NRT M-factor delivery document 26 Oct 2009

Klaus Bramstedt, ife Bremen

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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: 20 Oct 2009– 26 Oct 2009
- Prediction: 27 Oct 2009– 02 Nov 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
4691108a994eab5b4925356eaafd4b5a	SCI_MF1_AXNIFE20091026_225459_20091020_183649_20091022_183649
1a5a1f5e574f8b5d733d4e61aee91f26	SCI_MF1_AXNIFE20091026_225459_20091021_194547_20091023_194547
84edff6f223d5cdb489e02a5b84b9aec	SCI_MF1_AXNIFE20091026_225459_20091022_191410_20091024_191410
9016582f500cb70b184835f407644958	SCI_MF1_AXNIFE20091026_225459_20091023_184233_20091025_184233
0b2d31113d257c1b463689e17d00cf4f	SCI_MF1_AXNIFE20091026_225459_20091024_181056_20091026_181056
fce7885c7ba88422b86097ccee218b7f	SCI_MF1_AXNIFE20091026_225459_20091025_191955_20091027_191955
e9fe8f63976f3120ef56ba2778d58b15	SCI_MF1_AXNIFE20091026_225459_20091026_184818_20091028_184818
a17b7c1ca3e05a54347375b962fd91cc	SCI_MF1_AXNIFE20091026_225459_20091027_181641_20091029_181641
cd2f69bdc8958779ce6e905939fcb70b	SCI_MF1_AXNIFE20091026_225459_20091028_192540_20091030_192540
24334de93106b926f4cec3011669e763	SCI_MF1_AXNIFE20091026_225459_20091029_185403_20091031_185403
321b52810882fa75a6a8181c7d118c4c	SCI_MF1_AXNIFE20091026_225459_20091030_182226_20091101_182226
021602fe66fb662a9a3da25c56a846b0	SCI_MF1_AXNIFE20091026_225459_20091031_193125_20091102_193125
7d38b2cfcbcee6480ab3a8c2a90e651d	SCI_MF1_AXNIFE20091026_225459_20091101_185948_20091103_185948
1a840acb38e916223cba8bb7acefeba3	SCI_MF1_AXNIFE20091026_225459_20091102_182811_20091130_182811

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

validity identifier	M_CAL	M_DL	M_DN
20091020_183649_20091022_183649	meas.	meas.	interp.
20091021_194547_20091023_194547	meas.	meas.	interp.
20091022_191410_20091024_191410	meas.	meas.	interp.
20091023_184233_20091025_184233	meas.	meas.	meas.
20091024_181056_20091026_181056	meas.	meas.	pred.
20091025_191955_20091027_191955	meas.	meas.	pred.
20091026_184818_20091028_184818	meas.	pred.	pred.
20091027_181641_20091029_181641	pred.	pred.	pred.
20091028_192540_20091030_192540	pred.	pred.	pred.
20091029_185403_20091031_185403	pred.	pred.	pred.
20091030_182226_20091101_182226	pred.	pred.	pred.
20091031_193125_20091102_193125	pred.	pred.	pred.
20091101_185948_20091103_185948	pred.	pred.	pred.
20091102_182811_20091130_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	1.0030	1.0137	1.0150	1.0007	1.0057	1.0046	1.0400	OK
2	1.0027	1.0075	1.0067	1.0010	1.0027	1.0020	1.0200	OK
3	1.0012	1.0025	1.0020	1.0003	1.0005	0.9998	1.0100	OK
4	1.0009	1.0005	1.0012	0.9999	1.0001	0.9995	1.0100	OK
5	1.0016	1.0013	1.0012	0.9993	0.9998	1.0004	1.0120	OK
6	1.0015	1.0014	1.0032	0.9997	1.0007	1.0017	1.0100	OK
7	1.0003	1.0019	1.0020	–	–	–	1.0070	OK
8	1.0025	1.0008	1.0005	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 19 Oct 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091019_215801_20091019_190826_20091021_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

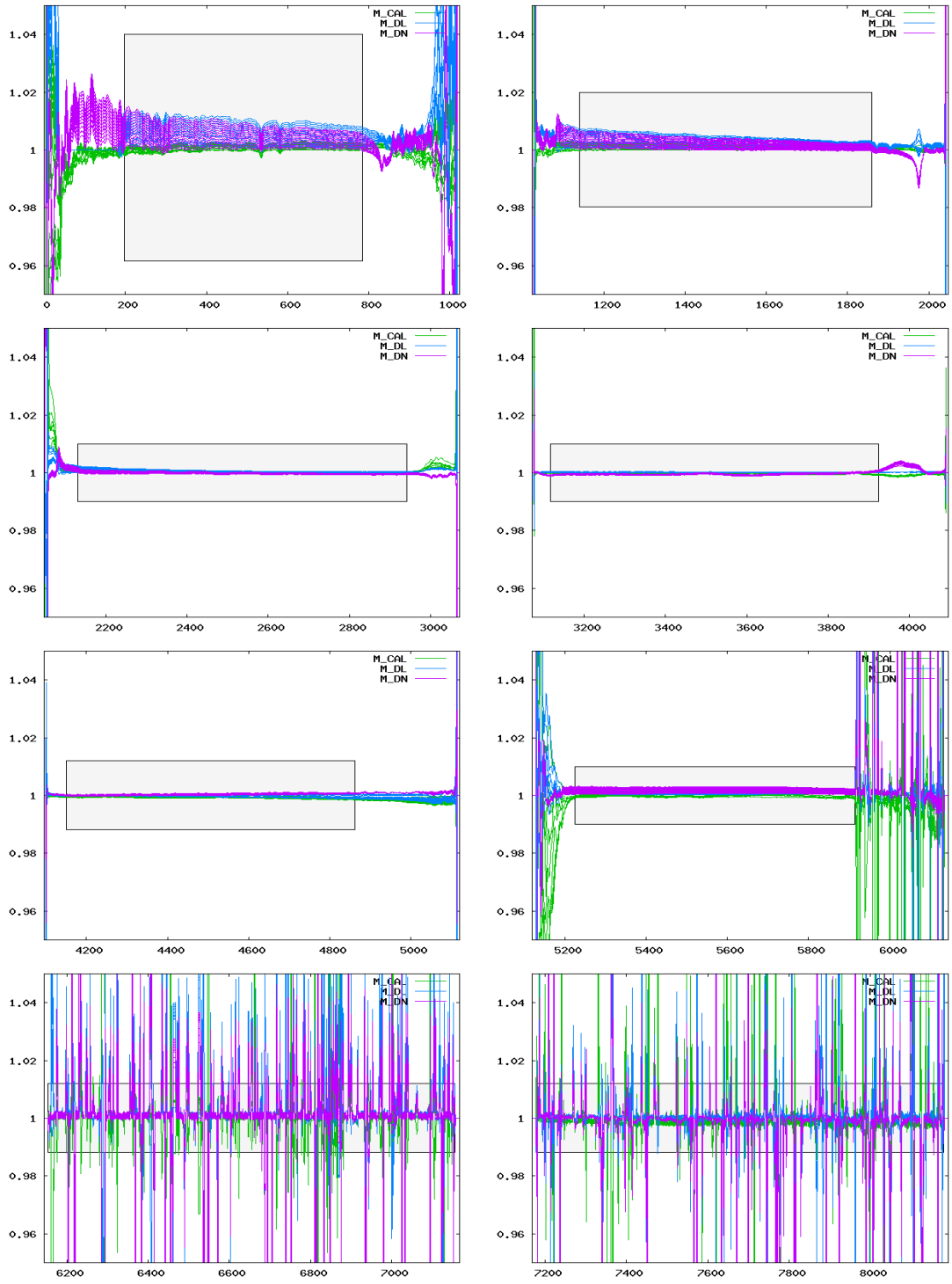

Figure 1: Ratio of delivered m-factors (20 Oct 2009– 02 Nov 2009) to the corresponding m-factor of the previous delivery day (19 Oct 2009). The grey boxes visualize the maximum ratio allowed.