NRT M-factor delivery document
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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: 10 Jun 2008– 16 Jun 2008
- Prediction: 17 Jun 2008– 23 Jun 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
3db2fbf5b5c84f2661a93f0f97c182f1	SCI_MF1_AXNIFE20080616_215526_20080610_185657_20080612_185657
f8df6fbe6b98e4c81a6875ab25470159	SCI_MF1_AXNIFE20080616_215526_20080611_182520_20080613_182520
3ea73281a9f7708172fea1c40a631307	SCI_MF1_AXNIFE20080616_215526_20080612_193419_20080614_193419
2f5777316843208cc6587822039f56a8	SCI_MF1_AXNIFE20080616_215526_20080613_190242_20080615_190242
645a06ff6ccc3c7ed58b2e8ef3195e38	SCI_MF1_AXNIFE20080616_215526_20080614_183105_20080616_183105
a7daef1154445262c680d5c28983155c	SCI_MF1_AXNIFE20080616_215526_20080615_194004_20080617_194004
2e08e8919fcdd58dc4bc081db5f81359	SCI_MF1_AXNIFE20080616_215526_20080616_190827_20080618_190827
7e812a630e5b69721efe4b26c7c85ac0	SCI_MF1_AXNIFE20080616_215526_20080617_183650_20080619_183650
79496f959a648d46474e48bc8c3ec2d0	SCI_MF1_AXNIFE20080616_215526_20080618_194548_20080620_194548
9db072cf34c990c94e8eb43bdb6bf391	SCI_MF1_AXNIFE20080616_215526_20080619_191411_20080621_191411
3aa7bfd592af425f94dbafad1e62c065	SCI_MF1_AXNIFE20080616_215526_20080620_184234_20080622_184234
0e2beabd272f3c668cd4c10f8d14741f	SCI_MF1_AXNIFE20080616_215526_20080621_181057_20080623_181057
c5878b63e497ce5f7453f80bfbe6ca9b	SCI_MF1_AXNIFE20080616_215526_20080622_191956_20080624_191956
bc39d8a8bf866e721062caa52d705311	SCI_MF1_AXNIFE20080616_215526_20080623_184819_20080721_184819

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

validity identifier	M_CAL	M_DL	M_DN
20080610_185657_20080612_185657	meas.	meas.	pred.
20080611_182520_20080613_182520	meas.	meas.	pred.
20080612_193419_20080614_193419	meas.	meas.	pred.
20080613_190242_20080615_190242	meas.	meas.	pred.
20080614_183105_20080616_183105	meas.	meas.	pred.
20080615_194004_20080617_194004	meas.	meas.	pred.
20080616_190827_20080618_190827	pred.	pred.	pred.
20080617_183650_20080619_183650	pred.	pred.	pred.
20080618_194548_20080620_194548	pred.	pred.	pred.
20080619_191411_20080621_191411	pred.	pred.	pred.
20080620_184234_20080622_184234	pred.	pred.	pred.
20080621_181057_20080623_181057	pred.	pred.	pred.
20080622_191956_20080624_191956	pred.	pred.	pred.
20080623_184819_20080721_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	1.0058	1.0094	1.0119	1.0004	1.0027	1.0039	1.0400	OK
2	1.0017	1.0039	1.0048	1.0005	1.0012	1.0018	1.0200	OK
3	1.0004	1.0012	1.0018	1.0000	1.0002	1.0005	1.0100	OK
4	1.0004	1.0005	1.0006	1.0000	1.0001	1.0002	1.0100	OK
5	1.0013	1.0005	1.0013	1.0001	0.9999	0.9998	1.0120	OK
6	1.0014	1.0009	1.0007	0.9997	0.9994	0.9999	1.0100	OK
7	0.9977	0.9986	0.9994	–	–	–	1.0070	OK
8	1.0006	1.0002	0.9995	–	–	–	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 09 Jun 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080609_215756_20080609_192834_20080611_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

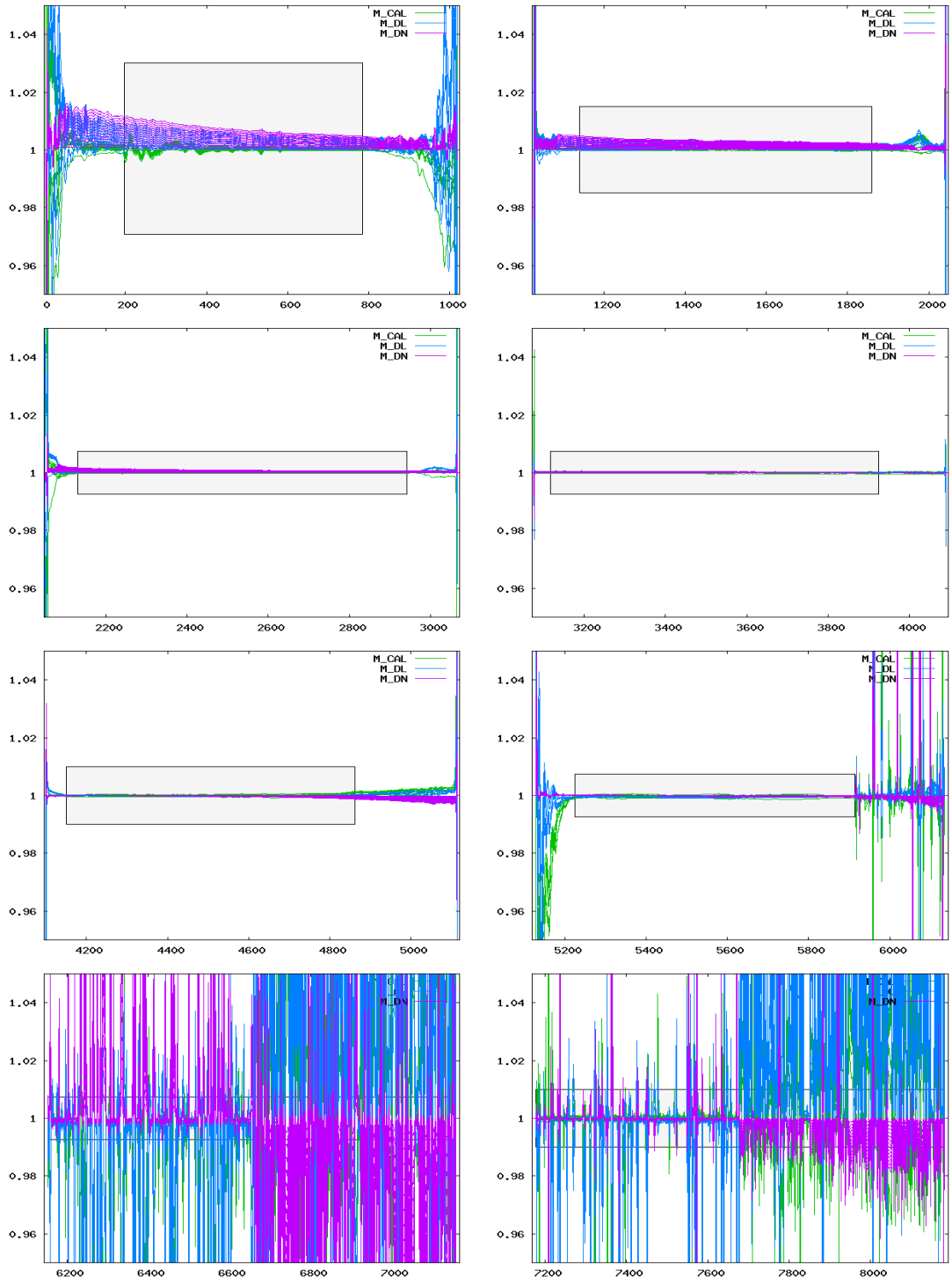

Figure 1: Ratio of delivered m-factors (10 Jun 2008– 23 Jun 2008) to the corresponding m-factor of the previous delivery day (09 Jun 2008). The grey boxes visualize the maximum ratio allowed.