NRT M-factor delivery document 06 Jul 2009

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06 Jul 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: 30 Jun 2009– 06 Jul 2009

- Prediction: 07 Jul 2009– 13 Jul 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
dc71cb4fedb9d9efc318ed979995c697	SCI_MF1_AXNIFE20090720_132041_20090630_185656_20090702_185656
77e2acc546dafbf2fd220f13b483d5a8	SCI_MF1_AXNIFE20090720_132041_20090701_182519_20090703_182519
a844906b748ac36e42db24f45399cd5c	SCI_MF1_AXNIFE20090720_132041_20090702_193418_20090704_193418
2bfe1b13a2fa927ce3fdf3732be2fe86	SCI_MF1_AXNIFE20090720_132041_20090703_190241_20090705_190241
c190bd9bc04c514f1c07c28609fd1e1b	SCI_MF1_AXNIFE20090720_132041_20090704_183104_20090706_183104
00f1a92e2915cfb52ccf0bb66c90e711	SCI_MF1_AXNIFE20090720_132041_20090705_194003_20090707_194003
a641c3ceb92558ebc0b39d1a22d96b5f	SCI_MF1_AXNIFE20090720_132041_20090706_190826_20090708_190826
6051a0ffefb44ef7fd8cbf6342f51bdb	SCI_MF1_AXNIFE20090720_132041_20090707_183649_20090709_183649
a17e233224e26928d0f1bd988d6e9281	SCI_MF1_AXNIFE20090720_132041_20090708_194548_20090710_194548
f88e98be67e8d27e42e3059f3c7319a6	SCI_MF1_AXNIFE20090720_132041_20090709_191411_20090711_191411
e665ca07992b753e4ffca3ca8fd44f3b	SCI_MF1_AXNIFE20090720_132041_20090710_184234_20090712_184234
f8ae279b9dfab7f05fc6c7007c23daa6	SCI_MF1_AXNIFE20090720_132041_20090711_181057_20090713_181057
ffd2d4c183b935671505d726e4f28602	SCI_MF1_AXNIFE20090720_132041_20090712_191956_20090714_191956
4b2c56d6b02749ed760cb264f9ce124f	SCI_MF1_AXNIFE20090720_132041_20090713_184819_20090810_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090630_185656_20090702_185656	meas.	meas.	interp.
20090701_182519_20090703_182519	meas.	meas.	meas.
20090702_193418_20090704_193418	meas.	meas.	interp.
20090703_190241_20090705_190241	meas.	meas.	interp.
20090704_183104_20090706_183104	meas.	meas.	interp.
20090705_194003_20090707_194003	meas.	meas.	meas.
20090706_190826_20090708_190826	pred.	pred.	pred.
20090707_183649_20090709_183649	pred.	pred.	pred.
20090708_194548_20090710_194548	pred.	pred.	pred.
20090709_191411_20090711_191411	pred.	pred.	pred.
20090710_184234_20090712_184234	pred.	pred.	pred.
20090711_181057_20090713_181057	pred.	pred.	pred.
20090712_191956_20090714_191956	pred.	pred.	pred.
20090713_184819_20090810_184819	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	1.0112	1.0278	1.0117	1.0024	1.0086	1.0018	1.0400	OK
2	1.0030	1.0092	1.0058	1.0010	1.0030	1.0015	1.0200	OK
3	1.0006	1.0026	1.0014	1.0000	1.0007	0.9999	1.0100	OK
4	1.0005	1.0009	1.0016	0.9999	1.0002	0.9992	1.0100	OK
5	1.0021	1.0020	1.0020	1.0003	1.0000	0.9991	1.0120	OK
6	1.0023	1.0015	1.0007	1.0006	0.9999	1.0002	1.0100	OK
7	1.0006	1.0008	1.0007	–	–	–	1.0070	OK
8	1.0071	1.0087	1.0160	–	–	–	1.0500	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 29 Jun 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090629_215354_20090629_192833_20090701_192833` .

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
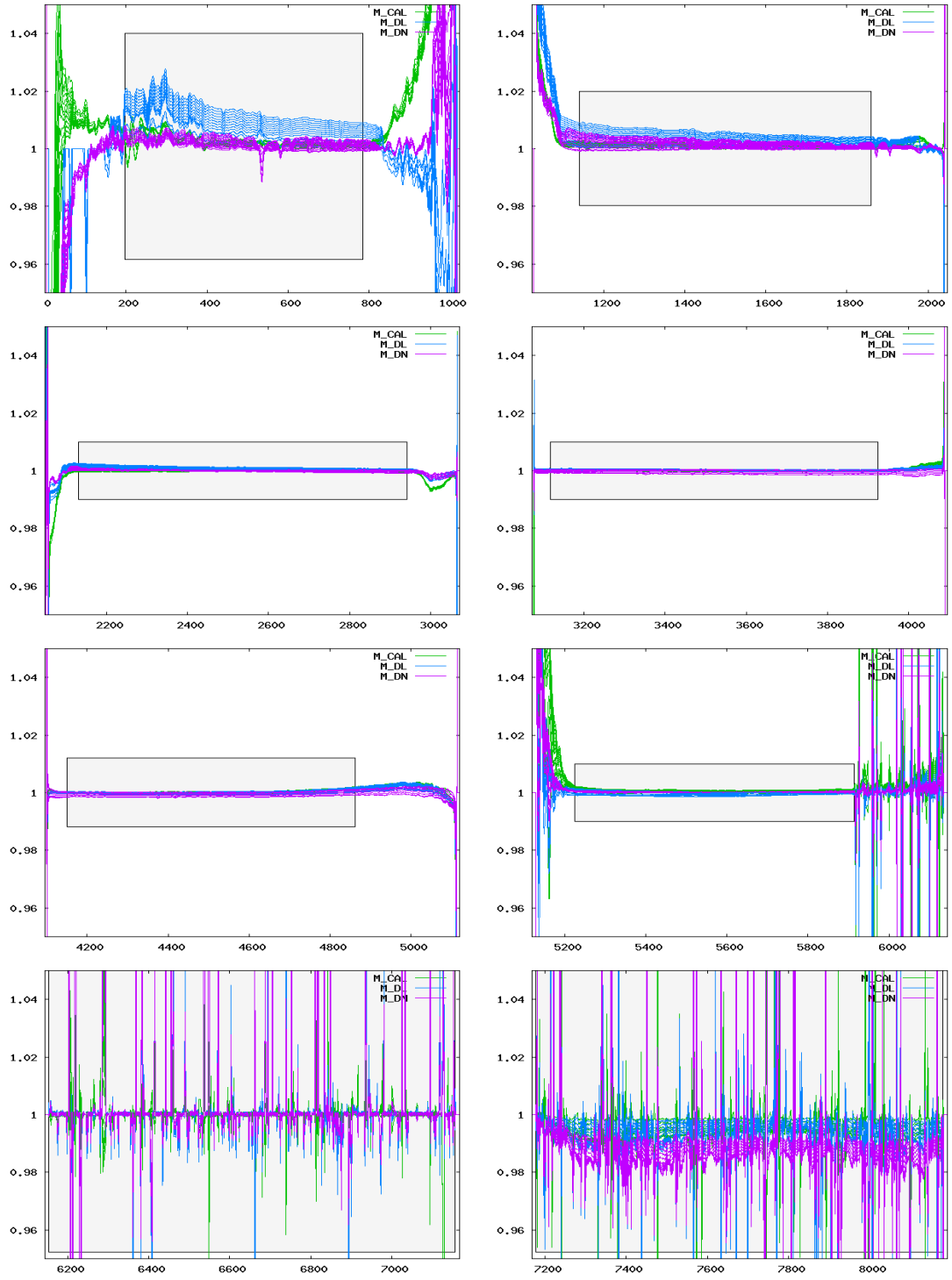
Figure 1: Ratio of delivered m-factors (30 Jun 2009– 13 Jul 2009) to the corresponding m-factor of the previous delivery day (29 Jun 2009). The grey boxes visualize the maximum ratio allowed.