NRT M-factor delivery document 28 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: 22 Jul 2008– 28 Jul 2008
- Prediction: 29 Jul 2008– 04 Aug 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
4219f39f219a05a8dcd6d0b59146907e	SCI_MF1_AXNIFE20080728_215444_20080722_183650_20080724_183650
190dc85f13b4ae5c1197417b46fe51ce	SCI_MF1_AXNIFE20080728_215444_20080723_194548_20080725_194548
260e1df309e5db784f166cf6d9a14bc7	SCI_MF1_AXNIFE20080728_215444_20080724_191411_20080726_191411
bbbb2a31957bf318c0c3af25e86413ca	SCI_MF1_AXNIFE20080728_215444_20080725_184234_20080727_184234
d58a8bbf9f9ff4d03d5d41d6d63b7275	SCI_MF1_AXNIFE20080728_215444_20080726_181057_20080728_181057
0a48219000c209b9b58670a59155c849	SCI_MF1_AXNIFE20080728_215444_20080727_191956_20080729_191956
5c87b2dff3f5d7c78b9e5e1aceb3324f	SCI_MF1_AXNIFE20080728_215444_20080728_184819_20080730_184819
1a4f4bfe9cf2f0ef834660209d7be3ee	SCI_MF1_AXNIFE20080728_215444_20080729_181642_20080731_181642
6bc9e56a3e4cc03f39c9984c8c3ce4e7	SCI_MF1_AXNIFE20080728_215444_20080730_192541_20080801_192541
cd0a7eb5e7d3f75bd62911479093da8d	SCI_MF1_AXNIFE20080728_215444_20080731_185404_20080802_185404
766a585563fd61308f682142576eec5f	SCI_MF1_AXNIFE20080728_215444_20080801_182227_20080803_182227
219e3262edc9a2f66aaba43780d0cd40	SCI_MF1_AXNIFE20080728_215444_20080802_193126_20080804_193126
6b5bc9648fd9d6e49d7cd56cdd1c4b90	SCI_MF1_AXNIFE20080728_215444_20080803_185949_20080805_185949
f9b572046952b8cd18d53dd55ed6400f	SCI_MF1_AXNIFE20080728_215444_20080804_182812_20080901_182812

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

validity identifier	M_CAL	M_DL	M_DN
20080722_183650_20080724_183650	meas.	meas.	interp.
20080723_194548_20080725_194548	meas.	meas.	interp.
20080724_191411_20080726_191411	meas.	meas.	interp.
20080725_184234_20080727_184234	meas.	meas.	meas.
20080726_181057_20080728_181057	meas.	meas.	pred.
20080727_191956_20080729_191956	meas.	meas.	pred.
20080728_184819_20080730_184819	pred.	pred.	pred.
20080729_181642_20080731_181642	pred.	pred.	pred.
20080730_192541_20080801_192541	pred.	pred.	pred.
20080731_185404_20080802_185404	pred.	pred.	pred.
20080801_182227_20080803_182227	pred.	pred.	pred.
20080802_193126_20080804_193126	pred.	pred.	pred.
20080803_185949_20080805_185949	pred.	pred.	pred.
20080804_182812_20080901_182812	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	1.0139	1.0111	1.0026	1.0021	1.0050	1.0004	1.0400	OK
2	1.0028	1.0068	1.0021	1.0013	1.0026	1.0004	1.0200	OK
3	1.0009	1.0020	1.0011	1.0004	1.0007	0.9994	1.0100	OK
4	1.0007	1.0011	1.0015	1.0003	1.0004	0.9990	1.0100	OK
5	1.0013	1.0026	1.0017	1.0005	1.0012	0.9990	1.0120	OK
6	1.0016	1.0027	1.0006	1.0007	1.0016	0.9998	1.0100	OK
7	0.9997	1.0001	0.9988	–	–	–	1.0070	OK
8	1.0014	1.0017	0.9997	–	–	–	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 21 Jul 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080721_215530_20080721_190827_20080723_190827` .

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

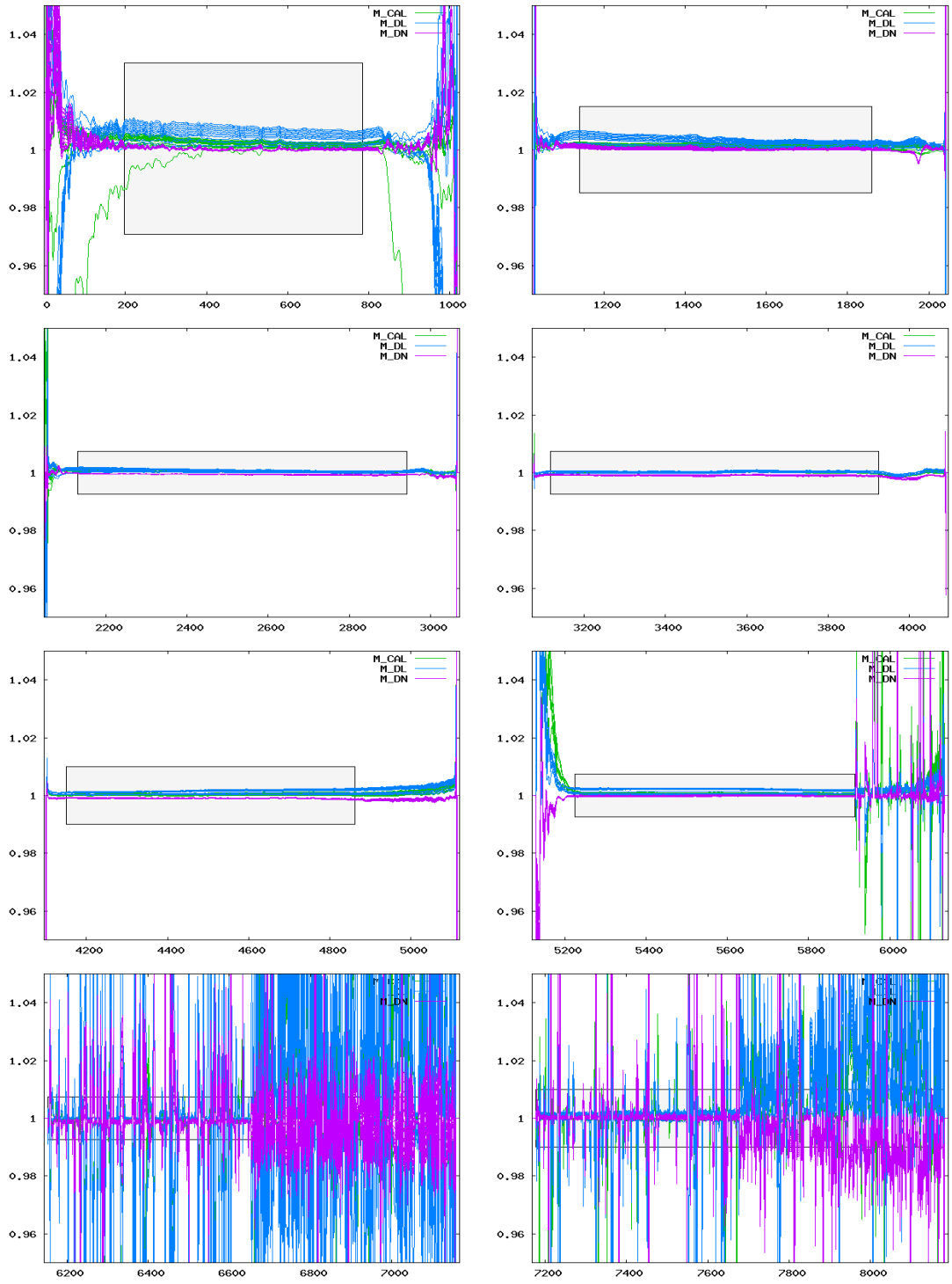

Figure 1: Ratio of delivered m-factors (22 Jul 2008– 04 Aug 2008) to the corresponding m-factor of the previous delivery day (21 Jul 2008). The grey boxes visualize the maximum ratio allowed.