NRT M-factor delivery document 29 Dec 2008

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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: 23 Dec 2008– 29 Dec 2008

- Prediction: 30 Dec 2008– 05 Jan 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
bb535c8a05e9ca18c83e9c81692d53d1	SCI_MF1_AXNIFE20090123_095143_20081219_182227_20090116_182227
ffd8468ea79c5d58a4c08758b17eccf5	SCI_MF1_AXNIFE20090123_095143_20081223_193711_20081225_193711
1c4d5de948f37c05ba206206176486a2	SCI_MF1_AXNIFE20090123_095143_20081224_190534_20081226_190534
8057059c6c2b20c3f06706c3234eea2b	SCI_MF1_AXNIFE20090123_095143_20081225_183357_20081227_183357
ff5133bba2c2b2de8cb2cf5c19f76f64	SCI_MF1_AXNIFE20090123_095143_20081226_194256_20081228_194256
40eea4ec4539405b1cbbc08349f7a0dd	SCI_MF1_AXNIFE20090123_095143_20081227_191119_20081229_191119
5245ba26dcc501f358ac54bf326f61c4	SCI_MF1_AXNIFE20090123_095143_20081228_183942_20081230_183942
f48cdb68a55d968b073bfd61eac6cc20	SCI_MF1_AXNIFE20090123_095143_20081229_194841_20081231_194841
ee7aeb46a806f8e9f9c7ee0da1b5f206	SCI_MF1_AXNIFE20090123_095143_20081230_191704_20090101_191704
ccf0a6f7055af24254ea4d4ecf9da1d1	SCI_MF1_AXNIFE20090123_095143_20081231_184527_20090102_184527
b7d99923894a8e5d1acc72a0a7bb6458	SCI_MF1_AXNIFE20090123_095143_20090101_181350_20090103_181350
969279da20bd5775c8332fe29e3ba0b7	SCI_MF1_AXNIFE20090123_095143_20090102_192248_20090104_192248
44e317e42e4db42ed77a5cacf7f2c933	SCI_MF1_AXNIFE20090123_095143_20090103_185111_20090105_185111
ced7cb982366cab9700f4e609527247b	SCI_MF1_AXNIFE20090123_095143_20090104_181934_20090106_181934

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

validity identifier	M_CAL	M_DL	M_DN
20081219_182227_20090116_182227	pred.	pred.	pred.
20081223_193711_20081225_193711	pred.	pred.	pred.
20081224_190534_20081226_190534	pred.	pred.	pred.
20081225_183357_20081227_183357	pred.	pred.	pred.
20081226_194256_20081228_194256	pred.	pred.	pred.
20081227_191119_20081229_191119	pred.	pred.	pred.
20081228_183942_20081230_183942	pred.	pred.	pred.
20081229_194841_20081231_194841	pred.	pred.	pred.
20081230_191704_20090101_191704	pred.	pred.	pred.
20081231_184527_20090102_184527	pred.	pred.	pred.
20090101_181350_20090103_181350	pred.	pred.	pred.
20090102_192248_20090104_192248	pred.	pred.	pred.
20090103_185111_20090105_185111	pred.	pred.	pred.
20090104_181934_20090106_181934	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. SCIA-MACHY 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			limit	status
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN		
1	1.2338	1.6053	1.1369	1.0379	1.0905	1.0002	1.0400	Not OK
2	1.1730	1.1924	1.0302	1.0148	1.0264	0.9918	1.0200	Not OK
3	1.0995	1.1275	1.0591	1.0013	1.0032	1.0043	1.0100	Not OK
4	1.1019	1.1161	1.0267	1.0061	1.0078	0.9927	1.0100	Not OK
5	1.5395	1.6331	1.1053	1.0327	1.0412	0.9497	1.0120	Not OK
6	1.2620	1.1359	1.0401	0.9959	0.9992	0.9798	1.0100	Not OK
7	2.8791	3.5582	1.5239	–	–	–	1.0070	Not OK
8	4.0896	3.1299	1.6760	–	–	–	1.0120	Not OK

certain limit l:

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

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 22 Dec 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090123_095023_20081222_182812_20081224_182812` .

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
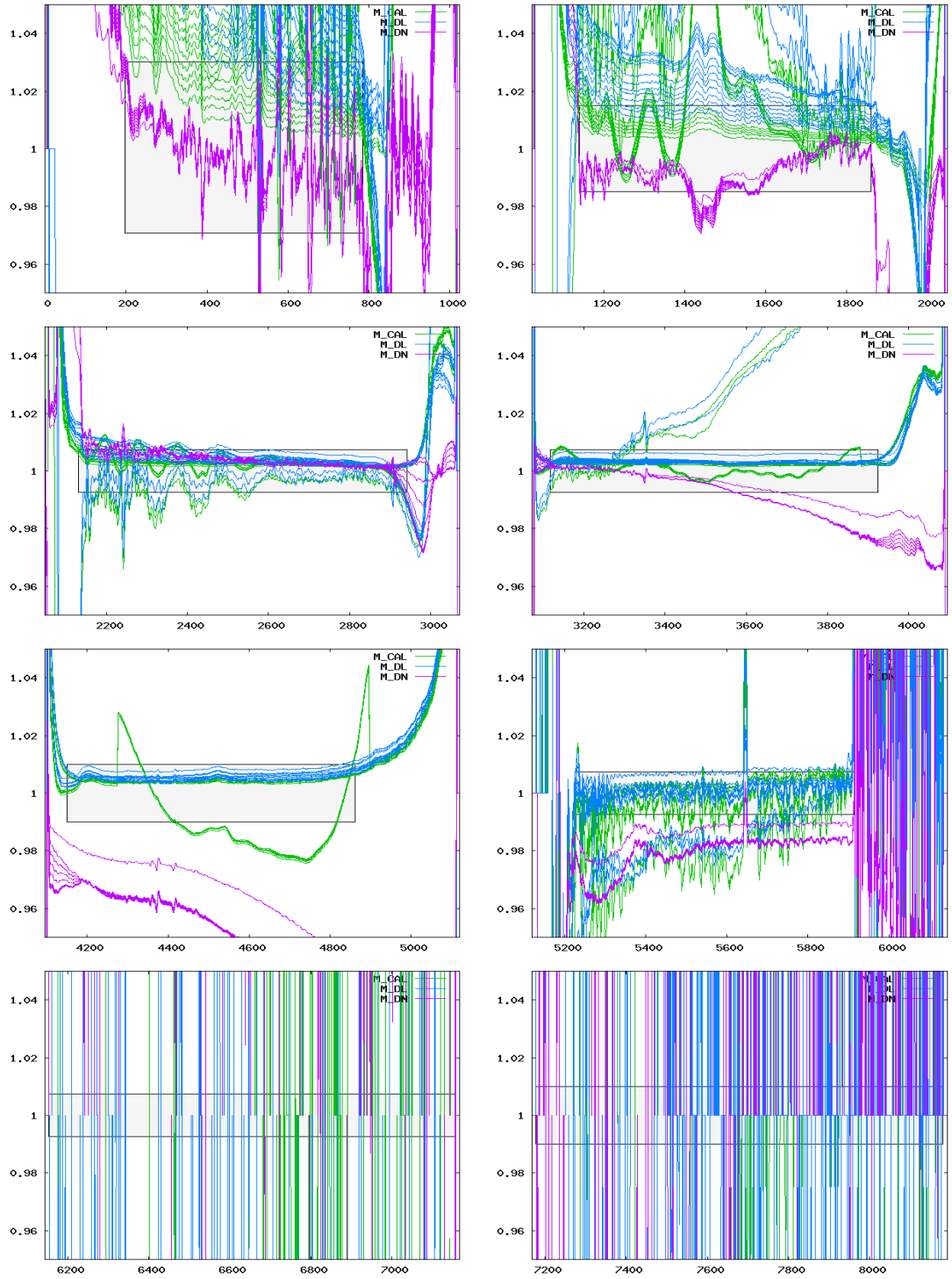
Figure 1: Ratio of delivered m-factors (23 Dec 2008– 05 Jan 2009) to the corresponding m-factor of the previous delivery day (22 Dec 2008). The grey boxes visualize the maximum ratio allowed.