NRT M-factor delivery document 23 Feb 2009

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 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: 17 Feb 2009– 23 Feb 2009
- Prediction: 24 Feb 2009– 02 Mar 2009

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
bb0787180299b3062d881eab89f3dbf4	SCI_MF1_AXNIFE20090223_225529_20090217_183649_20090219_183649
209cb55def9108d2ea2ebf2891624679	SCI_MF1_AXNIFE20090223_225529_20090218_194548_20090220_194548
31a16c0055ae98dd1040c7fbc157b194	SCI_MF1_AXNIFE20090223_225529_20090219_191411_20090221_191411
12f7c8c3854605e09736851fa2507287	SCI_MF1_AXNIFE20090223_225529_20090220_184234_20090222_184234
823d69bdf346740231d79725739a23bc	SCI_MF1_AXNIFE20090223_225529_20090221_181057_20090223_181057
02ceb2a6a1e05317d91e6a40f803455c	SCI_MF1_AXNIFE20090223_225529_20090222_191956_20090224_191956
9d10e6be7db96e03ede07ee36cf6b2c8	SCI_MF1_AXNIFE20090223_225529_20090223_184819_20090225_184819
aee2de9e889aba41c6edf772a8993e1f	SCI_MF1_AXNIFE20090223_225529_20090224_181642_20090226_181642
eb0052f4f43596c28a9e831c7f5912e0	SCI_MF1_AXNIFE20090223_225529_20090225_192541_20090227_192541
f8c01e0438515780d22f2696a97dfc18	SCI_MF1_AXNIFE20090223_225529_20090226_185404_20090228_185404
ebbe961b8ef2cc851fbda0a5b1d33ff5	SCI_MF1_AXNIFE20090223_225529_20090227_182227_20090301_182227
7ed22ed9d357ef39c31ab576498b57bd	SCI_MF1_AXNIFE20090223_225529_20090228_193126_20090302_193126
343b2b2e49d13bb76a5000772e94a484	SCI_MF1_AXNIFE20090223_225529_20090301_185949_20090303_185949
75d4442e452f85c5136933e549c95c17	SCI_MF1_AXNIFE20090223_225529_20090302_182812_20090330_182812

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

validity identifier	M_CAL	M_DL	M_DN
20090217_183649_20090219_183649	meas.	meas.	interp.
20090218_194548_20090220_194548	meas.	meas.	interp.
20090219_191411_20090221_191411	meas.	meas.	meas.
20090220_184234_20090222_184234	meas.	meas.	pred.
20090221_181057_20090223_181057	meas.	meas.	pred.
20090222_191956_20090224_191956	meas.	meas.	pred.
20090223_184819_20090225_184819	pred.	pred.	pred.
20090224_181642_20090226_181642	pred.	pred.	pred.
20090225_192541_20090227_192541	pred.	pred.	pred.
20090226_185404_20090228_185404	pred.	pred.	pred.
20090227_182227_20090301_182227	pred.	pred.	pred.
20090228_193126_20090302_193126	pred.	pred.	pred.
20090301_185949_20090303_185949	pred.	pred.	pred.
20090302_182812_20090330_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	1.1372	1.1600	1.1470	1.0070	1.0088	1.0035	1.0400	Not OK
2	1.0106	1.0144	1.0115	1.0047	1.0045	0.9996	1.0200	OK
3	1.0222	1.0212	1.0221	1.0034	1.0022	1.0016	1.0100	Not OK
4	1.0055	1.0042	1.0037	1.0025	1.0014	1.0013	1.0100	OK
5	1.0090	1.0093	1.0079	1.0021	1.0017	0.9999	1.0120	OK
6	1.0030	1.0032	1.0017	1.0018	1.0022	1.0002	1.0100	OK
7	1.0008	1.0025	1.0007	–	–	–	1.0070	OK
8	1.0110	1.0128	1.0149	–	–	–	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 16 Feb 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090216_230213_20090216_190826_20090218_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 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

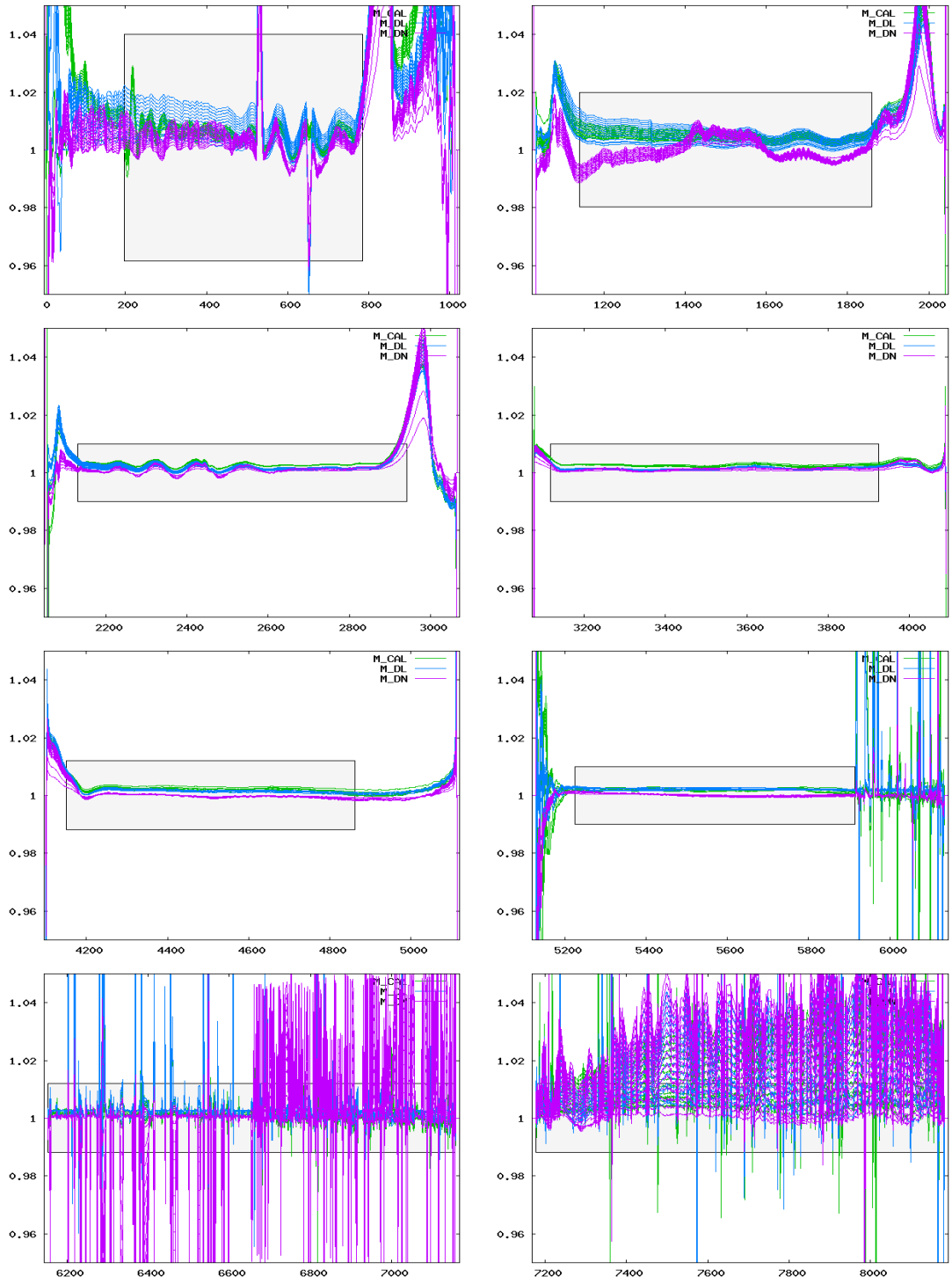

Figure 1: Ratio of delivered m-factors (17 Feb 2009– 02 Mar 2009) to the corresponding m-factor of the previous delivery day (16 Feb 2009). The grey boxes visualize the maximum ratio allowed.