NRT M-factor delivery document 21 Apr 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: 15 Apr 2008– 21 Apr 2008
- Prediction: 22 Apr 2008– 28 Apr 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
360a5b074aef66fbbdc3e29e276c55ca	SCI_MF1_AXNIFE20080422_090206_20080415_181643_20080417_181643
98cb6bb0472bc6df82572098002c06da	SCI_MF1_AXNIFE20080422_090206_20080416_192541_20080418_192541
bf5317e212513bc449d6113c46dfdbca	SCI_MF1_AXNIFE20080422_090206_20080417_185404_20080419_185404
0b80fd57b9743036b29c7275289e4d9f	SCI_MF1_AXNIFE20080422_090206_20080418_182227_20080420_182227
58565a547f4ddd1425ef3567041803a2	SCI_MF1_AXNIFE20080422_090206_20080419_193126_20080421_193126
fdb0e82b856fb678d16036f25d048925	SCI_MF1_AXNIFE20080422_090206_20080420_185949_20080422_185949
5a9fb55e8d8fb0058ec8afe08edaa400	SCI_MF1_AXNIFE20080422_090206_20080421_182812_20080423_182812
f27bf4856b64020365ef64c7a57416c2	SCI_MF1_AXNIFE20080422_090206_20080422_193711_20080424_193711
53c9cd919cbb984d1e4f5ff12fed2b01	SCI_MF1_AXNIFE20080422_090206_20080423_190534_20080425_190534
e66bff0b7b820836ff6f2d0e05944ba2	SCI_MF1_AXNIFE20080422_090206_20080424_183357_20080426_183357
02519ff95258f81813562e7f4ac44fd1	SCI_MF1_AXNIFE20080422_090206_20080425_194256_20080427_194256
f56a1fe209b10ac54c49181af6b1b31e	SCI_MF1_AXNIFE20080422_090206_20080426_191119_20080428_191119
85084e4a51b038edc102ffec8390c2cc	SCI_MF1_AXNIFE20080422_090206_20080427_183942_20080429_183942
0ad92f52fc4409c40010ca127b78ab50	SCI_MF1_AXNIFE20080422_090206_20080428_194841_20080526_194841

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

validity identifier	M_CAL	M_DL	M_DN
20080415_181643_20080417_181643	meas.	meas.	interp.
20080416_192541_20080418_192541	meas.	meas.	interp.
20080417_185404_20080419_185404	meas.	meas.	meas.
20080418_182227_20080420_182227	meas.	meas.	meas.
20080419_193126_20080421_193126	meas.	meas.	pred.
20080420_185949_20080422_185949	meas.	meas.	pred.
20080421_182812_20080423_182812	pred.	pred.	pred.
20080422_193711_20080424_193711	pred.	pred.	pred.
20080423_190534_20080425_190534	pred.	pred.	pred.
20080424_183357_20080426_183357	pred.	pred.	pred.
20080425_194256_20080427_194256	pred.	pred.	pred.
20080426_191119_20080428_191119	pred.	pred.	pred.
20080427_183942_20080429_183942	pred.	pred.	pred.
20080428_194841_20080526_194841	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	1.0040	1.0047	1.0240	0.9991	1.0019	1.0084	1.0400	OK
2	1.0005	1.0031	1.0093	0.9999	1.0011	1.0035	1.0200	OK
3	1.0004	1.0012	1.0036	1.0000	1.0002	1.0011	1.0100	OK
4	1.0011	1.0003	1.0010	0.9998	0.9999	1.0005	1.0100	OK
5	1.0024	1.0019	1.0009	0.9991	0.9994	1.0002	1.0120	OK
6	1.0027	1.0018	1.0015	1.0003	0.9997	1.0000	1.0100	OK
7	0.9998	0.9985	0.9991	–	–	–	1.0070	OK
8	0.9986	0.9971	0.9978	–	–	–	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 14 Apr 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080414_223136_20080414_184820_20080416_184820` .

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

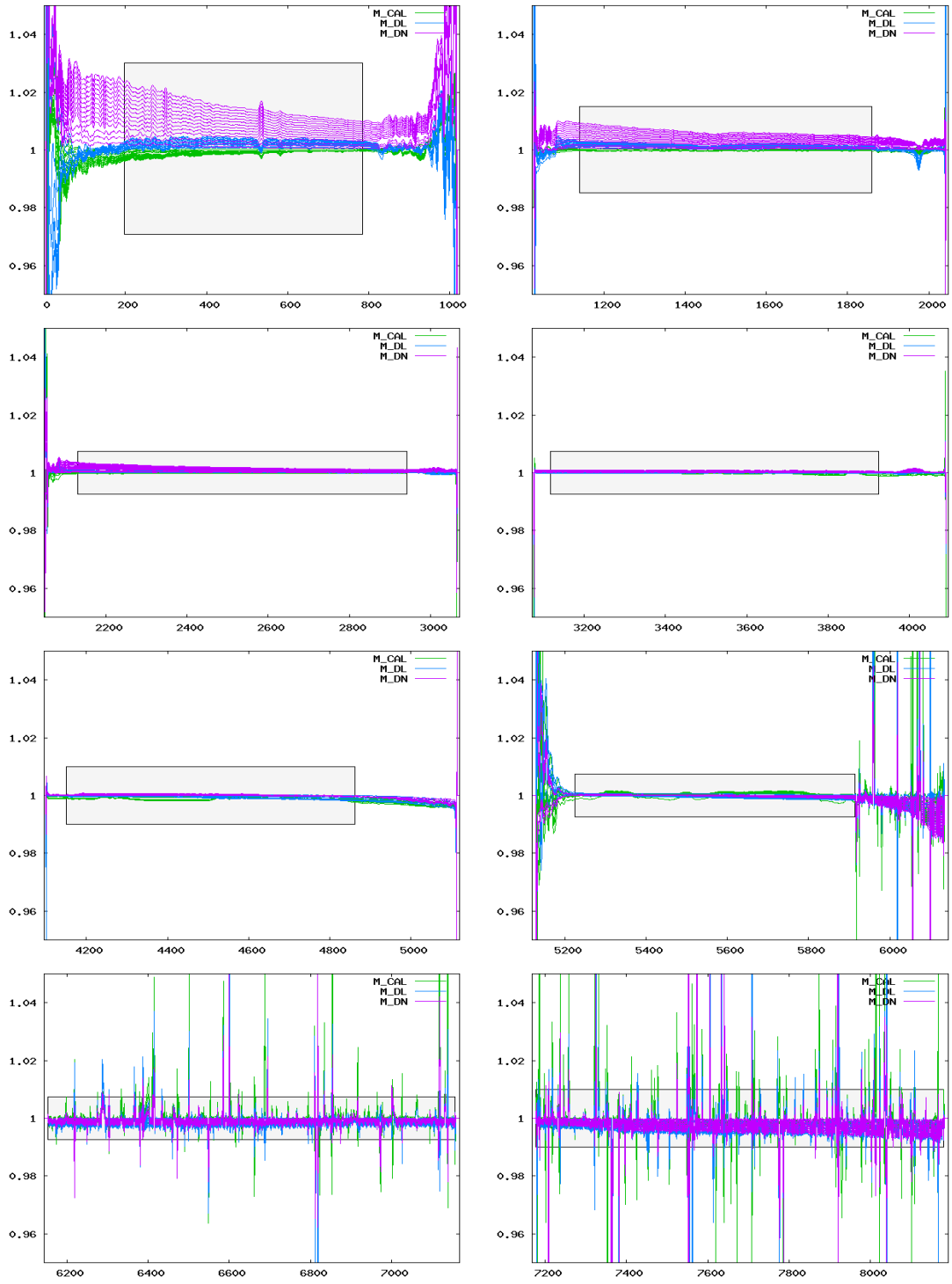

Figure 1: Ratio of delivered m-factors (15 Apr 2008– 28 Apr 2008) to the corresponding m-factor of the previous delivery day (14 Apr 2008). The grey boxes visualize the maximum ratio allowed.