFE20111101_104231_20111026_192031_20111028_192031
b83d7469188fa3a978133e3bf7b02bdd	SCI_MF1_AXNIFE20111101_104231_20111027_184345_20111029_184345
33ba6349bbd79be0cf1b18d14e97a9a2	SCI_MF1_AXNIFE20111101_104231_20111028_180700_20111030_180700
f3fbe7aac89ad909e947faf24ef851bf	SCI_MF1_AXNIFE20111101_104231_20111029_191028_20111031_191028
23cd8f2308fc4f3cb5600790bd981e71	SCI_MF1_AXNIFE20111101_104231_20111030_183343_20111101_183343
fc4d3c710a216798cb5989176b54e2a9	SCI_MF1_AXNIFE20111101_104231_20111031_193711_20111102_193711
1f436e0eb79f936f2cf863dbdb07b293	SCI_MF1_AXNIFE20111101_104231_20111101_190026_20111103_190026
a8ed6f0e17ab72cd2ac5ff7b3b7a0a31	SCI_MF1_AXNIFE20111101_104231_20111102_182340_20111104_182340
5d16481137506f2e465ddcb45eede289	SCI_MF1_AXNIFE20111101_104231_20111103_192709_20111105_192709
af69d0ee837be76786ba6fadaa7b11ae	SCI_MF1_AXNIFE20111101_104231_20111104_185023_20111106_185023
f0b3cfad4933170ceda3bdfca96e79d3	SCI_MF1_AXNIFE20111101_104231_20111105_181338_20111107_181338
6b842f5b93dd631116f7287a3339051d	SCI_MF1_AXNIFE20111101_104231_20111106_191706_20111108_191706
7b19508e06017ba1f6524b74aea787e8	SCI_MF1_AXNIFE20111101_104231_20111107_184021_20111205_184021

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

validity identifier	M_CAL	M_DL	M_DN
20111025_181702_20111027_181702	meas.	meas.	interp.
20111026_192031_20111028_192031	meas.	meas.	interp.
20111027_184345_20111029_184345	meas.	meas.	meas.
20111028_180700_20111030_180700	meas.	meas.	interp.
20111029_191028_20111031_191028	meas.	meas.	interp.
20111030_183343_20111101_183343	meas.	meas.	meas.
20111031_193711_20111102_193711	meas.	meas.	pred.
20111101_190026_20111103_190026	pred.	pred.	pred.
20111102_182340_20111104_182340	pred.	pred.	pred.
20111103_192709_20111105_192709	pred.	pred.	pred.
20111104_185023_20111106_185023	pred.	pred.	pred.
20111105_181338_20111107_181338	pred.	pred.	pred.
20111106_191706_20111108_191706	pred.	pred.	pred.
20111107_184021_20111205_184021	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	1.0098	1.1109	1.0847	1.0005	0.9555	0.9736	1.1200	OK
2	1.0016	1.0508	1.0341	0.9999	0.9831	0.9895	1.0600	OK
3	1.0010	1.0144	1.0109	0.9996	0.9963	0.9967	1.0200	OK
4	1.0006	1.0025	1.0041	0.9998	0.9990	0.9980	1.0100	OK
5	1.0010	1.0019	1.0031	0.9997	0.9990	0.9984	1.0120	OK
6	1.0010	1.0010	1.0024	1.0003	0.9998	0.9992	1.0100	OK
7	1.0004	1.0011	1.0021	–	–	–	1.0070	OK
8	1.0012	1.0027	1.0017	–	–	–	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 24 Oct 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111025_090449_20111024_185348_20111026_185348` .

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

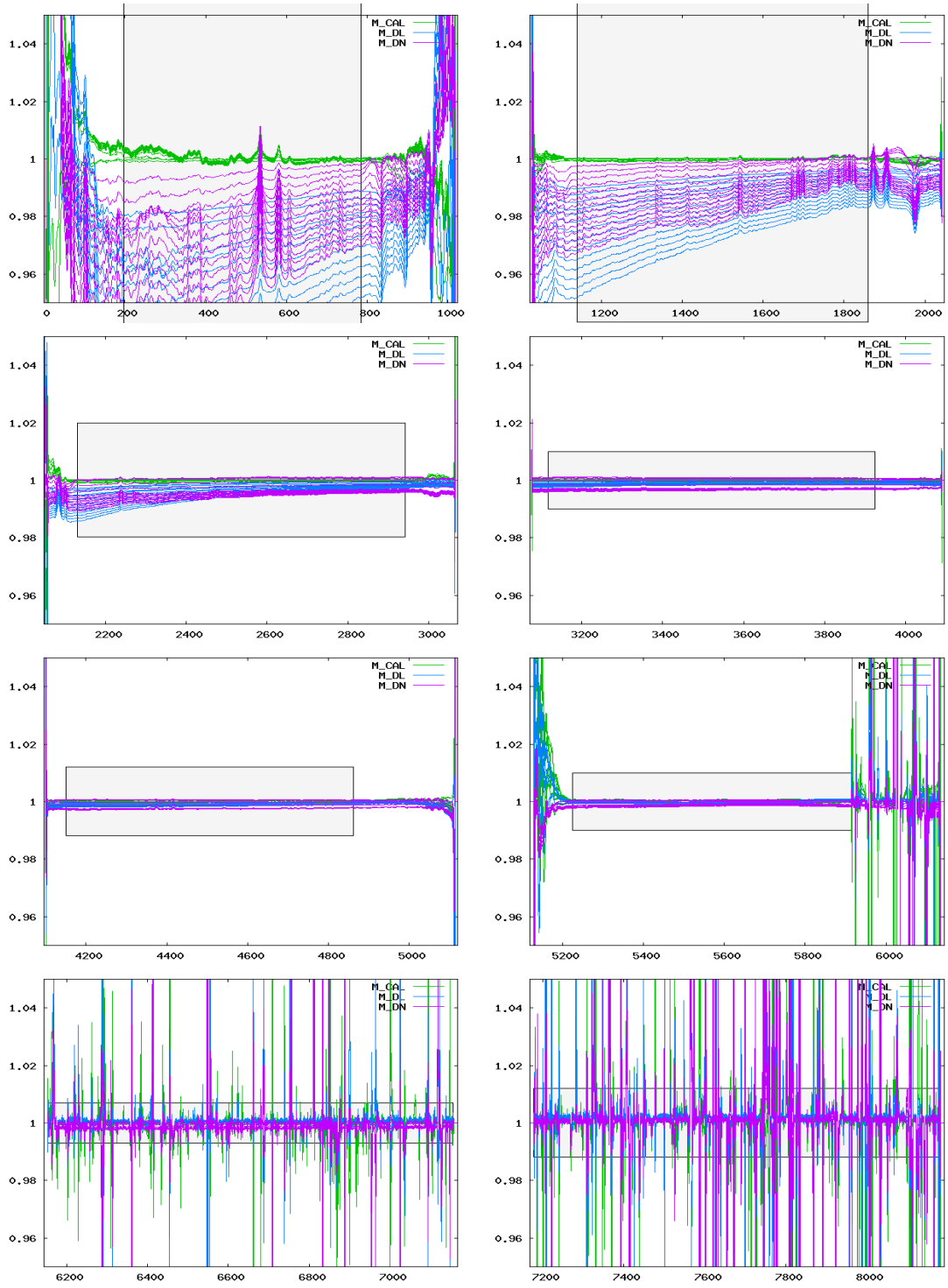

Figure 1: Ratio of delivered m-factors (25 Oct 2011– 07 Nov 2011) to the corresponding m-factor of the previous delivery day (24 Oct 2011). The grey boxes visualize the maximum ratio allowed.