NRT M-factor delivery document 22 Jun 2009

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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 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: 16 Jun 2009– 22 Jun 2009
- Prediction: 23 Jun 2009– 29 Jun 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
4e09056113fedd6f4a944dfdaf9e78ab	SCI_MF1_AXNIFE20090623_090557_20090616_193710_20090618_193710
4866ba6e9948614a86446adbd1892206	SCI_MF1_AXNIFE20090623_090557_20090617_190533_20090619_190533
c6391b9a014ff52221b38d809fc8443b	SCI_MF1_AXNIFE20090623_090557_20090618_183356_20090620_183356
569a34c333968941e3dff26308d160bb	SCI_MF1_AXNIFE20090623_090557_20090619_194255_20090621_194255
850a7645a1f2576880565e07241dfa02	SCI_MF1_AXNIFE20090623_090557_20090620_191118_20090622_191118
a358a5a25eb4ab518b9b39aa42177df0	SCI_MF1_AXNIFE20090623_090557_20090621_183941_20090623_183941
4794e10f510d845bae0c8a4581d83a6e	SCI_MF1_AXNIFE20090623_090557_20090622_194840_20090624_194840
d8e4a16441fded0807628be5b1947d54	SCI_MF1_AXNIFE20090623_090557_20090623_191703_20090625_191703
e9b61fb3ba1d32b7ec74c63fd904c1fa	SCI_MF1_AXNIFE20090623_090557_20090624_184526_20090626_184526
bf9305780dba1231a4514a7ceba69e73	SCI_MF1_AXNIFE20090623_090557_20090625_181349_20090627_181349
4549d6698dd09a29fe3c350e15aea0ac	SCI_MF1_AXNIFE20090623_090557_20090626_192248_20090628_192248
74c04b80c8240ef21740ea9fb1b7d7bb	SCI_MF1_AXNIFE20090623_090557_20090627_185111_20090629_185111
3c77108fbd6bb452411d0c290794ac18	SCI_MF1_AXNIFE20090623_090557_20090628_181934_20090630_181934
58a24bfeaa67d0b0703c68dc31adce36	SCI_MF1_AXNIFE20090623_090557_20090629_192833_20090727_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090616_193710_20090618_193710	interp.	interp.	interp.
20090617_190533_20090619_190533	meas.	meas.	interp.
20090618_183356_20090620_183356	meas.	meas.	interp.
20090619_194255_20090621_194255	meas.	meas.	meas.
20090620_191118_20090622_191118	meas.	meas.	pred.
20090621_183941_20090623_183941	meas.	meas.	pred.
20090622_194840_20090624_194840	pred.	pred.	pred.
20090623_191703_20090625_191703	pred.	pred.	pred.
20090624_184526_20090626_184526	pred.	pred.	pred.
20090625_181349_20090627_181349	pred.	pred.	pred.
20090626_192248_20090628_192248	pred.	pred.	pred.
20090627_185111_20090629_185111	pred.	pred.	pred.
20090628_181934_20090630_181934	pred.	pred.	pred.
20090629_192833_20090727_192833	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	1.0108	1.0342	1.0183	1.0000	1.0034	1.0039	1.0400	OK
2	1.0026	1.0074	1.0069	1.0012	1.0027	1.0019	1.0200	OK
3	1.0007	1.0023	1.0013	1.0002	1.0005	0.9999	1.0100	OK
4	1.0018	1.0018	1.0009	1.0004	1.0004	0.9996	1.0100	OK
5	1.0078	1.0091	1.0014	1.0011	1.0009	0.9992	1.0120	OK
6	1.0018	1.0017	1.0014	1.0006	1.0004	0.9991	1.0100	OK
7	1.0011	1.0004	1.0007	–	–	–	1.0070	OK
8	1.0411	1.0448	1.0059	–	–	–	1.0500	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 15 Jun 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090615_215413_20090615_182811_20090617_182811` .

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

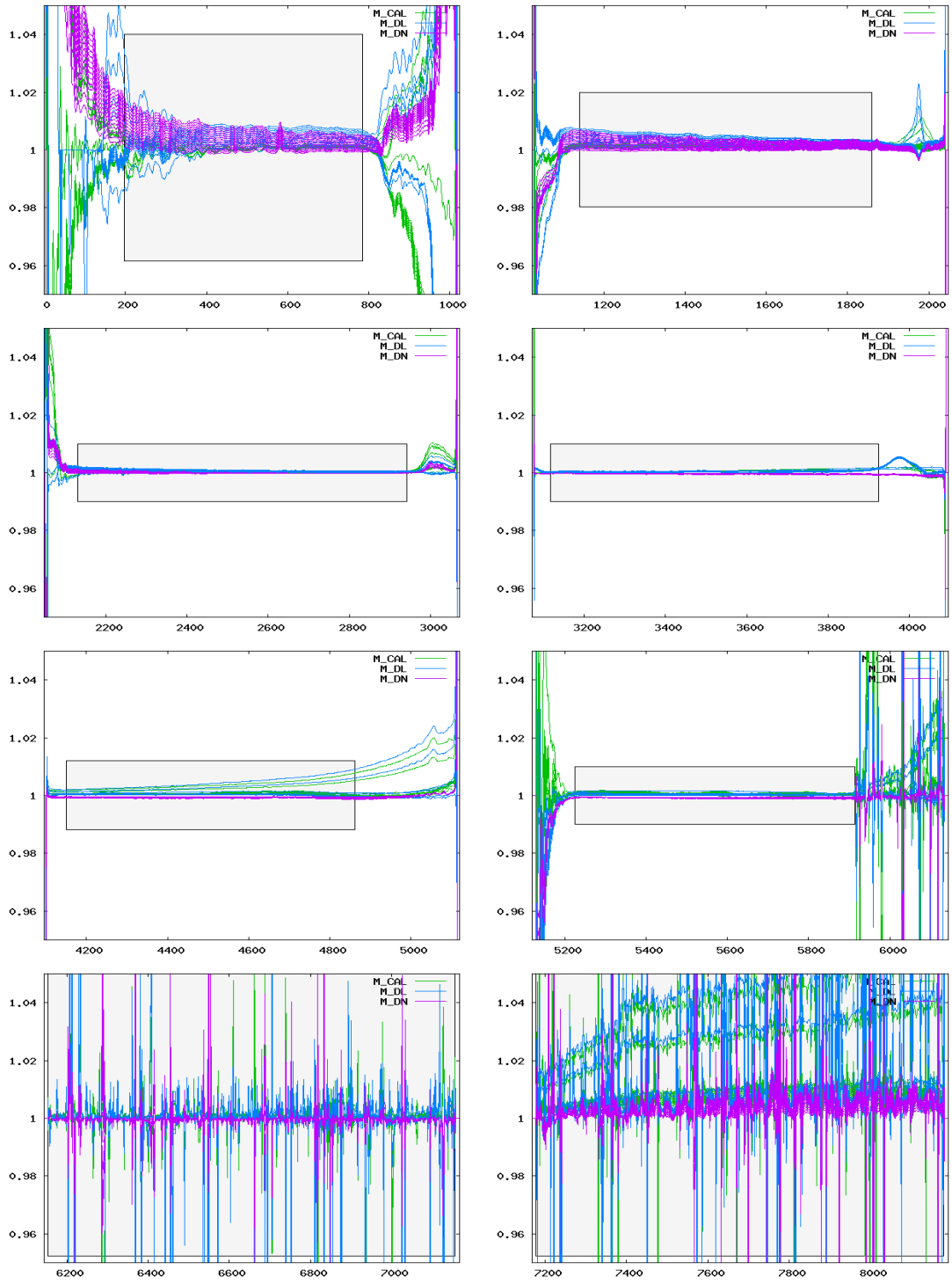

Figure 1: Ratio of delivered m-factors (16 Jun 2009– 29 Jun 2009) to the corresponding m-factor of the previous delivery day (15 Jun 2009). The grey boxes visualize the maximum ratio allowed.