NRT M-factor delivery document 26 Jan 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: 20 Jan 2009– 26 Jan 2009
- Prediction: 27 Jan 2009– 02 Feb 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
8b1de1a8622c136cde9faa6e4cb20314	SCI_MF1_AXNIFE20090126_225422_20090120_181642_20090122_181642
120e2ca1ed70f63d17571c746a7170c9	SCI_MF1_AXNIFE20090126_225422_20090121_192541_20090123_192541
844fb459898d8da85423b8cb0e5522bc	SCI_MF1_AXNIFE20090126_225422_20090122_185404_20090124_185404
702b4c6a353dd66772a90d69fbd55879	SCI_MF1_AXNIFE20090126_225422_20090123_182227_20090125_182227
542e77c05db65ea85f43882001f1f88e	SCI_MF1_AXNIFE20090126_225422_20090124_193126_20090126_193126
c6a228cacdb5f06865eb8ee1314dd905	SCI_MF1_AXNIFE20090126_225422_20090125_185949_20090127_185949
eed9548a649ba64adc84d16c348e64d4	SCI_MF1_AXNIFE20090126_225422_20090126_182812_20090128_182812
cdd4ee9a2347b0f9e10fa6b7a2f6b2f4	SCI_MF1_AXNIFE20090126_225422_20090127_193711_20090129_193711
c58668d0ae32f14b3e5ecbdf4e2b0d85	SCI_MF1_AXNIFE20090126_225422_20090128_190534_20090130_190534
89f35ab660f41a446389d9d7040841db	SCI_MF1_AXNIFE20090126_225422_20090129_183357_20090131_183357
9f93cc12029f4ca7b6953bcdc528002b	SCI_MF1_AXNIFE20090126_225422_20090130_194256_20090201_194256
1d9fc491d6b74cbba596904e520b8ac1	SCI_MF1_AXNIFE20090126_225422_20090131_191119_20090202_191119
7d5798f6afdc8f7d11780c752d575675	SCI_MF1_AXNIFE20090126_225422_20090201_183942_20090203_183942
a37841497c4a829745ebe8b1efc26f6e	SCI_MF1_AXNIFE20090126_225422_20090202_194840_20090302_194840

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

validity identifier	M_CAL	M_DL	M_DN
20090120_181642_20090122_181642	meas.	meas.	interp.
20090121_192541_20090123_192541	meas.	meas.	meas.
20090122_185404_20090124_185404	meas.	meas.	pred.
20090123_182227_20090125_182227	meas.	meas.	pred.
20090124_193126_20090126_193126	meas.	meas.	pred.
20090125_185949_20090127_185949	pred.	meas.	pred.
20090126_182812_20090128_182812	pred.	pred.	pred.
20090127_193711_20090129_193711	pred.	pred.	pred.
20090128_190534_20090130_190534	pred.	pred.	pred.
20090129_183357_20090131_183357	pred.	pred.	pred.
20090130_194256_20090201_194256	pred.	pred.	pred.
20090131_191119_20090202_191119	pred.	pred.	pred.
20090201_183942_20090203_183942	pred.	pred.	pred.
20090202_194840_20090302_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. 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	1.0228	1.0364	1.0241	1.0061	1.0109	1.0011	1.0400	OK
2	1.0087	1.0168	1.0062	1.0026	1.0049	1.0014	1.0200	OK
3	1.0031	1.0043	1.0031	1.0005	1.0006	1.0007	1.0100	OK
4	1.0009	1.0006	1.0018	1.0006	1.0001	1.0010	1.0100	OK
5	1.0020	1.0017	1.0019	1.0011	1.0004	1.0012	1.0120	OK
6	1.0232	1.0204	1.0220	0.9960	0.9962	0.9964	1.0100	Not OK
7	0.9980	0.9968	0.9949	–	–	–	1.0070	Not OK
8	1.0104	1.0126	1.0159	–	–	–	1.0120	Not 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 19 Jan 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090123_095557_20090119_184819_20090121_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 exceeds the limits. Additional checks are necessary.

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

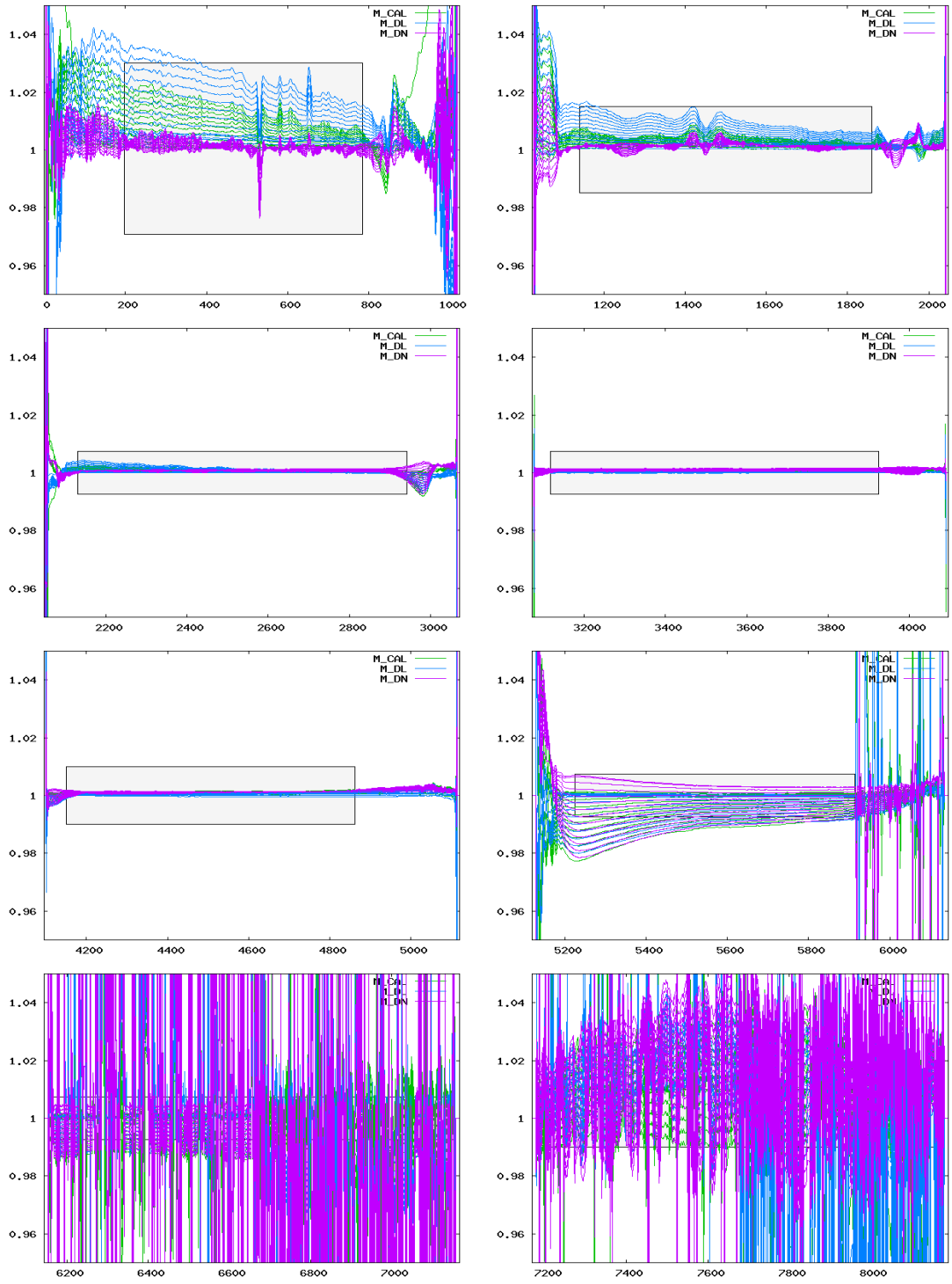

Figure 1: Ratio of delivered m-factors (20 Jan 2009– 02 Feb 2009) to the corresponding m-factor of the previous delivery day (19 Jan 2009). The grey boxes visualize the maximum ratio allowed.