NRT M-factor delivery document 15 Dec 2008

Klaus Bramstedt, ife Bremen

15 Dec 2008

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: 09 Dec 2008– 15 Dec 2008
- Prediction: 16 Dec 2008– 22 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
ca90b2d379045243a28836faa06823a4	SCI_MF1_AXNIFE20081217_081445_20081209_183649_20081211_183649
372c21ae1e9bbf4232785ce5a8e8d7f1	SCI_MF1_AXNIFE20081217_081445_20081210_194548_20081212_194548
8f40d2949933d11ccc6ac3155f0a4a14	SCI_MF1_AXNIFE20081217_081445_20081211_191411_20081213_191411
7c301786e69fa09789d80f03f12112f4	SCI_MF1_AXNIFE20081217_081445_20081212_184234_20081214_184234
37193acab2b9b9707535430080131064	SCI_MF1_AXNIFE20081217_081445_20081213_181057_20081215_181057
2f9bf6afbcd26b437e283f368d01bf6e	SCI_MF1_AXNIFE20081217_081445_20081214_191956_20081216_191956
c004fb0d02b585a62f129b53886c0504	SCI_MF1_AXNIFE20081217_081445_20081215_184819_20081217_184819
77338b4bb2b49b7e593f60a2c9c77ea0	SCI_MF1_AXNIFE20081217_081445_20081216_181642_20081218_181642
1a9d826daa45641abf52284a16b040f1	SCI_MF1_AXNIFE20081217_081445_20081217_192541_20081219_192541
002fb207d34da4f86365fc846ea1cb6d	SCI_MF1_AXNIFE20081217_081445_20081218_185404_20081220_185404
e8b566861d0341a40866f924c1936da2	SCI_MF1_AXNIFE20081217_081445_20081219_182227_20081221_182227
c33a4abe29d640f3990ead237b0fb138	SCI_MF1_AXNIFE20081217_081445_20081220_193126_20081222_193126
2e2291dafc7ac820251064949a5bb829	SCI_MF1_AXNIFE20081217_081445_20081221_185949_20081223_185949
335697dbcb3f219d798a834268722e5b	SCI_MF1_AXNIFE20081217_081445_20081222_182812_20090119_182812

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

validity identifier	M_CAL	M_DL	M_DN
20081209_183649_20081211_183649	meas.	meas.	interp.
20081210_194548_20081212_194548	meas.	meas.	meas.
20081211_191411_20081213_191411	meas.	meas.	meas.
20081212_184234_20081214_184234	meas.	meas.	pred.
20081213_181057_20081215_181057	meas.	meas.	pred.
20081214_191956_20081216_191956	pred.	meas.	pred.
20081215_184819_20081217_184819	pred.	meas.	pred.
20081216_181642_20081218_181642	pred.	pred.	pred.
20081217_192541_20081219_192541	pred.	pred.	pred.
20081218_185404_20081220_185404	pred.	pred.	pred.
20081219_182227_20081221_182227	pred.	pred.	pred.
20081220_193126_20081222_193126	pred.	pred.	pred.
20081221_185949_20081223_185949	pred.	pred.	pred.
20081222_182812_20090119_182812	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	1.0080	1.0133	1.0036	1.0002	1.0039	0.9986	1.0400	OK
2	1.0015	1.0052	1.0012	1.0004	1.0015	0.9995	1.0200	OK
3	1.0006	1.0008	1.0012	0.9998	1.0000	0.9995	1.0100	OK
4	1.0009	1.0004	1.0011	0.9996	0.9999	0.9998	1.0100	OK
5	1.0014	1.0016	1.0018	0.9997	1.0002	1.0003	1.0120	OK
6	1.0028	1.0011	1.0015	0.9992	1.0002	1.0001	1.0100	OK
7	0.9985	0.9989	0.9997	–	–	–	1.0070	OK
8	1.0002	1.0001	1.0014	–	–	–	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 08 Dec 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20081217_081120_20081208_190826_20081210_190826` .

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

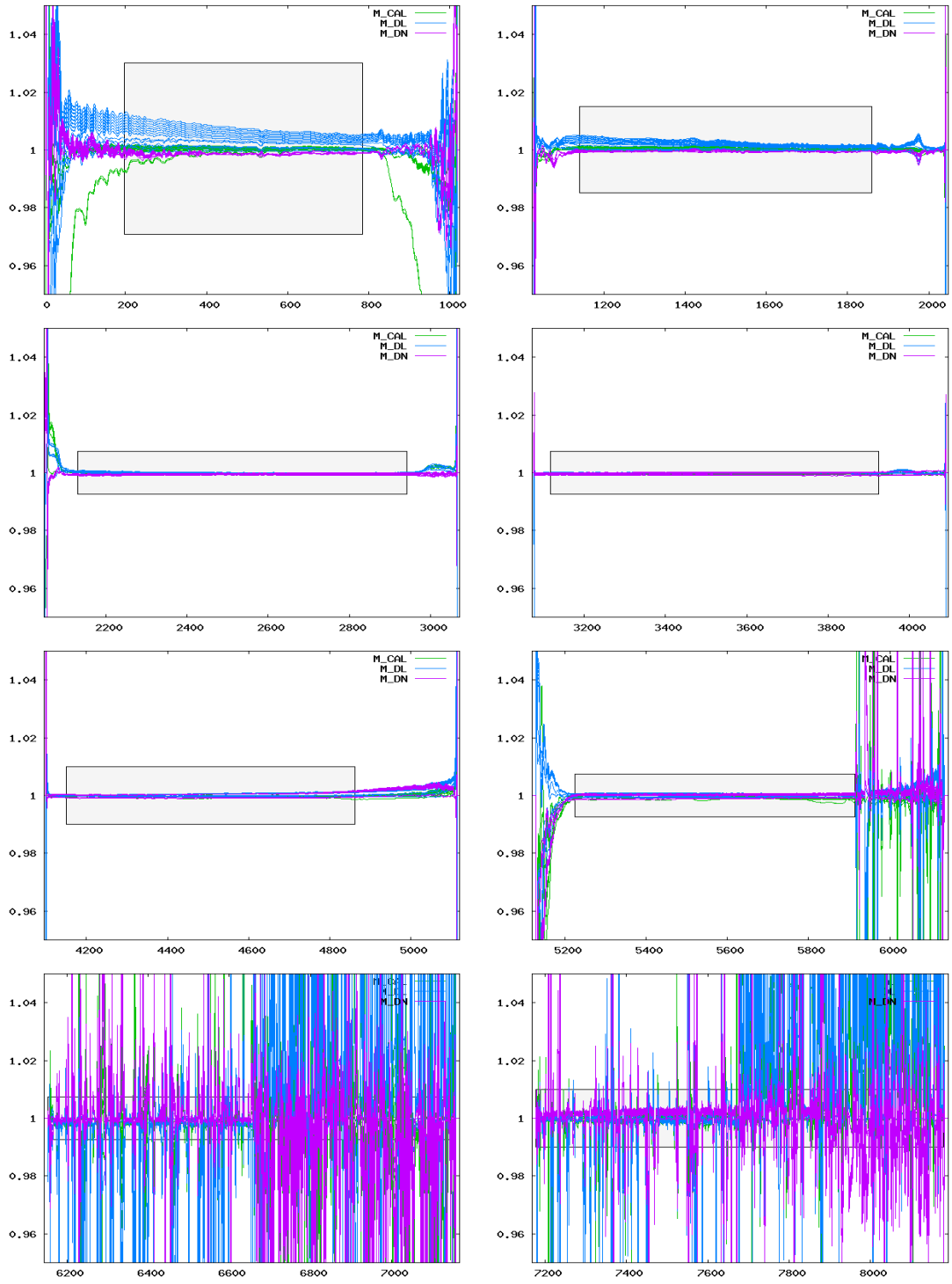

Figure 1: Ratio of delivered m-factors (09 Dec 2008– 22 Dec 2008) to the corresponding m-factor of the previous delivery day (08 Dec 2008). The grey boxes visualize the maximum ratio allowed.