NRT M-factor delivery document 13 Jun 2011

Klaus Bramstedt, ife Bremen

13 Jun 2011

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: 07 Jun 2011– 13 Jun 2011
- Prediction: 14 Jun 2011– 20 Jun 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
9b646213c082d240aeeb9b578d139cbc	SCI_MF1_AXNIFE20110614_034307_20110607_185118_20110609_185118
2b2b891d51d8049430f483abec1af5db	SCI_MF1_AXNIFE20110614_034307_20110608_181432_20110610_181432
147503703229ddb62da2b39a5e2d57ba	SCI_MF1_AXNIFE20110614_034307_20110609_191801_20110611_191801
b9639a27aa1cb28aebddafe5e6a10678	SCI_MF1_AXNIFE20110614_034307_20110610_184115_20110612_184115
3a7a470c86d474975aea3f1a90a24fe2	SCI_MF1_AXNIFE20110614_034307_20110611_194444_20110613_194444
c226b99b485c3dc7569f9f7acfec8085	SCI_MF1_AXNIFE20110614_034307_20110612_190758_20110614_190758
6c94966dbfff95cd22fd10af727b2616	SCI_MF1_AXNIFE20110614_034307_20110613_183113_20110615_183113
f597b95750a7ca7c760b855d98538be3	SCI_MF1_AXNIFE20110614_034307_20110614_193441_20110616_193441
354d63d4570e81245476dc828e92356e	SCI_MF1_AXNIFE20110614_034307_20110615_185756_20110617_185756
5f3fa6db2aa920b3efad1bb5061f1cd4	SCI_MF1_AXNIFE20110614_034307_20110616_182110_20110618_182110
c3463358d0c1e5ab0f1a4d7a45ecedf2	SCI_MF1_AXNIFE20110614_034307_20110617_192439_20110619_192439
277b5771b99ccf38619d6881cba7ea17	SCI_MF1_AXNIFE20110614_034307_20110618_184753_20110620_184753
2b05cb8c5e0417c10db1350df5549cac	SCI_MF1_AXNIFE20110614_034307_20110619_181108_20110621_181108
5f78f16004bbe28ffa4530f890bf7ce7	SCI_MF1_AXNIFE20110614_034307_20110620_191436_20110718_191436

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

validity identifier	M_CAL	M_DL	M_DN
20110607_185118_20110609_185118	meas.	meas.	interp.
20110608_181432_20110610_181432	meas.	meas.	interp.
20110609_191801_20110611_191801	meas.	meas.	meas.
20110610_184115_20110612_184115	meas.	meas.	pred.
20110611_194444_20110613_194444	meas.	meas.	pred.
20110612_190758_20110614_190758	meas.	meas.	pred.
20110613_183113_20110615_183113	pred.	meas.	pred.
20110614_193441_20110616_193441	pred.	pred.	pred.
20110615_185756_20110617_185756	pred.	pred.	pred.
20110616_182110_20110618_182110	pred.	pred.	pred.
20110617_192439_20110619_192439	pred.	pred.	pred.
20110618_184753_20110620_184753	pred.	pred.	pred.
20110619_181108_20110621_181108	pred.	pred.	pred.
20110620_191436_20110718_191436	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	1.0183	1.0097	1.0316	1.0023	0.9974	1.0055	1.0400	OK
2	1.0024	1.0056	1.0074	1.0007	0.9990	1.0012	1.0200	OK
3	1.0007	1.0012	1.0034	1.0000	0.9999	1.0014	1.0100	OK
4	1.0007	1.0003	1.0031	1.0002	1.0001	1.0020	1.0100	OK
5	1.0014	1.0008	1.0023	1.0002	0.9998	1.0012	1.0120	OK
6	1.0013	1.0011	1.0011	0.9999	0.9995	0.9999	1.0100	OK
7	1.0008	1.0004	1.0007	–	–	–	1.0070	OK
8	1.0016	1.0006	1.0006	–	–	–	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 06 Jun 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110607_073101_20110606_192803_20110608_192803` .

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

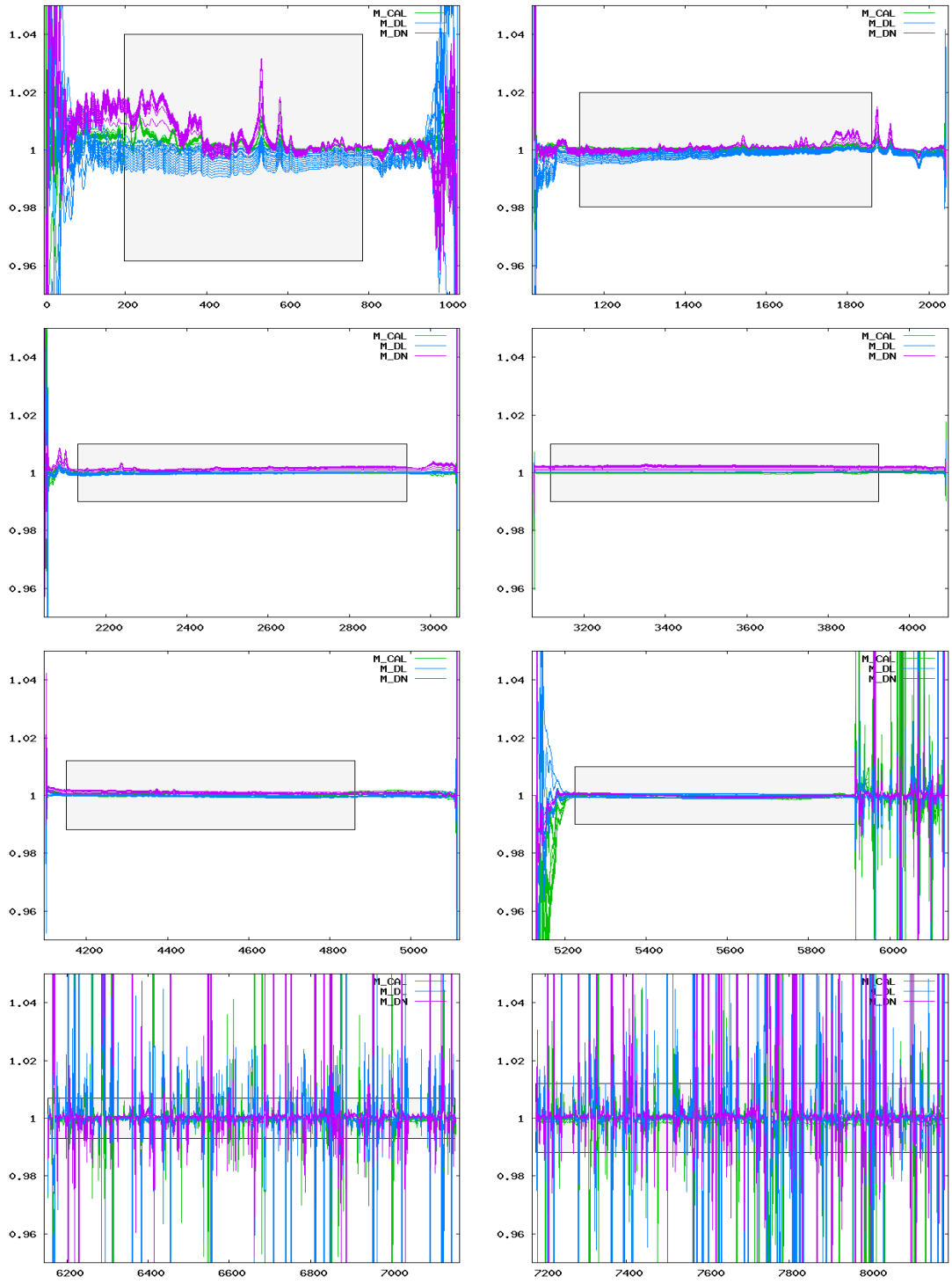

Figure 1: Ratio of delivered m-factors (07 Jun 2011– 20 Jun 2011) to the corresponding m-factor of the previous delivery day (06 Jun 2011). The grey boxes visualize the maximum ratio allowed.