NRT M-factor delivery document 05 Oct 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: 29 Sep 2009– 05 Oct 2009
- Prediction: 06 Oct 2009– 12 Oct 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
f4143f22ff855c8265a24e69ede82193	SCI_MF1_AXNIFE20091005_215431_20090929_193710_20091001_193710
261850891f598fe96d0fad3d14e473fa	SCI_MF1_AXNIFE20091005_215431_20090930_190533_20091002_190533
afab7aca34e5238d16cf19e20b9f4cc3	SCI_MF1_AXNIFE20091005_215431_20091001_183356_20091003_183356
b5d2e87d84e80e3ead1c523fcf8d8857	SCI_MF1_AXNIFE20091005_215431_20091002_194255_20091004_194255
3f45f48a8efd0b07f2d7d2fc5f2148e4	SCI_MF1_AXNIFE20091005_215431_20091003_191118_20091005_191118
1d85843bdfea932e8e1b3dc80bd9fdd0	SCI_MF1_AXNIFE20091005_215431_20091004_183941_20091006_183941
32a1f3143c0962ab4927e70d3df6953b	SCI_MF1_AXNIFE20091005_215431_20091005_194840_20091007_194840
53846ba98bcb0f37e10227543cac786e	SCI_MF1_AXNIFE20091005_215431_20091006_191703_20091008_191703
18349005c8ec43c89a1bce23b25fe8ee	SCI_MF1_AXNIFE20091005_215431_20091007_184526_20091009_184526
4059f5e82475b2aa4d59f7de31b56232	SCI_MF1_AXNIFE20091005_215431_20091008_181349_20091010_181349
c97efc38666a9d27b6f4dc550b9317ea	SCI_MF1_AXNIFE20091005_215431_20091009_192248_20091011_192248
65bbc6aa7dbc71cac3f452ce7a1c365f	SCI_MF1_AXNIFE20091005_215431_20091010_185111_20091012_185111
ca8aff6edaf83c8204eb7927e8caf9a7	SCI_MF1_AXNIFE20091005_215431_20091011_181934_20091013_181934
9b34b814f90200752d7e400435688e33	SCI_MF1_AXNIFE20091005_215431_20091012_192833_20091109_192833

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

validity identifier	M_CAL	M_DL	M_DN
20090929_193710_20091001_193710	meas.	meas.	interp.
20090930_190533_20091002_190533	meas.	meas.	meas.
20091001_183356_20091003_183356	meas.	meas.	interp.
20091002_194255_20091004_194255	meas.	meas.	interp.
20091003_191118_20091005_191118	meas.	meas.	meas.
20091004_183941_20091006_183941	meas.	meas.	pred.
20091005_194840_20091007_194840	pred.	pred.	pred.
20091006_191703_20091008_191703	pred.	pred.	pred.
20091007_184526_20091009_184526	pred.	pred.	pred.
20091008_181349_20091010_181349	pred.	pred.	pred.
20091009_192248_20091011_192248	pred.	pred.	pred.
20091010_185111_20091012_185111	pred.	pred.	pred.
20091011_181934_20091013_181934	pred.	pred.	pred.
20091012_192833_20091109_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	1.0118	1.0191	1.0243	1.0024	1.0072	1.0087	1.0400	OK
2	1.0032	1.0089	1.0084	1.0011	1.0030	1.0031	1.0200	OK
3	1.0008	1.0023	1.0053	1.0001	1.0004	0.9995	1.0100	OK
4	1.0004	1.0008	1.0064	0.9999	1.0001	0.9989	1.0100	OK
5	1.0011	1.0019	1.0075	0.9996	0.9999	0.9986	1.0120	OK
6	1.0019	1.0027	1.0071	1.0002	1.0007	0.9994	1.0100	OK
7	1.0002	1.0020	1.0057	–	–	–	1.0070	OK
8	1.0035	1.0017	1.0025	–	–	–	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 28 Sep 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090928_215435_20090928_182811_20090930_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

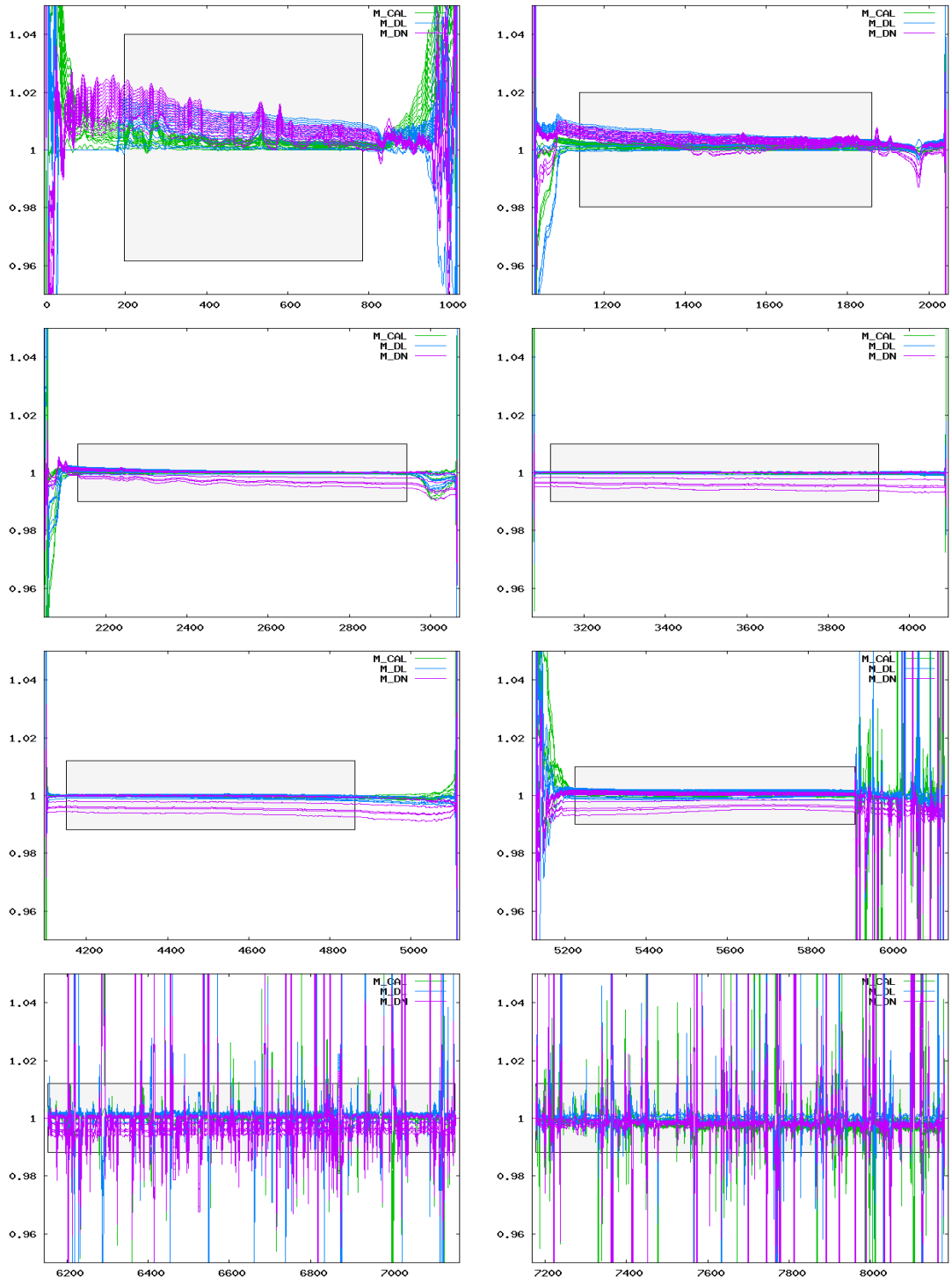

Figure 1: Ratio of delivered m-factors (29 Sep 2009– 12 Oct 2009) to the corresponding m-factor of the previous delivery day (28 Sep 2009). The grey boxes visualize the maximum ratio allowed.