NRT M-factor delivery document 27 Jul 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: 21 Jul 2009– 27 Jul 2009
- Prediction: 28 Jul 2009– 03 Aug 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
a8b78453511484c26de81597fea2aba5	SCI_MF1_AXNIFE20090728_084340_20090721_193710_20090723_193710
b33c9c252583a5a40a2a04669a2e5f6e	SCI_MF1_AXNIFE20090728_084340_20090722_190533_20090724_190533
f0a3eff7b5d81b4c9adad43528c396c1	SCI_MF1_AXNIFE20090728_084340_20090723_183356_20090725_183356
721b6e8d3b1b2746e93e5361d3a2da63	SCI_MF1_AXNIFE20090728_084340_20090724_194255_20090726_194255
17e3b1902fad70a65386b7b20688b6fa	SCI_MF1_AXNIFE20090728_084340_20090725_191118_20090727_191118
8048cd0fd030aee4bf2873e22ae3fc24	SCI_MF1_AXNIFE20090728_084340_20090726_183941_20090728_183941
39dec0fa82c65947f2b87df3abf7566d	SCI_MF1_AXNIFE20090728_084340_20090727_194840_20090729_194840
88b8b3836c7bc960e385220a38bec07c	SCI_MF1_AXNIFE20090728_084340_20090728_191703_20090730_191703
116855cfef5aad0a4edb3600fa7feaaf	SCI_MF1_AXNIFE20090728_084340_20090729_184526_20090731_184526
fb7be8ddc66f61624dcbfdc31e86d4e3	SCI_MF1_AXNIFE20090728_084340_20090730_181349_20090801_181349
aa3b4141bb6be50b1be1e296081c3924	SCI_MF1_AXNIFE20090728_084340_20090731_192248_20090802_192248
bdb9f322abbc396ac979a3e87df40258	SCI_MF1_AXNIFE20090728_084340_20090801_185111_20090803_185111
7243b467efa0dd70125e808458c3f2a9	SCI_MF1_AXNIFE20090728_084340_20090802_181934_20090804_181934
924cd8305fe0f56e5e34a53125f216be	SCI_MF1_AXNIFE20090728_084340_20090803_192833_20090831_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090721_193710_20090723_193710	meas.	meas.	interp.
20090722_190533_20090724_190533	meas.	meas.	interp.
20090723_183356_20090725_183356	meas.	meas.	interp.
20090724_194255_20090726_194255	meas.	meas.	interp.
20090725_191118_20090727_191118	meas.	meas.	interp.
20090726_183941_20090728_183941	meas.	meas.	meas.
20090727_194840_20090729_194840	pred.	pred.	pred.
20090728_191703_20090730_191703	pred.	pred.	pred.
20090729_184526_20090731_184526	pred.	pred.	pred.
20090730_181349_20090801_181349	pred.	pred.	pred.
20090731_192248_20090802_192248	pred.	pred.	pred.
20090801_185111_20090803_185111	pred.	pred.	pred.
20090802_181934_20090804_181934	pred.	pred.	pred.
20090803_192833_20090831_192833	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	1.0141	1.0229	1.0085	1.0019	1.0074	1.0011	1.0400	OK
2	1.0039	1.0091	1.0033	1.0016	1.0034	1.0008	1.0200	OK
3	1.0009	1.0024	1.0005	1.0002	1.0006	0.9999	1.0100	OK
4	1.0008	1.0012	1.0002	1.0002	1.0004	1.0001	1.0100	OK
5	1.0021	1.0023	1.0009	1.0006	1.0005	1.0001	1.0120	OK
6	1.0018	1.0021	1.0009	1.0001	1.0003	0.9999	1.0100	OK
7	1.0007	1.0023	1.0008	–	–	–	1.0070	OK
8	1.0081	1.0073	1.0076	–	–	–	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 20 Jul 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090720_215321_20090720_182811_20090722_182811` .

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

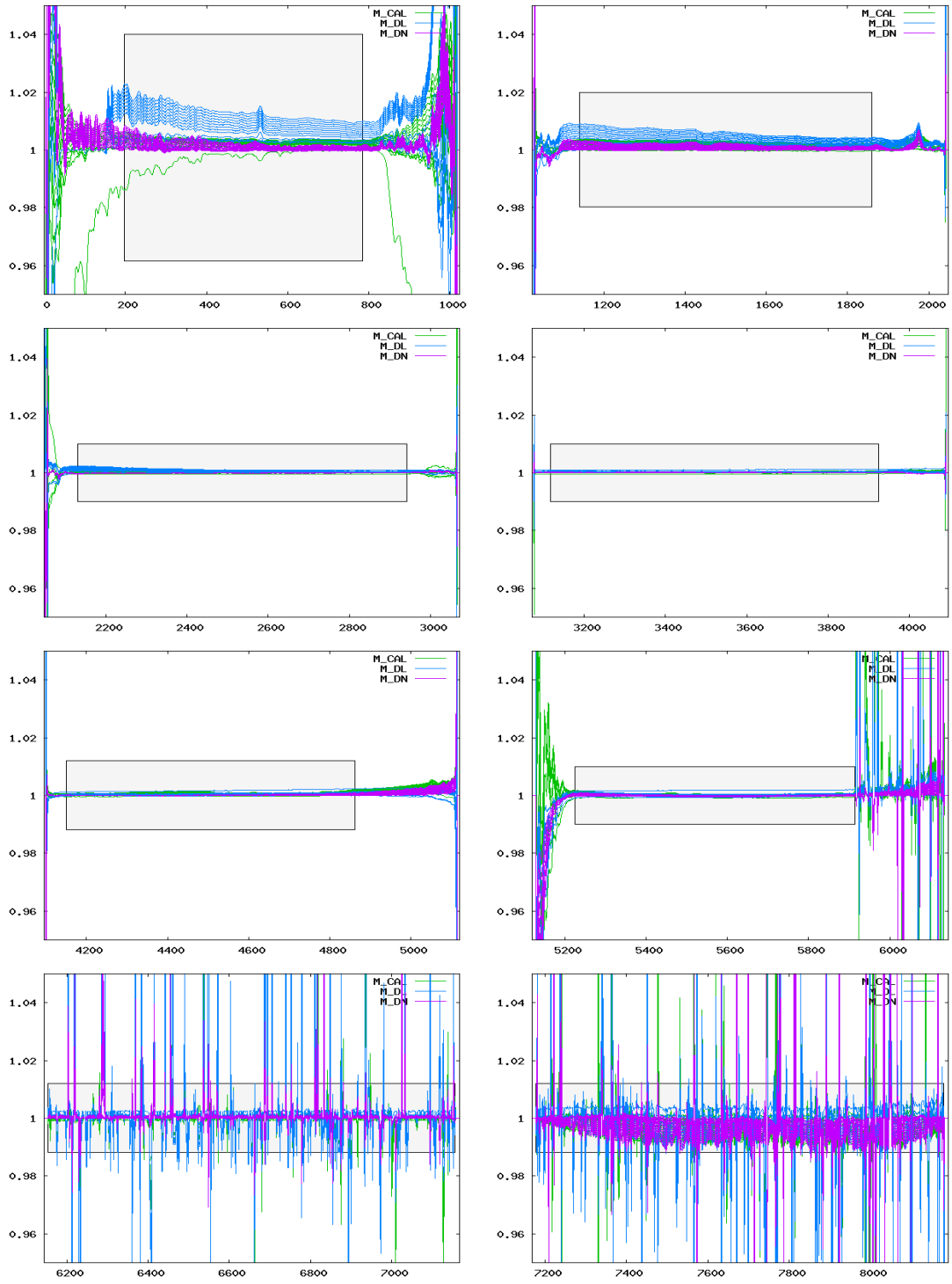

Figure 1: Ratio of delivered m-factors (21 Jul 2009– 03 Aug 2009) to the corresponding m-factor of the previous delivery day (20 Jul 2009). The grey boxes visualize the maximum ratio allowed.