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 07.01.

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: 05 Oct 2010– 11 Oct 2010
- Prediction: 12 Oct 2010– 18 Oct 2010

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
06e6a4f951b0fd30ba23d84279fd38c2	SCI_MF1_AXNIFE20101012_095552_20101005_183648_20101007_183648
92160c2b2309cc8c72498ec4ff0e44f1	SCI_MF1_AXNIFE20101012_095552_20101006_194547_20101008_194547
d1d034d8592b4d1e99fd439c9cbcfde2	SCI_MF1_AXNIFE20101012_095552_20101007_191410_20101009_191410
4b7761a092a03719bee7b40103a9e555	SCI_MF1_AXNIFE20101012_095552_20101008_184233_20101010_184233
785763fe7e5cb1c8ba1a226afc53125e	SCI_MF1_AXNIFE20101012_095552_20101009_181056_20101011_181056
4ba67d1a21ad1c7f7a6180c567f26405	SCI_MF1_AXNIFE20101012_095552_20101010_191955_20101012_191955
6c2c362326c6d82964d5a30d6cc56147	SCI_MF1_AXNIFE20101012_095552_20101011_184818_20101013_184818
efd0dc4712303aa7025d5bdf1ffb94d1	SCI_MF1_AXNIFE20101012_095552_20101012_181641_20101014_181641
29292cce7de68502c8b760dad9f7b4c8	SCI_MF1_AXNIFE20101012_095552_20101013_192540_20101015_192540
a4befc2df2b17f19ed607980dbac523d	SCI_MF1_AXNIFE20101012_095552_20101014_185403_20101016_185403
3229fc8c81ef4f7031b236f95a5fa400	SCI_MF1_AXNIFE20101012_095552_20101015_182226_20101017_182226
ef8a6076f62616e25a5e021647516eee	SCI_MF1_AXNIFE20101012_095552_20101016_193124_20101018_193124
8053cbb5bd81beddefaeca65b5caa0d5	SCI_MF1_AXNIFE20101012_095552_20101017_185947_20101019_185947
e01a54eb24ef9819a5656fda39716971	SCI_MF1_AXNIFE20101012_095552_20101018_182810_20101115_182810

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

validity identifier	M_CAL	M_DL	M_DN
20101005_183648_20101007_183648	interp.	meas.	interp.
20101006_194547_20101008_194547	meas.	meas.	interp.
20101007_191410_20101009_191410	meas.	meas.	interp.
20101008_184233_20101010_184233	meas.	meas.	meas.
20101009_181056_20101011_181056	meas.	meas.	pred.
20101010_191955_20101012_191955	meas.	meas.	pred.
20101011_184818_20101013_184818	meas.	meas.	pred.
20101012_181641_20101014_181641	pred.	pred.	pred.
20101013_192540_20101015_192540	pred.	pred.	pred.
20101014_185403_20101016_185403	pred.	pred.	pred.
20101015_182226_20101017_182226	pred.	pred.	pred.
20101016_193124_20101018_193124	pred.	pred.	pred.
20101017_185947_20101019_185947	pred.	pred.	pred.
20101018_182810_20101115_182810	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	1.0084	1.0542	1.0169	1.0007	1.0030	1.0054	1.0600	OK
2	1.0014	1.0052	1.0078	1.0006	1.0016	1.0029	1.0200	OK
3	1.0006	1.0012	1.0027	1.0002	1.0000	1.0009	1.0100	OK
4	1.0006	1.0006	1.0018	1.0001	0.9999	1.0008	1.0100	OK
5	1.0033	1.0038	1.0008	1.0003	1.0001	1.0000	1.0120	OK
6	1.0015	1.0018	1.0011	1.0007	1.0007	1.0000	1.0100	OK
7	1.0008	1.0017	1.0018	–	–	–	1.0070	OK
8	1.0175	1.0192	1.0015	–	–	–	1.0200	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 04 Oct 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101005_034304_20101004_190825_20101006_190825` .

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

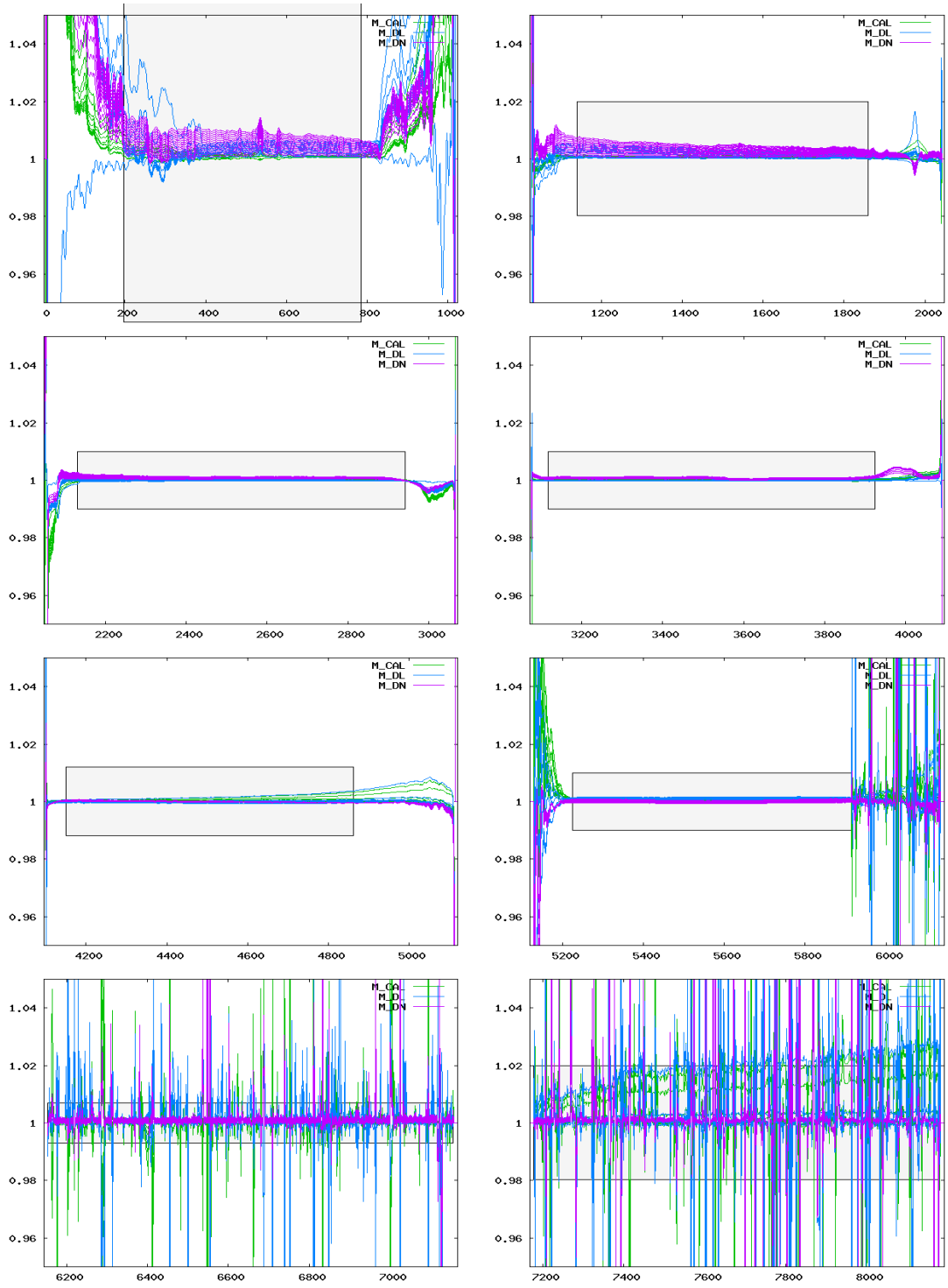

Figure 1: Ratio of delivered m-factors (05 Oct 2010– 18 Oct 2010) to the corresponding m-factor of the previous delivery day (04 Oct 2010). The grey boxes visualize the maximum ratio allowed.