NRT M-factor delivery document 27 Jun 2011

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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: 21 Jun 2011– 27 Jun 2011
- Prediction: 28 Jun 2011– 04 Jul 2011

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
689729dfe143e0bb39d4be28ccef8a00	SCI_MF1_AXNIFE20110628_034322_20110621_183751_20110623_183751
6c26173f4f9b6046698525a1a3af26b1	SCI_MF1_AXNIFE20110628_034322_20110622_194119_20110624_194119
2eaa8e74aea17ebd7f345aaf0e1be6f9	SCI_MF1_AXNIFE20110628_034322_20110623_190434_20110625_190434
92ae307bb2d3499c31960f2de38787fa	SCI_MF1_AXNIFE20110628_034322_20110624_182748_20110626_182748
44e8355b0d4a7bf7bc6509932b2cc9be	SCI_MF1_AXNIFE20110628_034322_20110625_193117_20110627_193117
94529dd131d2d77c7cbb8d5df9fe6c36	SCI_MF1_AXNIFE20110628_034322_20110626_185431_20110628_185431
4bb9927002872ea704154e394fa6e012	SCI_MF1_AXNIFE20110628_034322_20110627_181746_20110629_181746
86d43f5418c12b4d156bf5fd15a62a4d	SCI_MF1_AXNIFE20110628_034322_20110628_192114_20110630_192114
8bb9317f0f0ed33608f4dcfdfd21d57a	SCI_MF1_AXNIFE20110628_034322_20110629_184429_20110701_184429
268264a49bf6844d332bd1db607a79de	SCI_MF1_AXNIFE20110628_034322_20110630_180744_20110702_180744
f8319e5bfb011d5714fb2fd3e6c3dc14	SCI_MF1_AXNIFE20110628_034322_20110701_191112_20110703_191112
d3300082ed7ec270cf414f1c7d64aa2a	SCI_MF1_AXNIFE20110628_034322_20110702_183426_20110704_183426
ef446808df885484e8a12681713e4467	SCI_MF1_AXNIFE20110628_034322_20110703_193755_20110705_193755
66561e27fefc457ac7c8701f286df01e	SCI_MF1_AXNIFE20110628_034322_20110704_190109_20110801_190109

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

validity identifier	M_CAL	M_DL	M_DN
20110621_183751_20110623_183751	meas.	meas.	interp.
20110622_194119_20110624_194119	meas.	meas.	interp.
20110623_190434_20110625_190434	meas.	meas.	meas.
20110624_182748_20110626_182748	meas.	meas.	pred.
20110625_193117_20110627_193117	meas.	meas.	pred.
20110626_185431_20110628_185431	meas.	meas.	pred.
20110627_181746_20110629_181746	pred.	meas.	pred.
20110628_192114_20110630_192114	pred.	pred.	pred.
20110629_184429_20110701_184429	pred.	pred.	pred.
20110630_180744_20110702_180744	pred.	pred.	pred.
20110701_191112_20110703_191112	pred.	pred.	pred.
20110702_183426_20110704_183426	pred.	pred.	pred.
20110703_193755_20110705_193755	pred.	pred.	pred.
20110704_190109_20110801_190109	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	1.0149	1.0110	1.0272	1.0013	0.9993	0.9917	1.0400	OK
2	1.0023	1.0027	1.0062	1.0006	0.9994	0.9974	1.0200	OK
3	1.0009	1.0015	1.0023	0.9999	0.9997	0.9990	1.0100	OK
4	1.0009	1.0014	1.0020	1.0000	1.0000	0.9990	1.0100	OK
5	1.0008	1.0026	1.0023	1.0001	1.0009	0.9988	1.0120	OK
6	1.0009	1.0022	1.0006	0.9997	1.0009	0.9997	1.0100	OK
7	1.0007	1.0005	1.0005	–	–	–	1.0070	OK
8	1.0013	1.0031	1.0005	–	–	–	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 20 Jun 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110621_075135_20110620_191436_20110622_191436` .

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

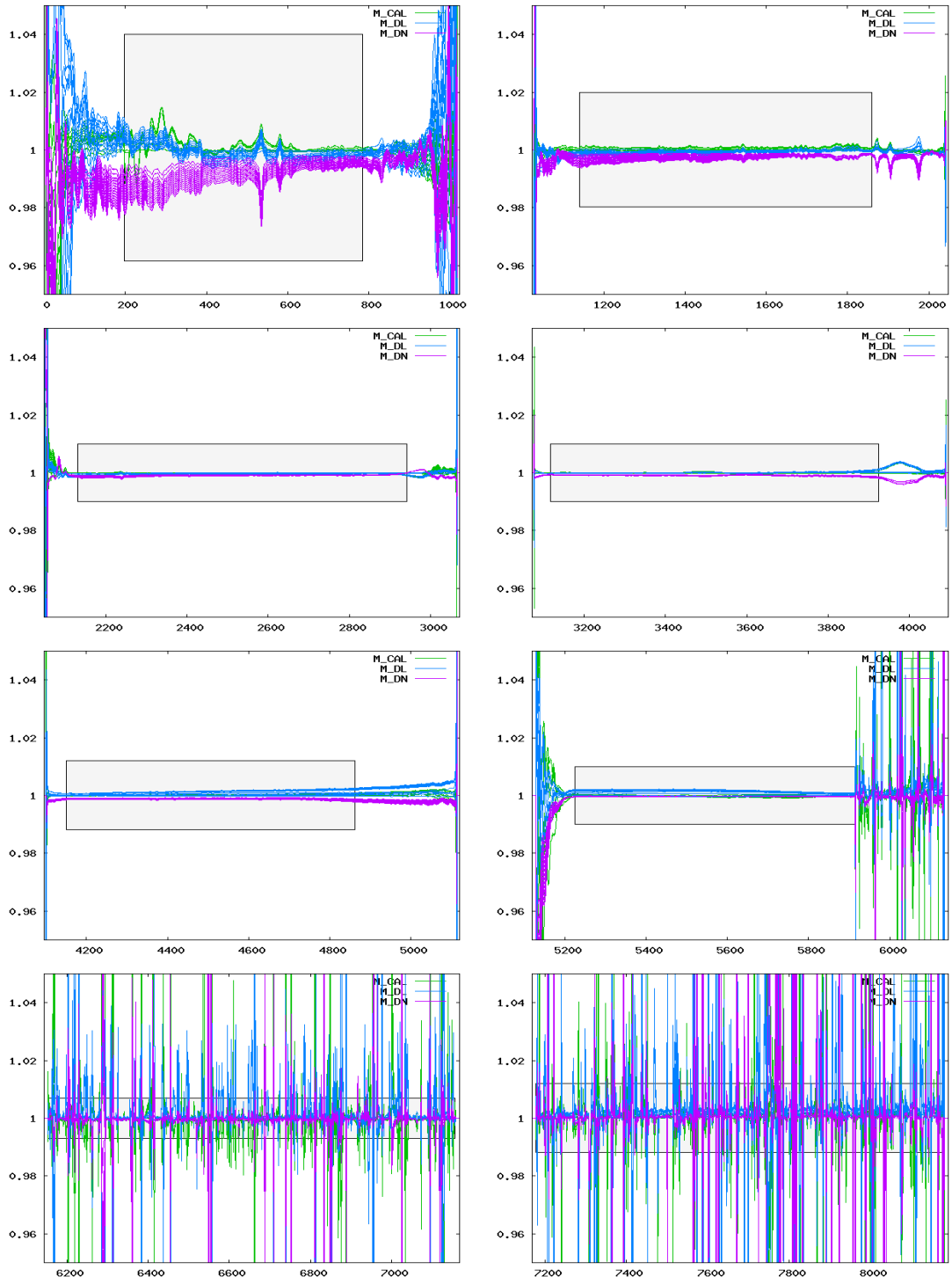

Figure 1: Ratio of delivered m-factors (21 Jun 2011– 04 Jul 2011) to the corresponding m-factor of the previous delivery day (20 Jun 2011). The grey boxes visualize the maximum ratio allowed.