NRT M-factor delivery document 07 Apr 2008

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07 Apr 2008

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: 01 Apr 2008– 07 Apr 2008
- Prediction: 08 Apr 2008– 14 Apr 2008

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
0a6a73d36bbc49d9f01f7ae7c6df6359	SCI_MF1_AXNIFE20080410_080825_20080401_185657_20080403_185657
de00a8c8eb7b462f5d258f2c3be7df69	SCI_MF1_AXNIFE20080410_080825_20080402_182520_20080404_182520
4989a84b639c2915e41383fc02521d2b	SCI_MF1_AXNIFE20080410_080825_20080403_193419_20080405_193419
befbb716fd8af12f2a7c2982c70c4dfc	SCI_MF1_AXNIFE20080410_080825_20080404_190242_20080406_190242
67018c551f778ad177d47a09861cf28a	SCI_MF1_AXNIFE20080410_080825_20080405_183105_20080407_183105
12601026f40302838c152b7575afab72	SCI_MF1_AXNIFE20080410_080825_20080406_194004_20080408_194004
3c38a42d9803c87fa5461aa396fc9d8d	SCI_MF1_AXNIFE20080410_080825_20080407_190827_20080409_190827
926e66e4f7e09a31ff9fe9e496edd225	SCI_MF1_AXNIFE20080410_080825_20080408_183650_20080410_183650
aa2988c5486700d5dea82ba17e3965b2	SCI_MF1_AXNIFE20080410_080825_20080409_194549_20080411_194549
bfa1fbba21d8eec3ef91cdbbea217fc7	SCI_MF1_AXNIFE20080410_080825_20080410_191412_20080412_191412
b4a16a494bab8ecf29cf887b433a7578	SCI_MF1_AXNIFE20080410_080825_20080411_184235_20080413_184235
ef0bc059aa1abef5a3a3141bfeedb1bc	SCI_MF1_AXNIFE20080410_080825_20080412_181058_20080414_181058
3a95d66d99142497e887ccb465bc6661	SCI_MF1_AXNIFE20080410_080825_20080413_191957_20080415_191957
33b7fc9c442bf9e91de652fe31850000	SCI_MF1_AXNIFE20080410_080825_20080414_184820_20080512_184820

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

validity identifier	M_CAL	M_DL	M_DN
20080401_185657_20080403_185657	meas.	meas.	meas.
20080402_182520_20080404_182520	meas.	meas.	interp.
20080403_193419_20080405_193419	meas.	meas.	interp.
20080404_190242_20080406_190242	meas.	meas.	interp.
20080405_183105_20080407_183105	meas.	meas.	meas.
20080406_194004_20080408_194004	interp.	meas.	pred.
20080407_190827_20080409_190827	meas.	meas.	pred.
20080408_183650_20080410_183650	pred.	pred.	pred.
20080409_194549_20080411_194549	pred.	pred.	pred.
20080410_191412_20080412_191412	pred.	pred.	pred.
20080411_184235_20080413_184235	pred.	pred.	pred.
20080412_181058_20080414_181058	pred.	pred.	pred.
20080413_191957_20080415_191957	pred.	pred.	pred.
20080414_184820_20080512_184820	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	1.0079	1.0134	1.0246	1.0012	1.0042	1.0067	1.0400	OK
2	1.0018	1.0043	1.0059	1.0003	1.0016	1.0012	1.0200	OK
3	1.0006	1.0020	1.0026	1.0001	1.0006	1.0006	1.0100	OK
4	1.0004	1.0008	1.0023	1.0001	1.0003	1.0010	1.0100	OK
5	1.0019	1.0033	1.0019	0.9994	0.9989	1.0000	1.0120	OK
6	1.0016	1.0025	1.0012	1.0004	0.9991	1.0001	1.0100	OK
7	0.9997	0.9989	0.9998	–	–	–	1.0070	OK
8	0.9986	0.9976	0.9968	–	–	–	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 31 Mar 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080410_080414_20080331_192834_20080402_192834` .

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

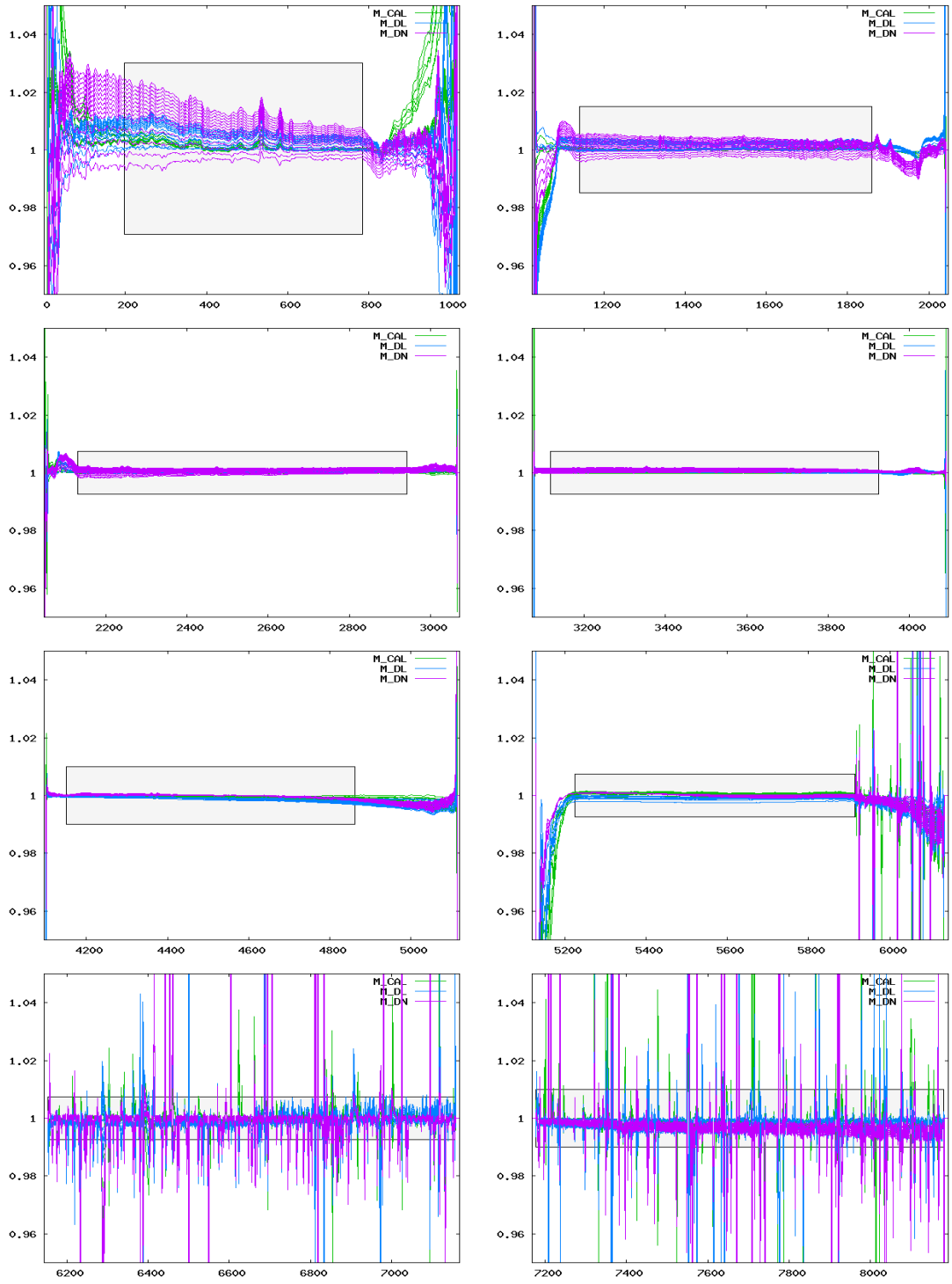

Figure 1: Ratio of delivered m-factors (01 Apr 2008– 14 Apr 2008) to the corresponding m-factor of the previous delivery day (31 Mar 2008). The grey boxes visualize the maximum ratio allowed.