NRT M-factor delivery document 21 Sep 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: 15 Sep 2009– 21 Sep 2009
- Prediction: 22 Sep 2009– 28 Sep 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
75c17c4e629d867649e374070f4c618f	SCI_MF1_AXNIFE20090921_215431_20090915_183649_20090917_183649
f95e5e8c585d48b2a1c4970a1ed9294f	SCI_MF1_AXNIFE20090921_215431_20090916_194548_20090918_194548
c7c4841758a3f2120be11e5bcd61dcbd	SCI_MF1_AXNIFE20090921_215431_20090917_191411_20090919_191411
b384cecd583eef6fe7fb710eb353fb66	SCI_MF1_AXNIFE20090921_215431_20090918_184234_20090920_184234
9c060b6e82a17d4e4b4fdd8a7574cb10	SCI_MF1_AXNIFE20090921_215431_20090919_181057_20090921_181057
a6a182fb99029884b29d88f340c9594c	SCI_MF1_AXNIFE20090921_215431_20090920_191955_20090922_191955
430409da954218591e2d255fc47467c8	SCI_MF1_AXNIFE20090921_215431_20090921_184818_20090923_184818
7a86ccbd80eab5aba79e7d0fd2f48a8b	SCI_MF1_AXNIFE20090921_215431_20090922_181641_20090924_181641
c1e44f59f99ec63385af789866033c65	SCI_MF1_AXNIFE20090921_215431_20090923_192540_20090925_192540
6a9dabfe1cbdf0c0262aa4d595fdf94c	SCI_MF1_AXNIFE20090921_215431_20090924_185403_20090926_185403
d11a702dd4d22dfef81bb5e086bc4bbd	SCI_MF1_AXNIFE20090921_215431_20090925_182226_20090927_182226
682b71d8bd59b41a74d9e17ff4c3cf86	SCI_MF1_AXNIFE20090921_215431_20090926_193125_20090928_193125
af0b1ec412c5b594d64d4d17587f2bed	SCI_MF1_AXNIFE20090921_215431_20090927_185948_20090929_185948
9ecc1844d1d5b6279d5082c871389806	SCI_MF1_AXNIFE20090921_215431_20090928_182811_20091026_182811

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

validity identifier	M_CAL	M_DL	M_DN
20090915_183649_20090917_183649	meas.	meas.	meas.
20090916_194548_20090918_194548	meas.	meas.	interp.
20090917_191411_20090919_191411	meas.	meas.	interp.
20090918_184234_20090920_184234	meas.	meas.	interp.
20090919_181057_20090921_181057	meas.	meas.	meas.
20090920_191955_20090922_191955	meas.	meas.	pred.
20090921_184818_20090923_184818	pred.	pred.	pred.
20090922_181641_20090924_181641	pred.	pred.	pred.
20090923_192540_20090925_192540	pred.	pred.	pred.
20090924_185403_20090926_185403	pred.	pred.	pred.
20090925_182226_20090927_182226	pred.	pred.	pred.
20090926_193125_20090928_193125	pred.	pred.	pred.
20090927_185948_20090929_185948	pred.	pred.	pred.
20090928_182811_20091026_182811	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	1.0052	1.0143	1.0116	1.0010	1.0059	1.0038	1.0400	OK
2	1.0029	1.0074	1.0079	1.0011	1.0027	1.0019	1.0200	OK
3	1.0008	1.0019	1.0029	1.0002	1.0004	0.9986	1.0100	OK
4	1.0015	1.0015	1.0036	1.0001	1.0001	0.9977	1.0100	OK
5	1.0008	1.0012	1.0029	0.9999	1.0001	0.9978	1.0120	OK
6	1.0019	1.0016	1.0019	1.0003	1.0008	0.9991	1.0100	OK
7	1.0007	1.0018	1.0016	–	–	–	1.0070	OK
8	1.0021	1.0009	1.0012	–	–	–	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 14 Sep 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090914_215423_20090914_190826_20090916_190826` .

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

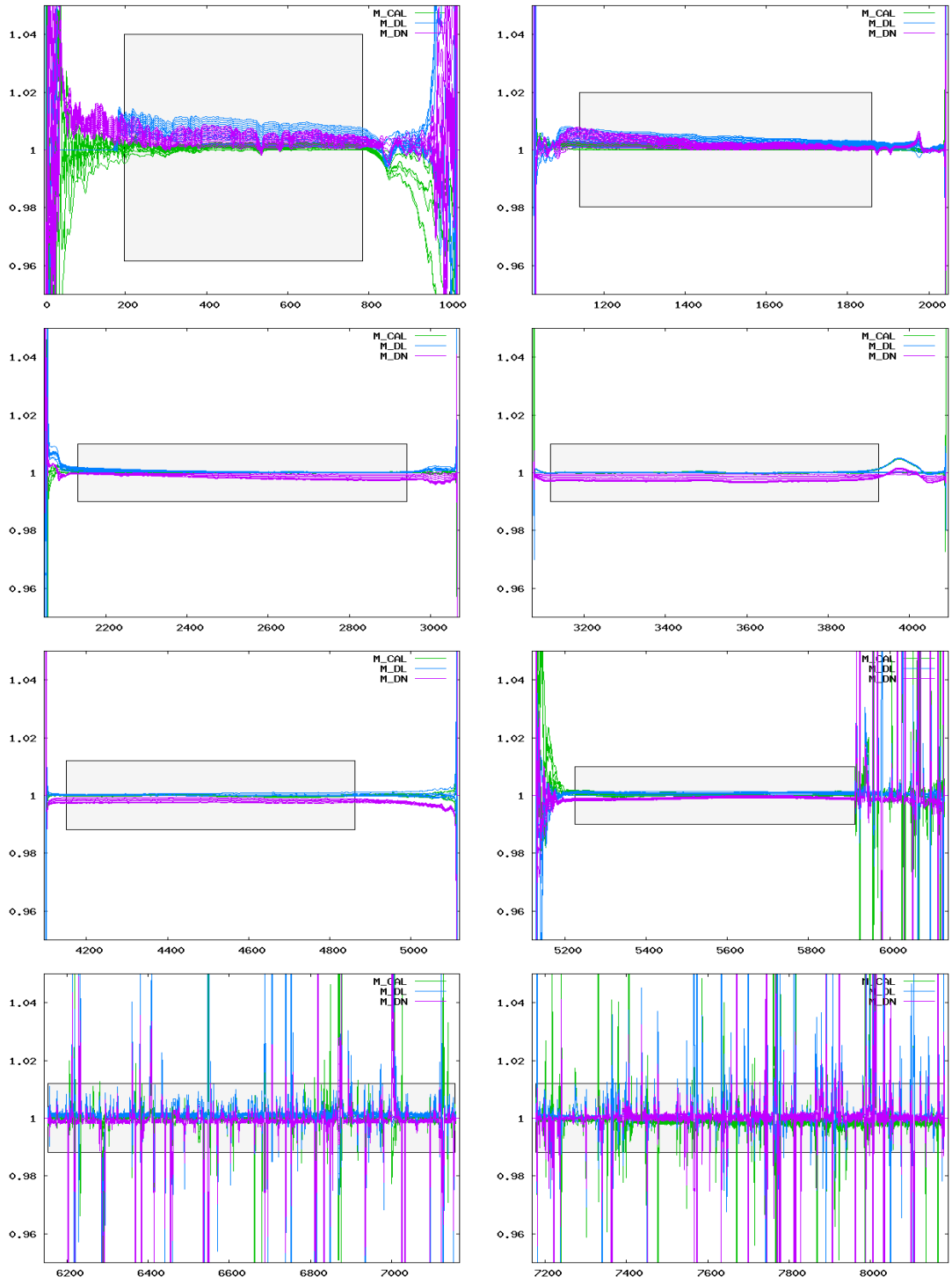

Figure 1: Ratio of delivered m-factors (15 Sep 2009– 28 Sep 2009) to the corresponding m-factor of the previous delivery day (14 Sep 2009). The grey boxes visualize the maximum ratio allowed.