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: 09 Feb 2010– 15 Feb 2010
- Prediction: 16 Feb 2010– 22 Feb 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
4d754df25b2fabea6649608833b063a9	SCI_MF1_AXNIFE20100408_095958_20100209_181641_20100211_181641
6acb5199d5bff52e5d5e7e7eb2e88d98	SCI_MF1_AXNIFE20100408_095958_20100210_192540_20100212_192540
004216cc59b3ee347523a6d6b9bae2ba	SCI_MF1_AXNIFE20100408_095958_20100211_185403_20100213_185403
fb581d84447e31ef0a493865289fb4c3	SCI_MF1_AXNIFE20100408_095958_20100212_182226_20100214_182226
fd63fa1491e22cac5014c989c666d5d6	SCI_MF1_AXNIFE20100408_095958_20100213_193125_20100215_193125
941a6dd09f90f7d3e8278586fc90110f	SCI_MF1_AXNIFE20100408_095958_20100214_185948_20100216_185948
341f70653bfe536de466c89b432272c9	SCI_MF1_AXNIFE20100408_095958_20100215_182811_20100217_182811
2e34fce117bd240874ce77cb569aa6fc	SCI_MF1_AXNIFE20100408_095958_20100216_193710_20100218_193710
75edd677ba2091aae170fbc329e5b2c2	SCI_MF1_AXNIFE20100408_095958_20100217_190533_20100219_190533
1851aabb50dfad103271b61be8a103d0	SCI_MF1_AXNIFE20100408_095958_20100218_183356_20100220_183356
c8adcb6dcc690f62f815f20cfe3c2eb1	SCI_MF1_AXNIFE20100408_095958_20100219_194255_20100221_194255
035e230e95024cf95c9c58404e708fd0	SCI_MF1_AXNIFE20100408_095958_20100220_191118_20100222_191118
a0bdd34b7c93cda303d48a3525f90e4e	SCI_MF1_AXNIFE20100408_095958_20100221_183941_20100223_183941
1093b7054420d9b0a3ab49e046abdafd	SCI_MF1_AXNIFE20100408_095958_20100222_194840_20100322_194840

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

validity identifier	M_CAL	M_DL	M_DN
20100209_181641_20100211_181641	meas.	meas.	meas.
20100210_192540_20100212_192540	meas.	meas.	interp.
20100211_185403_20100213_185403	meas.	meas.	interp.
20100212_182226_20100214_182226	meas.	meas.	interp.
20100213_193125_20100215_193125	meas.	meas.	meas.
20100214_185948_20100216_185948	meas.	meas.	pred.
20100215_182811_20100217_182811	meas.	meas.	pred.
20100216_193710_20100218_193710	pred.	pred.	pred.
20100217_190533_20100219_190533	pred.	pred.	pred.
20100218_183356_20100220_183356	pred.	pred.	pred.
20100219_194255_20100221_194255	pred.	pred.	pred.
20100220_191118_20100222_191118	pred.	pred.	pred.
20100221_183941_20100223_183941	pred.	pred.	pred.
20100222_194840_20100322_194840	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	1.0087	1.0134	1.0167	0.9997	1.0049	1.0060	1.0400	OK
2	1.0012	1.0076	1.0061	1.0002	1.0026	1.0031	1.0200	OK
3	1.0009	1.0014	1.0023	0.9997	1.0003	1.0002	1.0100	OK
4	1.0013	1.0015	1.0031	0.9999	1.0000	0.9997	1.0100	OK
5	1.0013	1.0014	1.0023	1.0003	1.0004	0.9997	1.0120	OK
6	1.0016	1.0016	1.0017	1.0006	1.0005	0.9999	1.0100	OK
7	1.0023	1.0003	1.0022	–	–	–	1.0070	OK
8	1.0025	1.0004	1.0011	–	–	–	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 08 Feb 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_094816_20100208_184818_20100210_184818` .

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

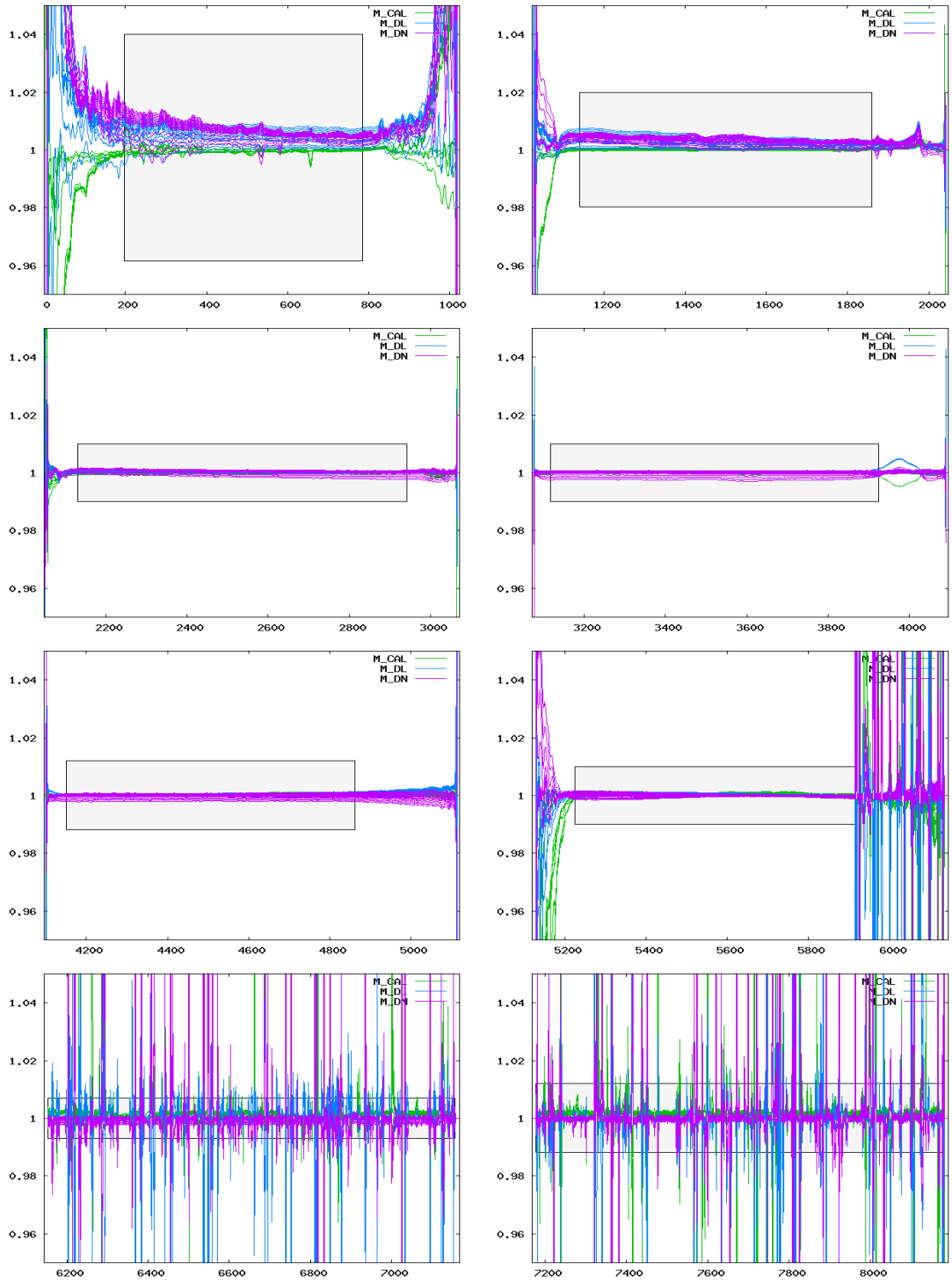

Figure 1: Ratio of delivered m-factors (09 Feb 2010– 22 Feb 2010) to the corresponding m-factor of the previous delivery day (08 Feb 2010). The grey boxes visualize the maximum ratio allowed.