

NRT M-factor delivery document

06 Apr 2009

Klaus Bramstedt, ife Bremen

06 Apr 2009

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: 31 Mar 2009– 06 Apr 2009
- Prediction: 07 Apr 2009– 13 Apr 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
2f5858c3f0b8cfba7e31df93ce6cb804	SCI_MF1_AXNIFE20090406_215442_20090331_181642_20090402_181642
df2ec491b8aeb04acc521f7aaa2ad7dd	SCI_MF1_AXNIFE20090406_215442_20090401_192541_20090403_192541
38e53f96bc8dd749ef575afb4cd741e2	SCI_MF1_AXNIFE20090406_215442_20090402_185404_20090404_185404
1eb767fd26f8a7a6ef3a49555de2c65f	SCI_MF1_AXNIFE20090406_215442_20090403_182227_20090405_182227
6bf410dcae0af1408b8723864492a20f	SCI_MF1_AXNIFE20090406_215442_20090404_193126_20090406_193126
8533812f1c38be218a352ba5d0726274	SCI_MF1_AXNIFE20090406_215442_20090405_185949_20090407_185949
82922d10f8abaefe85b41515c83d9f53	SCI_MF1_AXNIFE20090406_215442_20090406_182812_20090408_182812
dd40ff40784ad7f07a4978ee81d19dc2	SCI_MF1_AXNIFE20090406_215442_20090407_193711_20090409_193711
5cb14d31d807bd11956e1994a6c187df	SCI_MF1_AXNIFE20090406_215442_20090408_190534_20090410_190534
e3303b068bb88dd95f05eeee07231de6	SCI_MF1_AXNIFE20090406_215442_20090409_183357_20090411_183357
4f40c2ca377969fd10f2837dfb207749	SCI_MF1_AXNIFE20090406_215442_20090410_194255_20090412_194255
faa7309ac6bd8aae9131c9d40eb42859	SCI_MF1_AXNIFE20090406_215442_20090411_191118_20090413_191118
ecefb60a91f6ccd2b619caddfeff6241	SCI_MF1_AXNIFE20090406_215442_20090412_183941_20090414_183941
2b65fa6971ec65756ee0ebacf2ba100e	SCI_MF1_AXNIFE20090406_215442_20090413_194840_20090511_194840

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

validity identifier	M.CAL	M.DL	M.DN
20090331_181642_20090402_181642	meas.	meas.	interp.
20090401_192541_20090403_192541	meas.	meas.	meas.
20090402_185404_20090404_185404	meas.	meas.	pred.
20090403_182227_20090405_182227	meas.	meas.	pred.
20090404_193126_20090406_193126	meas.	meas.	pred.
20090405_185949_20090407_185949	meas.	meas.	pred.
20090406_182812_20090408_182812	pred.	pred.	pred.
20090407_193711_20090409_193711	pred.	pred.	pred.
20090408_190534_20090410_190534	pred.	pred.	pred.
20090409_183357_20090411_183357	pred.	pred.	pred.
20090410_194255_20090412_194255	pred.	pred.	pred.
20090411_191118_20090413_191118	pred.	pred.	pred.
20090412_183941_20090414_183941	pred.	pred.	pred.
20090413_194840_20090511_194840	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			limit	status
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN		
1	1.0079	1.0279	1.0346	1.0009	1.0076	1.0133	1.0400	OK
2	1.0029	1.0073	1.0149	1.0008	1.0022	1.0056	1.0200	OK
3	1.0010	1.0028	1.0050	1.0002	1.0005	1.0014	1.0100	OK
4	1.0004	1.0007	1.0015	1.0001	1.0001	1.0002	1.0100	OK
5	1.0017	1.0042	1.0025	0.9995	0.9985	0.9995	1.0120	OK
6	1.0022	1.0031	1.0016	1.0006	0.9983	0.9999	1.0100	OK
7	1.0014	1.0017	1.0005	—	—	—	1.0070	OK
8	1.0081	1.0050	1.0055	—	—	—	1.0120	OK

certain limit l :

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

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 30 Mar 2009, therefore M_{t_0} is taken from the m-factor file SCI MF1 AXNIFE20090330_215836_20090330_184819_20090401_184819 .

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 Slijkhuis, 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

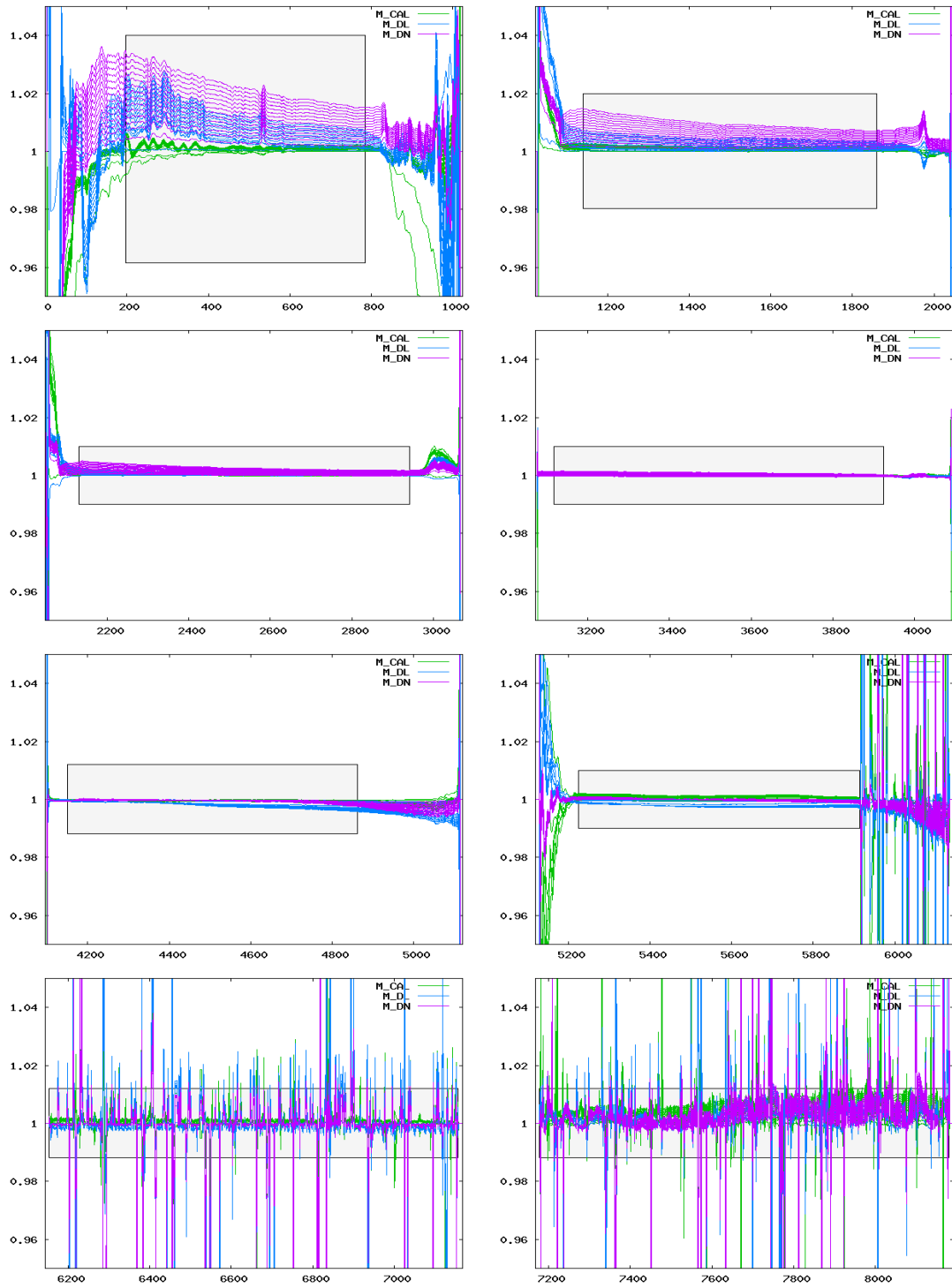


Figure 1: Ratio of delivered m-factors (31 Mar 2009– 13 Apr 2009) to the corresponding m-factor of the previous delivery day (30 Mar 2009). The grey boxes visualize the maximum ratio allowed.