NRT M-factor delivery document 15 Mar 2010

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 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: 09 Mar 2010– 15 Mar 2010
- Prediction: 16 Mar 2010– 22 Mar 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
4688fe85ef0028134f582f3f79341068	SCI_MF1_AXNIFE20100408_103443_20100309_183648_20100311_183648
a2dddef7a216bf8b972422bbe6069df8	SCI_MF1_AXNIFE20100408_103443_20100310_194547_20100312_194547
e530e4f0d7651fdfc461df4c532e5cb2	SCI_MF1_AXNIFE20100408_103443_20100311_191410_20100313_191410
77a602ca206b5c94b49de734175154ca	SCI_MF1_AXNIFE20100408_103443_20100312_184233_20100314_184233
2abe7c1f8c2879fa44bd0b846061c676	SCI_MF1_AXNIFE20100408_103443_20100313_181056_20100315_181056
bd58bca9e815c35034476101d9e4798c	SCI_MF1_AXNIFE20100408_103443_20100314_191955_20100316_191955
d92ef4f274e2f06b52cc78387d1e4787	SCI_MF1_AXNIFE20100408_103443_20100315_184818_20100317_184818
4e92cb58bef94da25586a81eec53b18f	SCI_MF1_AXNIFE20100408_103443_20100316_181641_20100318_181641
e411d83ef1a7edbe1f141b1158bb562c	SCI_MF1_AXNIFE20100408_103443_20100317_192540_20100319_192540
8b3cf524e62a94c5a8071a921733fa66	SCI_MF1_AXNIFE20100408_103443_20100318_185403_20100320_185403
58ba0c5604c13cb1a5eb6817a32d9cc5	SCI_MF1_AXNIFE20100408_103443_20100319_182226_20100321_182226
cf2a10b28b9cd13f9508b19e0350a15a	SCI_MF1_AXNIFE20100408_103443_20100320_193125_20100322_193125
c47d391cecd63a58b31849ec4d46ab68	SCI_MF1_AXNIFE20100408_103443_20100321_185948_20100323_185948
4a5a5e2b6bb5a95bf084f2ecc197d666	SCI_MF1_AXNIFE20100408_103443_20100322_182811_20100419_182811

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

validity identifier	M_CAL	M_DL	M_DN
20100309_183648_20100311_183648	meas.	meas.	interp.
20100310_194547_20100312_194547	meas.	meas.	meas.
20100311_191410_20100313_191410	meas.	meas.	interp.
20100312_184233_20100314_184233	meas.	meas.	interp.
20100313_181056_20100315_181056	meas.	meas.	interp.
20100314_191955_20100316_191955	meas.	meas.	meas.
20100315_184818_20100317_184818	meas.	meas.	pred.
20100316_181641_20100318_181641	pred.	pred.	pred.
20100317_192540_20100319_192540	pred.	pred.	pred.
20100318_185403_20100320_185403	pred.	pred.	pred.
20100319_182226_20100321_182226	pred.	pred.	pred.
20100320_193125_20100322_193125	pred.	pred.	pred.
20100321_185948_20100323_185948	pred.	pred.	pred.
20100322_182811_20100419_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. 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	1.0162	1.0307	1.0188	0.9989	1.0087	1.0080	1.0400	OK
2	1.0012	1.0085	1.0124	1.0004	1.0029	1.0045	1.0200	OK
3	1.0007	1.0026	1.0046	1.0004	1.0008	1.0010	1.0100	OK
4	1.0009	1.0007	1.0021	1.0003	1.0003	1.0000	1.0100	OK
5	1.0011	1.0011	1.0027	0.9999	0.9999	0.9989	1.0120	OK
6	1.0018	1.0018	1.0021	1.0006	1.0004	0.9990	1.0100	OK
7	1.0007	1.0004	1.0018	–	–	–	1.0070	OK
8	1.0031	1.0038	1.0079	–	–	–	1.0120	OK

certain limit l:

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

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 08 Mar 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_102043_20100308_190825_20100310_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

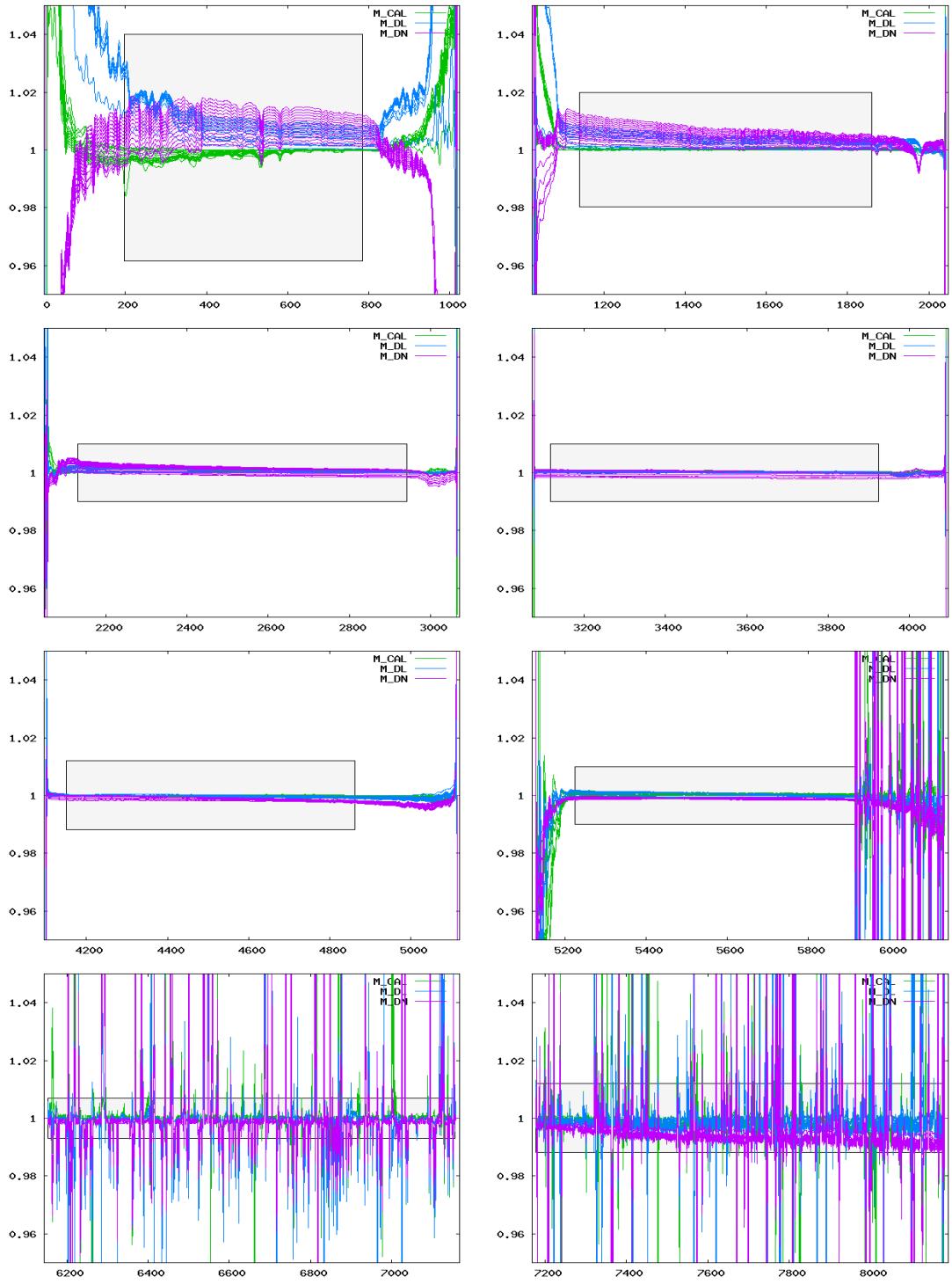

Figure 1: Ratio of delivered m-factors (09 Mar 2010– 22 Mar 2010) to the corresponding m-factor of the previous delivery day (08 Mar 2010). The grey boxes visualize the maximum ratio allowed.