NRT M-factor delivery document 23 Mar 2009

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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: 17 Mar 2009– 23 Mar 2009
- Prediction: 24 Mar 2009– 30 Mar 2009

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
dd26547a8113b051af3bf61d7118b4ec	SCI_MF1_AXNIFE20090323_225519_20090317_185656_20090319_185656
7439866e140ce90cea038d6f96e9f0b4	SCI_MF1_AXNIFE20090323_225519_20090318_182519_20090320_182519
6a8427fdbf1fd9e41abd564149dfbffc	SCI_MF1_AXNIFE20090323_225519_20090319_193418_20090321_193418
73bffc74bf86b77ef5c9557f2b170393	SCI_MF1_AXNIFE20090323_225519_20090320_190241_20090322_190241
ae7d62e9aa3cd72de7309d8d55abef18	SCI_MF1_AXNIFE20090323_225519_20090321_183104_20090323_183104
0d97be0aaf6a3f2b017d75e8607655a2	SCI_MF1_AXNIFE20090323_225519_20090322_194003_20090324_194003
ad65c87aeefdb4a163ffbf751a91a444	SCI_MF1_AXNIFE20090323_225519_20090323_190826_20090325_190826
05417981b1384737704fd17a5060c9f7	SCI_MF1_AXNIFE20090323_225519_20090324_183649_20090326_183649
53860d2ce162be5ba93cbcd5e71c5e70	SCI_MF1_AXNIFE20090323_225519_20090325_194548_20090327_194548
bf2c8d1440f5f1fdb005965a2e250dcc	SCI_MF1_AXNIFE20090323_225519_20090326_191411_20090328_191411
743e0e1450e21ac4fb31423bc6c144eb	SCI_MF1_AXNIFE20090323_225519_20090327_184234_20090329_184234
3562c30e7fb2a5ebd412cc006cc916d5	SCI_MF1_AXNIFE20090323_225519_20090328_181057_20090330_181057
1f852145be0c202b9c99a0bf4497e1f0	SCI_MF1_AXNIFE20090323_225519_20090329_191956_20090331_191956
2709996414629422f88eb0610e28ce5c	SCI_MF1_AXNIFE20090323_225519_20090330_184819_20090427_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090317_185656_20090319_185656	meas.	meas.	meas.
20090318_182519_20090320_182519	meas.	meas.	interp.
20090319_193418_20090321_193418	meas.	meas.	interp.
20090320_190241_20090322_190241	meas.	meas.	interp.
20090321_183104_20090323_183104	meas.	meas.	meas.
20090322_194003_20090324_194003	meas.	meas.	pred.
20090323_190826_20090325_190826	pred.	pred.	pred.
20090324_183649_20090326_183649	pred.	pred.	pred.
20090325_194548_20090327_194548	pred.	pred.	pred.
20090326_191411_20090328_191411	pred.	pred.	pred.
20090327_184234_20090329_184234	pred.	pred.	pred.
20090328_181057_20090330_181057	pred.	pred.	pred.
20090329_191956_20090331_191956	pred.	pred.	pred.
20090330_184819_20090427_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	1.0067	1.0202	1.0337	1.0012	1.0063	1.0122	1.0400	OK
2	1.0031	1.0083	1.0147	1.0009	1.0029	1.0053	1.0200	OK
3	1.0007	1.0024	1.0036	1.0002	1.0008	1.0007	1.0100	OK
4	1.0015	1.0016	1.0026	1.0002	1.0003	0.9995	1.0100	OK
5	1.0006	1.0029	1.0023	0.9999	0.9990	0.9992	1.0120	OK
6	1.0029	1.0021	1.0023	1.0013	0.9989	0.9996	1.0100	OK
7	1.0030	1.0011	1.0018	–	–	–	1.0070	OK
8	1.0121	1.0055	1.0048	–	–	–	1.0120	Not 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 16 Mar 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090316_225430_20090316_192833_20090318_192833` .

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 exceeds the limits. Additional checks are necessary.

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

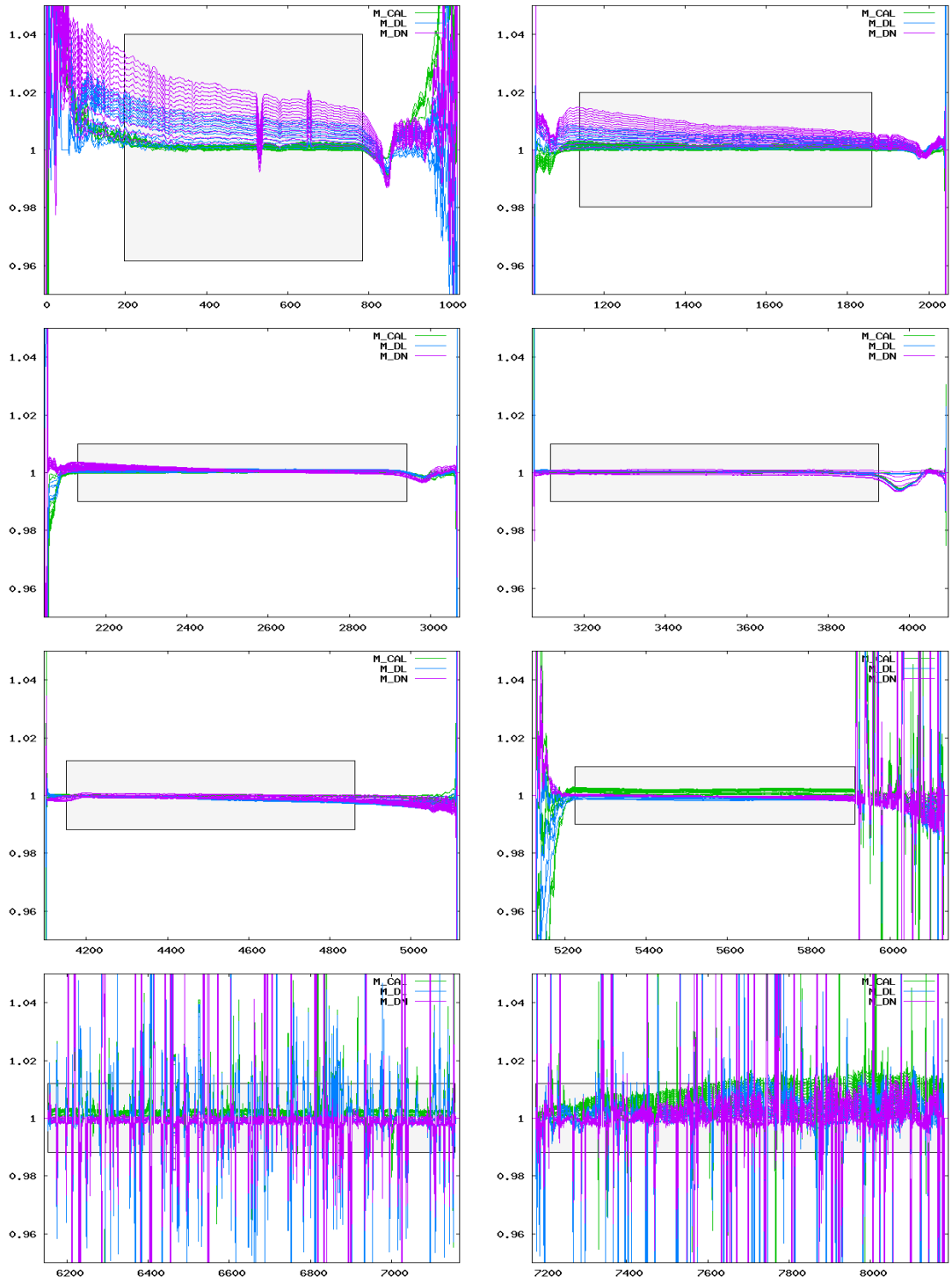

Figure 1: Ratio of delivered m-factors (17 Mar 2009– 30 Mar 2009) to the corresponding m-factor of the previous delivery day (16 Mar 2009). The grey boxes visualize the maximum ratio allowed.