NRT M-factor delivery document 22 Dec 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: 16 Dec 2008– 22 Dec 2008
- Prediction: 23 Dec 2008– 29 Dec 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
b3511ab5c248c6aaf48cae346c2f74ff	SCI_MF1_AXNIFE20090123_095023_20081216_181642_20081218_181642
7bbe6ab4cbd5622fa8e5436d0320e3d5	SCI_MF1_AXNIFE20090123_095023_20081217_192541_20081219_192541
cdc1643ad631ae62695eaedfe3d13957	SCI_MF1_AXNIFE20090123_095023_20081218_185404_20081220_185404
6ee8a1d3aaefd15e74b762c0d30b123b	SCI_MF1_AXNIFE20090123_095023_20081219_182227_20081221_182227
e751004cbad3315e259a4e077b207a9b	SCI_MF1_AXNIFE20090123_095023_20081219_182227_20090116_182227
e5544084028f666ef8460432d60ff1c6	SCI_MF1_AXNIFE20090123_095023_20081220_193126_20081222_193126
e9ebb41f27614a9adcb562609fa39a5e	SCI_MF1_AXNIFE20090123_095023_20081221_185949_20081223_185949
494356f0fcb57721e9038b7b9d9bfdf9	SCI_MF1_AXNIFE20090123_095023_20081222_182812_20081224_182812
0c6481353a57a7dfef0b70a46cbfebe4	SCI_MF1_AXNIFE20090123_095023_20081223_193711_20081225_193711
99926dc98baa27870053241ed27b35fa	SCI_MF1_AXNIFE20090123_095023_20081224_190534_20081226_190534
1c5fffc418ebd496ab3bb0218b3d3369	SCI_MF1_AXNIFE20090123_095023_20081225_183357_20081227_183357
f6b0bb1567c007e10959989c74db5765	SCI_MF1_AXNIFE20090123_095023_20081226_194256_20081228_194256
1ba4a0e9a9b66b4f3124c2435cfb538e	SCI_MF1_AXNIFE20090123_095023_20081227_191119_20081229_191119
254b850e69a5ef974696b9942facfe48	SCI_MF1_AXNIFE20090123_095023_20081228_183942_20081230_183942

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

validity identifier	M_CAL	M_DL	M_DN
20081216_181642_20081218_181642	meas.	meas.	pred.
20081217_192541_20081219_192541	meas.	meas.	pred.
20081218_185404_20081220_185404	meas.	meas.	pred.
20081219_182227_20081221_182227	pred.	pred.	pred.
20081219_182227_20090116_182227	pred.	pred.	pred.
20081220_193126_20081222_193126	pred.	pred.	pred.
20081221_185949_20081223_185949	pred.	pred.	pred.
20081222_182812_20081224_182812	pred.	pred.	pred.
20081223_193711_20081225_193711	pred.	pred.	pred.
20081224_190534_20081226_190534	pred.	pred.	pred.
20081225_183357_20081227_183357	pred.	pred.	pred.
20081226_194256_20081228_194256	pred.	pred.	pred.
20081227_191119_20081229_191119	pred.	pred.	pred.
20081228_183942_20081230_183942	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	1.2136	1.2521	1.2692	0.9871	0.9991	0.9834	1.0400	Not OK
2	1.1211	1.1524	1.1451	0.9698	0.9740	0.9666	1.0200	Not OK
3	1.1305	1.1602	1.1382	1.0111	1.0116	1.0081	1.0100	Not OK
4	1.1155	1.1140	1.1107	0.9760	0.9768	0.9766	1.0100	Not OK
5	1.6325	1.6234	1.6127	0.8339	0.8395	0.8476	1.0120	Not OK
6	1.1260	1.0999	1.0707	0.9748	0.9744	0.9795	1.0100	Not OK
7	0.9997	1.0005	1.3787	–	–	–	1.0070	Not OK
8	0.9987	1.0002	1.0005	–	–	–	1.0120	Not 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 15 Dec 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20081217_081445_20081215_184819_20081217_184819` .

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 exceeds the limits. Additional checks are necessary.

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

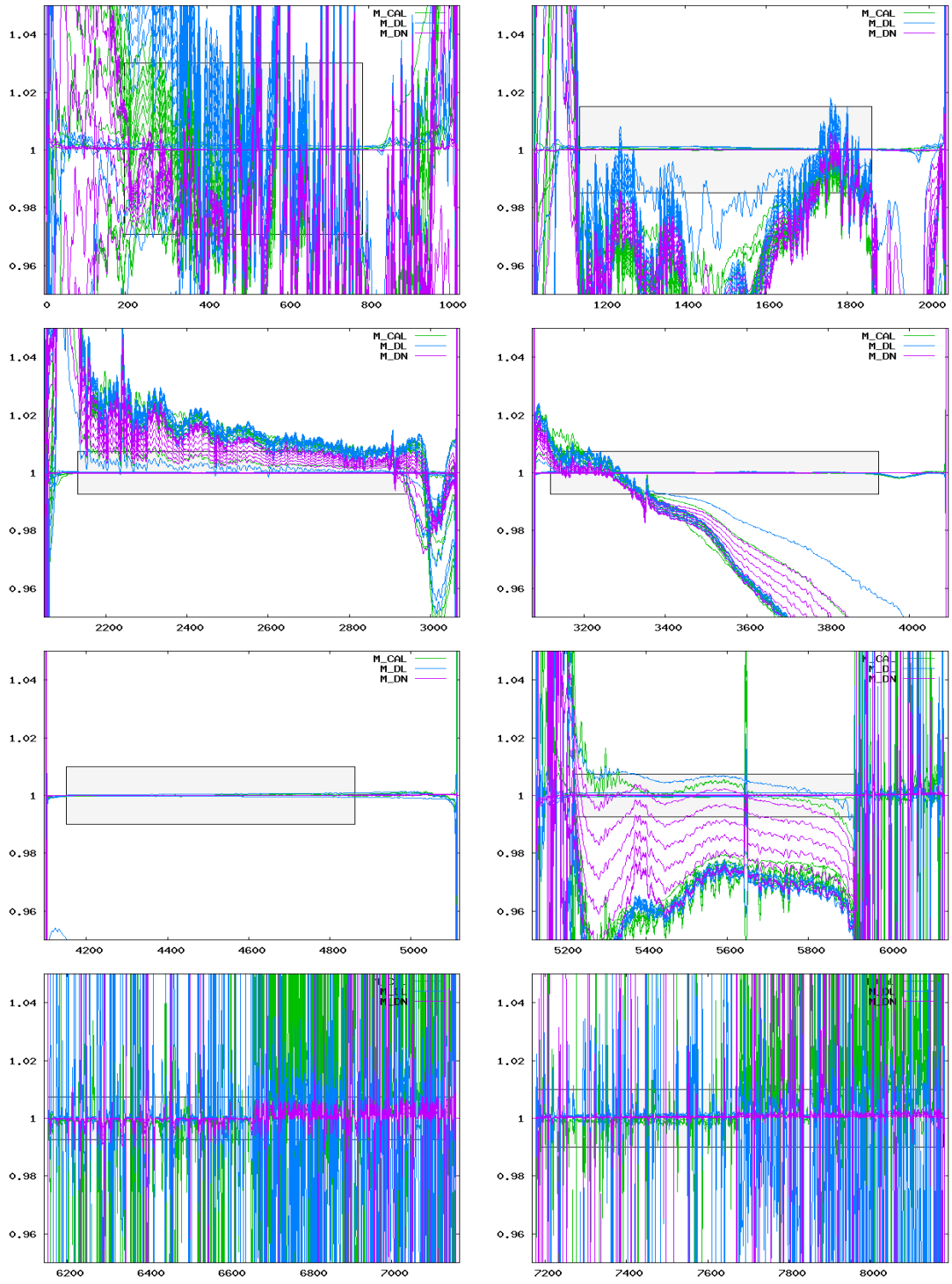

Figure 1: Ratio of delivered m-factors (16 Dec 2008– 29 Dec 2008) to the corresponding m-factor of the previous delivery day (15 Dec 2008). The grey boxes visualize the maximum ratio allowed.