NRT M-factor delivery document 14 Feb 2011

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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: 08 Feb 2011– 14 Feb 2011
- Prediction: 15 Feb 2011– 21 Feb 2011

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
b2aef413a79e2e710eaab271ecb3fbed	SCI_MF1_AXNIFE20110215_044244_20110208_181516_20110210_181516
518e93d1156fdc1a58f42dc7632e8db1	SCI_MF1_AXNIFE20110215_044244_20110209_191845_20110211_191845
3da103865e8e08846bb39b385202e20e	SCI_MF1_AXNIFE20110215_044244_20110210_184159_20110212_184159
f636b02dd20e3e165640f88258d704e3	SCI_MF1_AXNIFE20110215_044244_20110211_194528_20110213_194528
980124f2b078ce457a47c911ebe9b45c	SCI_MF1_AXNIFE20110215_044244_20110212_190842_20110214_190842
3474ef2069984c7545dd82fdd349530e	SCI_MF1_AXNIFE20110215_044244_20110213_183157_20110215_183157
dcc132f3d26f83ca673272d8040dd4be	SCI_MF1_AXNIFE20110215_044244_20110214_193525_20110216_193525
28e002225d14b62d1f6975b0de569a9d	SCI_MF1_AXNIFE20110215_044244_20110215_185840_20110217_185840
bb94bf71b7b4e9a68184800ab7798425	SCI_MF1_AXNIFE20110215_044244_20110216_182154_20110218_182154
2b10793a98f328351dac584962937df4	SCI_MF1_AXNIFE20110215_044244_20110217_192523_20110219_192523
66801fafc69c541f86f718172789da4b	SCI_MF1_AXNIFE20110215_044244_20110218_184837_20110220_184837
802b51b7170a7b0a172a761d0436e4c7	SCI_MF1_AXNIFE20110215_044244_20110219_181152_20110221_181152
cff1b95bcb7aea85e580d37d85f7d248	SCI_MF1_AXNIFE20110215_044244_20110220_191520_20110222_191520
035a91ef794e66aafa497933817e0f9a	SCI_MF1_AXNIFE20110215_044244_20110221_183835_20110321_183835

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

validity identifier	M_CAL	M_DL	M_DN
20110208_181516_20110210_181516	meas.	meas.	interp.
20110209_191845_20110211_191845	meas.	meas.	interp.
20110210_184159_20110212_184159	meas.	meas.	interp.
20110211_194528_20110213_194528	meas.	meas.	meas.
20110212_190842_20110214_190842	meas.	meas.	pred.
20110213_183157_20110215_183157	meas.	meas.	pred.
20110214_193525_20110216_193525	pred.	meas.	pred.
20110215_185840_20110217_185840	pred.	pred.	pred.
20110216_182154_20110218_182154	pred.	pred.	pred.
20110217_192523_20110219_192523	pred.	pred.	pred.
20110218_184837_20110220_184837	pred.	pred.	pred.
20110219_181152_20110221_181152	pred.	pred.	pred.
20110220_191520_20110222_191520	pred.	pred.	pred.
20110221_183835_20110321_183835	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	1.0098	1.0118	1.0112	0.9984	1.0008	0.9986	1.0400	OK
2	1.0021	1.0060	1.0034	1.0009	1.0022	1.0008	1.0200	OK
3	1.0008	1.0020	1.0014	1.0004	1.0007	0.9993	1.0100	OK
4	1.0006	1.0008	1.0016	1.0001	1.0003	0.9989	1.0100	OK
5	1.0011	1.0021	1.0016	1.0001	1.0006	0.9989	1.0120	OK
6	1.0017	1.0016	1.0012	0.9999	1.0003	0.9991	1.0100	OK
7	1.0021	1.0003	1.0012	–	–	–	1.0070	OK
8	1.0017	1.0007	1.0008	–	–	–	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 07 Feb 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110208_044308_20110207_185202_20110209_185202` .

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

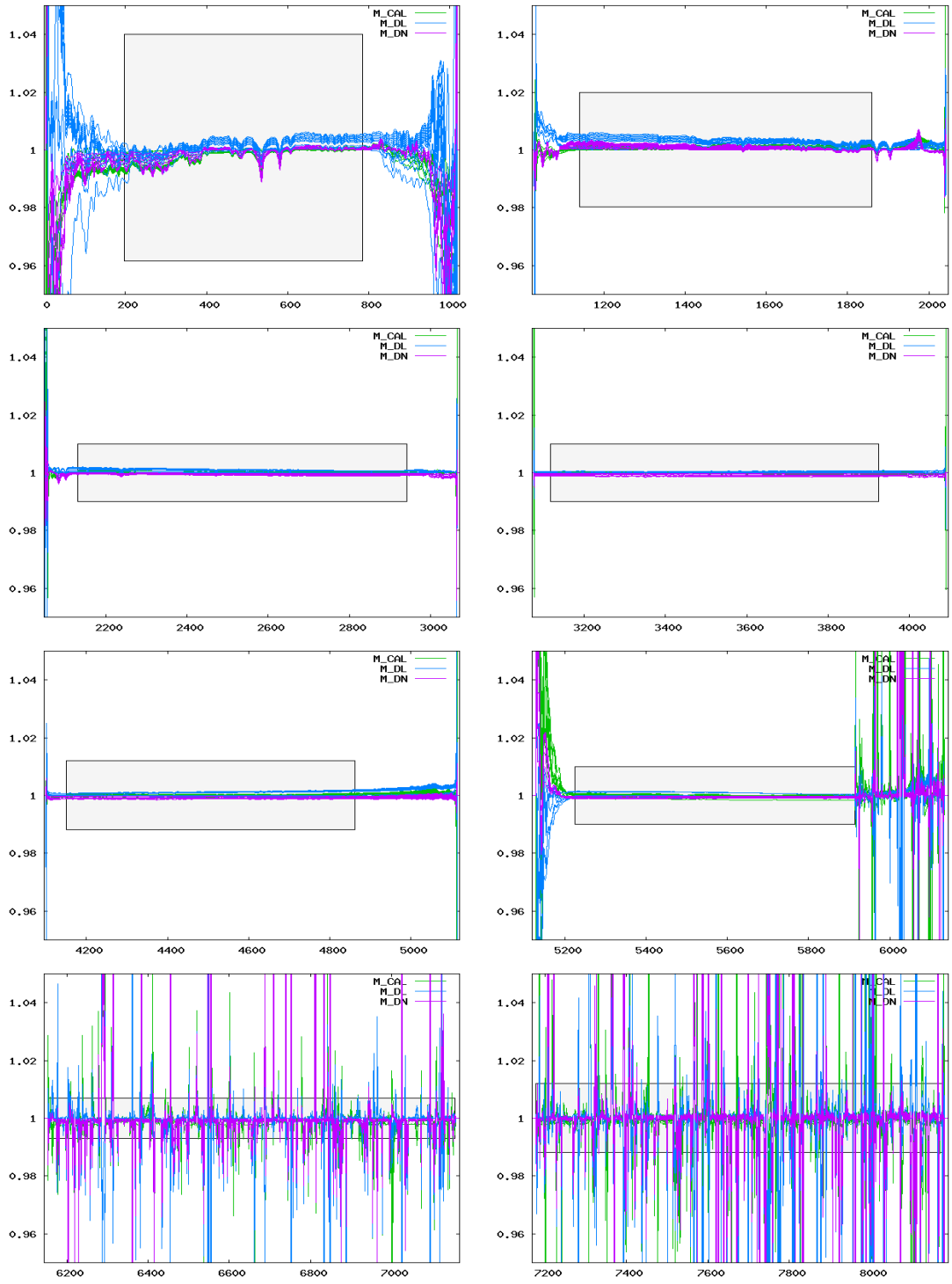

Figure 1: Ratio of delivered m-factors (08 Feb 2011– 21 Feb 2011) to the corresponding m-factor of the previous delivery day (07 Feb 2011). The grey boxes visualize the maximum ratio allowed.