NRT M-factor delivery document
19 Apr 2010

Klaus Bramstedt, ife Bremen

19 Apr 2010

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: 13 Apr 2010– 19 Apr 2010

- Prediction: 20 Apr 2010– 26 Apr 2010

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
c23d209f0d5410f7ebfada3997ae0a94	SCI_MF1_AXNIFE20100420_074857_20100413_183648_20100415_183648
b8fbb98223aed42ca78caef1985cab45	SCI_MF1_AXNIFE20100420_074857_20100414_194547_20100416_194547
3fc35426035572ffc22a08fe8ad03f31	SCI_MF1_AXNIFE20100420_074857_20100415_191410_20100417_191410
c3eb4a1544eaada8a50490f1f557d657	SCI_MF1_AXNIFE20100420_074857_20100416_184233_20100418_184233
eeecc7497f2e42a8fde4f7806071cee0	SCI_MF1_AXNIFE20100420_074857_20100417_181056_20100419_181056
d7e831a6f6f4789214f8569c5da5f0f0	SCI_MF1_AXNIFE20100420_074857_20100418_191955_20100420_191955
8893cc990143e79d748c9fef080d6bd1	SCI_MF1_AXNIFE20100420_074857_20100419_184818_20100421_184818
09f90b6598c93d82d754aaec2f962637	SCI_MF1_AXNIFE20100420_074857_20100420_181641_20100422_181641
c7c66f0927d23af986d153f2951e837c	SCI_MF1_AXNIFE20100420_074857_20100421_192540_20100423_192540
87b557c8115a20f8b5fec5b8e12a0a53	SCI_MF1_AXNIFE20100420_074857_20100422_185403_20100424_185403
633cc2aacee22778698767e5ba63a8e3	SCI_MF1_AXNIFE20100420_074857_20100423_182226_20100425_182226
94751ffd673ac65886718d547fbc361e	SCI_MF1_AXNIFE20100420_074857_20100424_193125_20100426_193125
79f883192a5426acdf64fc79953e0de7	SCI_MF1_AXNIFE20100420_074857_20100425_185948_20100427_185948
7826114bdb1b303bb68582224b5cbe82	SCI_MF1_AXNIFE20100420_074857_20100426_182811_20100524_182811

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

validity identifier	M_CAL	M_DL	M_DN
20100413_183648_20100415_183648	meas.	meas.	meas.
20100414_194547_20100416_194547	interp.	meas.	interp.
20100415_191410_20100417_191410	interp.	interp.	interp.
20100416_184233_20100418_184233	meas.	meas.	interp.
20100417_181056_20100419_181056	meas.	meas.	meas.
20100418_191955_20100420_191955	meas.	meas.	pred.
20100419_184818_20100421_184818	meas.	meas.	pred.
20100420_181641_20100422_181641	pred.	pred.	pred.
20100421_192540_20100423_192540	pred.	pred.	pred.
20100422_185403_20100424_185403	pred.	pred.	pred.
20100423_182226_20100425_182226	pred.	pred.	pred.
20100424_193125_20100426_193125	pred.	pred.	pred.
20100425_185948_20100427_185948	pred.	pred.	pred.
20100426_182811_20100524_182811	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. SCIA-MACHY 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	1.0065	1.0393	1.0452	0.9991	1.0056	1.0162	1.0500	OK
2	1.0008	1.0092	1.0185	0.9999	1.0033	1.0064	1.0200	OK
3	1.0006	1.0026	1.0061	1.0000	1.0007	1.0010	1.0100	OK
4	1.0003	1.0009	1.0010	1.0000	1.0002	0.9996	1.0100	OK
5	1.0018	1.0011	1.0022	0.9994	1.0003	0.9992	1.0120	OK
6	1.0015	1.0027	1.0029	1.0005	1.0008	0.9988	1.0100	OK
7	1.0015	1.0006	1.0020	–	–	–	1.0070	OK
8	1.0020	1.0054	1.0047	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \qquad \text{with} \quad M_{ratio,i} < l \qquad \text{and} \quad \frac{1}{M_{ratio,i}} < l \qquad (1)$$

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 12 Apr 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100413_073146_20100412_190825_20100414_190825` .

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
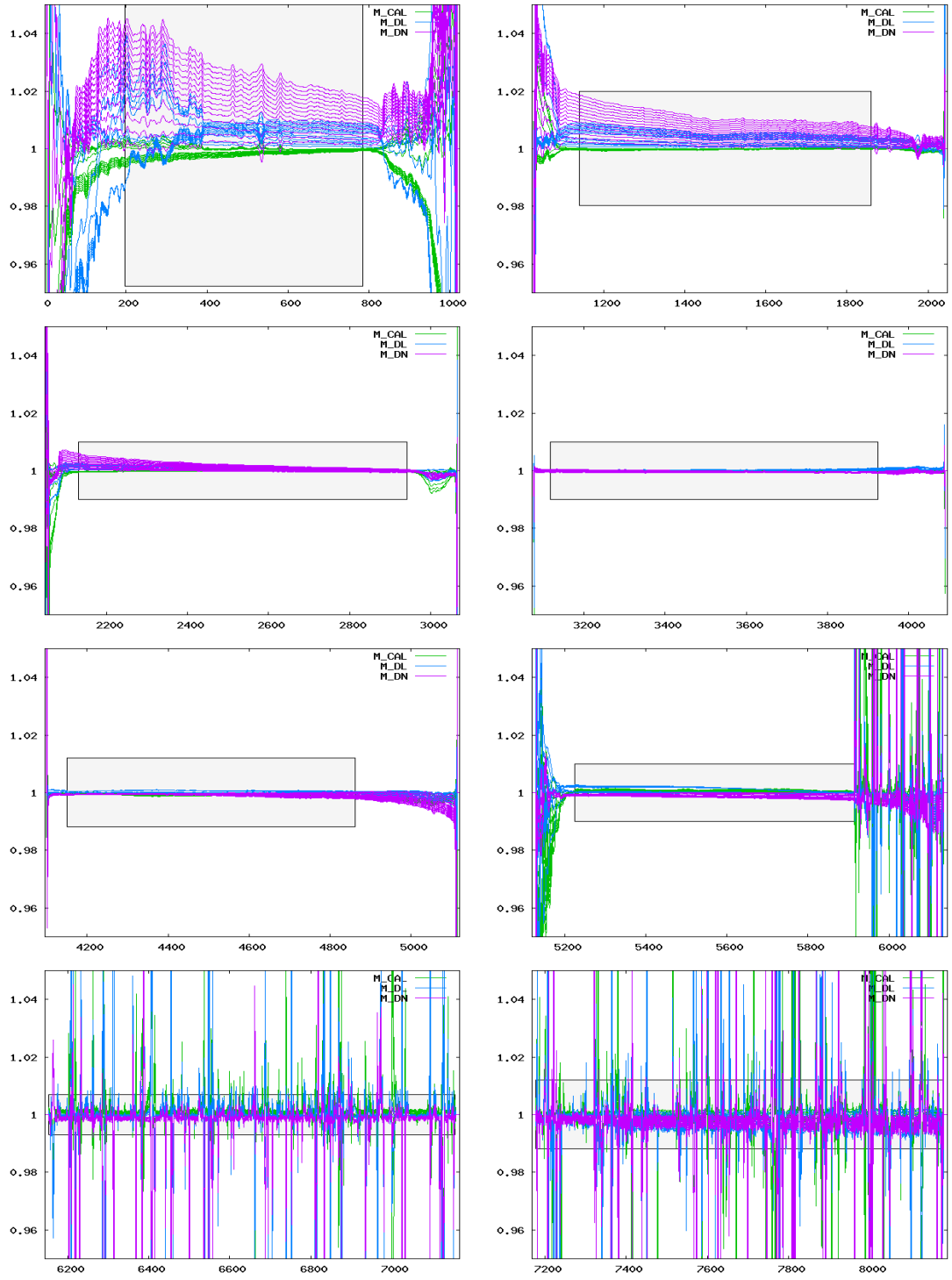
Figure 1: Ratio of delivered m-factors (13 Apr 2010– 26 Apr 2010) to the corresponding m-factor of the previous delivery day (12 Apr 2010). The grey boxes visualize the maximum ratio allowed.