NRT M-factor delivery document 28 Sep 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: 22 Sep 2009– 28 Sep 2009
- Prediction: 29 Sep 2009– 05 Oct 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
bd7485adb08f022a1c51e5f2cc10da49	SCI_MF1_AXNIFE20091202_121359_20090922_181641_20090924_181641
fdd496c8f93b91dc80fbe46ea7f5b7d8	SCI_MF1_AXNIFE20091202_121359_20090923_192540_20090925_192540
945271c9659d36707246ba6b96d49a22	SCI_MF1_AXNIFE20091202_121359_20090924_185403_20090926_185403
b4c6599d93010b9ebc403258af194f1c	SCI_MF1_AXNIFE20091202_121359_20090925_182226_20090927_182226
a62e701874af8b3e3ef2397f57090007	SCI_MF1_AXNIFE20091202_121359_20090926_193125_20090928_193125
eb07de0087a6f81c384053f42d5a89d6	SCI_MF1_AXNIFE20091202_121359_20090927_185948_20090929_185948
c56b08a60c2dfff4aed94123bbe38c64	SCI_MF1_AXNIFE20091202_121359_20090928_182811_20090930_182811
78642ec33fc0ee07901494fdc141ed43	SCI_MF1_AXNIFE20091202_121359_20090929_193710_20091001_193710
11e93f8935e67d4df73f536f7d6186b4	SCI_MF1_AXNIFE20091202_121359_20090930_190533_20091002_190533
469671a8b492c11a6b8b574a4b293cb8	SCI_MF1_AXNIFE20091202_121359_20091001_183356_20091003_183356
ddfd61447f16347bb63efc0c85aa0d76	SCI_MF1_AXNIFE20091202_121359_20091002_194255_20091004_194255
0ca1eefdbb00075e3cf2494b15f019b0	SCI_MF1_AXNIFE20091202_121359_20091003_191118_20091005_191118
4998789676d135ede3166d175c3e5e51	SCI_MF1_AXNIFE20091202_121359_20091004_183941_20091006_183941
29cf2921c7fb0790fe45d03a890489a0	SCI_MF1_AXNIFE20091202_121359_20091005_194840_20091102_194840

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

validity identifier	M_CAL	M_DL	M_DN
20090922_181641_20090924_181641	meas.	meas.	meas.
20090923_192540_20090925_192540	interp.	meas.	interp.
20090924_185403_20090926_185403	meas.	meas.	interp.
20090925_182226_20090927_182226	meas.	meas.	interp.
20090926_193125_20090928_193125	meas.	meas.	meas.
20090927_185948_20090929_185948	meas.	meas.	pred.
20090928_182811_20090930_182811	meas.	meas.	pred.
20090929_193710_20091001_193710	pred.	pred.	pred.
20090930_190533_20091002_190533	pred.	pred.	pred.
20091001_183356_20091003_183356	pred.	pred.	pred.
20091002_194255_20091004_194255	pred.	pred.	pred.
20091003_191118_20091005_191118	pred.	pred.	pred.
20091004_183941_20091006_183941	pred.	pred.	pred.
20091005_194840_20091102_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	1.0111	1.0129	1.0080	1.0010	1.0054	1.0025	1.0400	OK
2	1.0034	1.0081	1.0046	1.0011	1.0028	1.0016	1.0200	OK
3	1.0012	1.0023	1.0024	1.0002	1.0004	1.0016	1.0100	OK
4	1.0004	1.0003	1.0027	1.0000	1.0001	1.0021	1.0100	OK
5	1.0011	1.0013	1.0027	0.9997	1.0003	1.0020	1.0120	OK
6	1.0019	1.0026	1.0050	1.0006	1.0016	1.0027	1.0100	OK
7	1.0009	1.0023	1.0043	–	–	–	1.0070	OK
8	1.0019	1.0007	1.0009	–	–	–	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 21 Sep 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090921_215431_20090921_184818_20090923_184818` .

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

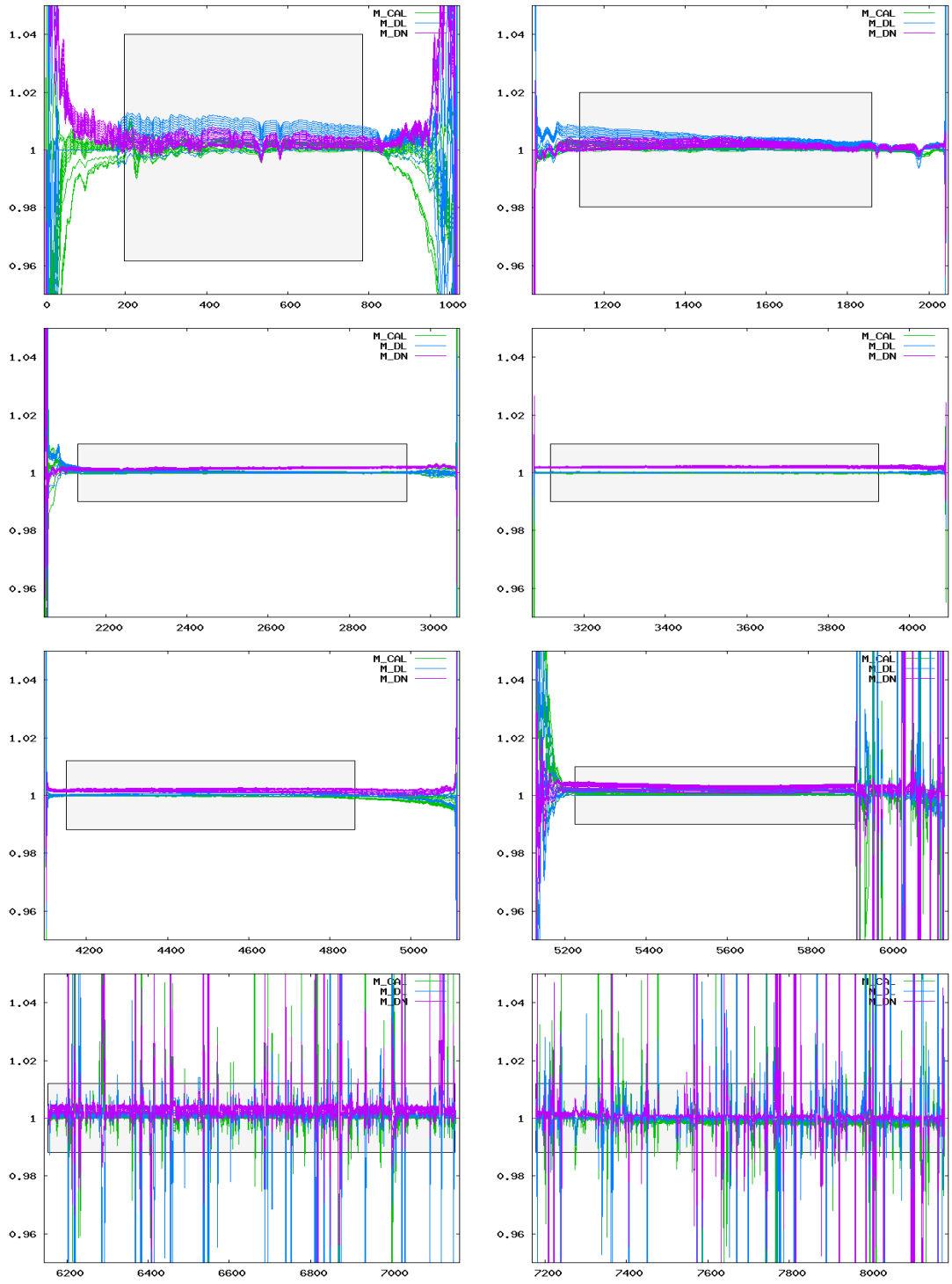

Figure 1: Ratio of delivered m-factors (22 Sep 2009– 05 Oct 2009) to the corresponding m-factor of the previous delivery day (21 Sep 2009). The grey boxes visualize the maximum ratio allowed.