NRT M-factor delivery document 21 Jul 2008

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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: 15 Jul 2008– 21 Jul 2008
- Prediction: 22 Jul 2008– 28 Jul 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
55eb1841dd6668b2f036d13fad331d12	SCI_MF1_AXNIFE20080721_215530_20080715_185657_20080717_185657
c5bee0c9ac0a0f2c97edb240cb54ea94	SCI_MF1_AXNIFE20080721_215530_20080716_182520_20080718_182520
f56bcad64dd7a6b5de25825820b2b950	SCI_MF1_AXNIFE20080721_215530_20080717_193419_20080719_193419
ebcd8badce5d6b94a8a042b1fb563897	SCI_MF1_AXNIFE20080721_215530_20080718_190242_20080720_190242
884f5de47b45de819dd61cb83116b5b5	SCI_MF1_AXNIFE20080721_215530_20080719_183105_20080721_183105
45bb697dbdc7de2d94f3ec8bfc42d28f	SCI_MF1_AXNIFE20080721_215530_20080720_194004_20080722_194004
0ffd449428d77f540d8492f62baf0a67	SCI_MF1_AXNIFE20080721_215530_20080721_190827_20080723_190827
de9d603baa3dbb53d429e2148fe69ebe	SCI_MF1_AXNIFE20080721_215530_20080722_183650_20080724_183650
c0320ffc907893d7e53f3c8f15d08784	SCI_MF1_AXNIFE20080721_215530_20080723_194548_20080725_194548
d8c8b12e763e3c8dd4a57ad6b6bf3d5b	SCI_MF1_AXNIFE20080721_215530_20080724_191411_20080726_191411
027ca3ef0fb116d8187a1bdf340da7a0	SCI_MF1_AXNIFE20080721_215530_20080725_184234_20080727_184234
a706fcdf4d28b86b59c5f7e8e0fd40c3	SCI_MF1_AXNIFE20080721_215530_20080726_181057_20080728_181057
4d28ff0bf983bf2ca6f51e37e5ecf5c4	SCI_MF1_AXNIFE20080721_215530_20080727_191956_20080729_191956
2c17436fd297a08c53be37b290aee59e	SCI_MF1_AXNIFE20080721_215530_20080728_184819_20080825_184819

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

validity identifier	M_CAL	M_DL	M_DN
20080715_185657_20080717_185657	meas.	meas.	interp.
20080716_182520_20080718_182520	meas.	meas.	meas.
20080717_193419_20080719_193419	meas.	meas.	meas.
20080718_190242_20080720_190242	meas.	meas.	pred.
20080719_183105_20080721_183105	meas.	meas.	pred.
20080720_194004_20080722_194004	meas.	meas.	pred.
20080721_190827_20080723_190827	pred.	pred.	pred.
20080722_183650_20080724_183650	pred.	pred.	pred.
20080723_194548_20080725_194548	pred.	pred.	pred.
20080724_191411_20080726_191411	pred.	pred.	pred.
20080725_184234_20080727_184234	pred.	pred.	pred.
20080726_181057_20080728_181057	pred.	pred.	pred.
20080727_191956_20080729_191956	pred.	pred.	pred.
20080728_184819_20080825_184819	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	1.0056	1.0085	1.0039	1.0013	1.0028	1.0002	1.0400	OK
2	1.0020	1.0041	1.0028	1.0007	1.0015	1.0007	1.0200	OK
3	1.0004	1.0011	1.0013	1.0000	1.0002	0.9999	1.0100	OK
4	1.0006	1.0006	1.0013	1.0000	1.0002	0.9999	1.0100	OK
5	1.0014	1.0010	1.0035	1.0002	1.0001	1.0009	1.0120	OK
6	1.0014	1.0011	1.0020	0.9996	0.9999	1.0009	1.0100	OK
7	0.9992	0.9997	0.9997	–	–	–	1.0070	OK
8	1.0018	1.0029	1.0015	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 14 Jul 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080714_215713_20080714_192834_20080716_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

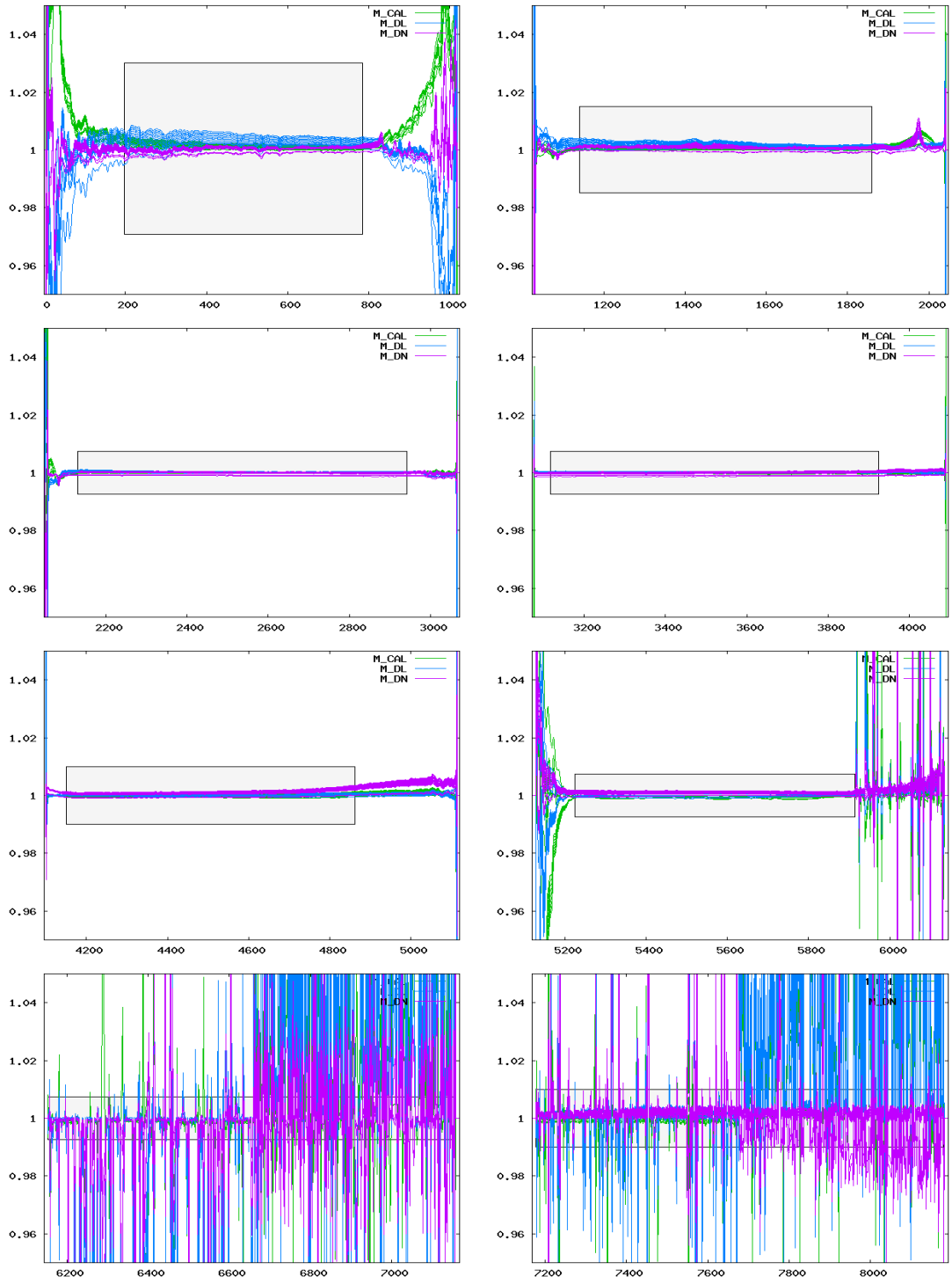

Figure 1: Ratio of delivered m-factors (15 Jul 2008– 28 Jul 2008) to the corresponding m-factor of the previous delivery day (14 Jul 2008). The grey boxes visualize the maximum ratio allowed.