NRT M-factor delivery document
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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 07.01.

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: 27 Jul 2010– 02 Aug 2010

- Prediction: 03 Aug 2010– 09 Aug 2010

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
59b2c22e463c1516597f4fb9c168a703	SCI_MF1_AXNIFE20100803_034108_20100727_183648_20100729_183648
b9dc0eda638a63f8ae7a96c78c8bf7f8	SCI_MF1_AXNIFE20100803_034108_20100728_194547_20100730_194547
1eda5776540b6b5483c665ea686ac2c2	SCI_MF1_AXNIFE20100803_034108_20100729_191410_20100731_191410
9bdeb36cf187d16138883a7cd18c7aba	SCI_MF1_AXNIFE20100803_034108_20100730_184233_20100801_184233
7ad8daaee41593041c4b81a87f6ded2f	SCI_MF1_AXNIFE20100803_034108_20100731_181056_20100802_181056
db1a1618255033df151c5d9f0acfc475	SCI_MF1_AXNIFE20100803_034108_20100801_191955_20100803_191955
050f088945ee1f73da56284a11dd181c	SCI_MF1_AXNIFE20100803_034108_20100802_184818_20100804_184818
243537c9df20c6687e0e4dc8cdb2456a	SCI_MF1_AXNIFE20100803_034108_20100803_181641_20100805_181641
fd5cec78bc87be862293dd5aaadd8754	SCI_MF1_AXNIFE20100803_034108_20100804_192540_20100806_192540
00cd632bbccbc6df212f9095a2368325	SCI_MF1_AXNIFE20100803_034108_20100805_185403_20100807_185403
f3e9dd224cef16fa9b721cf269ead1db	SCI_MF1_AXNIFE20100803_034108_20100806_182226_20100808_182226
1e84a906e2fc34f85230e192313d0056	SCI_MF1_AXNIFE20100803_034108_20100807_193125_20100809_193125
d169bf0b35b5d2714c6c6740b4c72925	SCI_MF1_AXNIFE20100803_034108_20100808_185948_20100810_185948
2c0d288c740e831a632f5d53fd228a09	SCI_MF1_AXNIFE20100803_034108_20100809_182811_20100906_182811

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

validity identifier	M_CAL	M_DL	M_DN
20100727_183648_20100729_183648	meas.	meas.	interp.
20100728_194547_20100730_194547	meas.	meas.	interp.
20100729_191410_20100731_191410	meas.	meas.	meas.
20100730_184233_20100801_184233	meas.	meas.	interp.
20100731_181056_20100802_181056	meas.	meas.	interp.
20100801_191955_20100803_191955	meas.	meas.	interp.
20100802_184818_20100804_184818	meas.	meas.	meas.
20100803_181641_20100805_181641	pred.	pred.	pred.
20100804_192540_20100806_192540	pred.	pred.	pred.
20100805_185403_20100807_185403	pred.	pred.	pred.
20100806_182226_20100808_182226	pred.	pred.	pred.
20100807_193125_20100809_193125	pred.	pred.	pred.
20100808_185948_20100810_185948	pred.	pred.	pred.
20100809_182811_20100906_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. 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				
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN	limit	status
1	1.0114	1.0095	1.0285	1.0010	1.0045	1.0066	1.0400	OK
2	1.0031	1.0071	1.0058	1.0012	1.0029	1.0018	1.0200	OK
3	1.0011	1.0021	1.0019	1.0003	1.0007	1.0005	1.0100	OK
4	1.0010	1.0009	1.0018	1.0004	1.0005	1.0010	1.0100	OK
5	1.0015	1.0017	1.0019	1.0007	1.0009	1.0011	1.0120	OK
6	1.0017	1.0020	1.0026	1.0006	1.0013	1.0014	1.0100	OK
7	1.0018	1.0014	1.0029	–	–	–	1.0070	OK
8	1.0028	1.0027	1.0029	–	–	–	1.0120	OK

certain limit l:

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

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 26 Jul 2010, therefore M_{t_0} is taken from the m–factor file SCI_MF1_AXNIFE20100727_034232_20100726_190825_20100728_190825 .

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
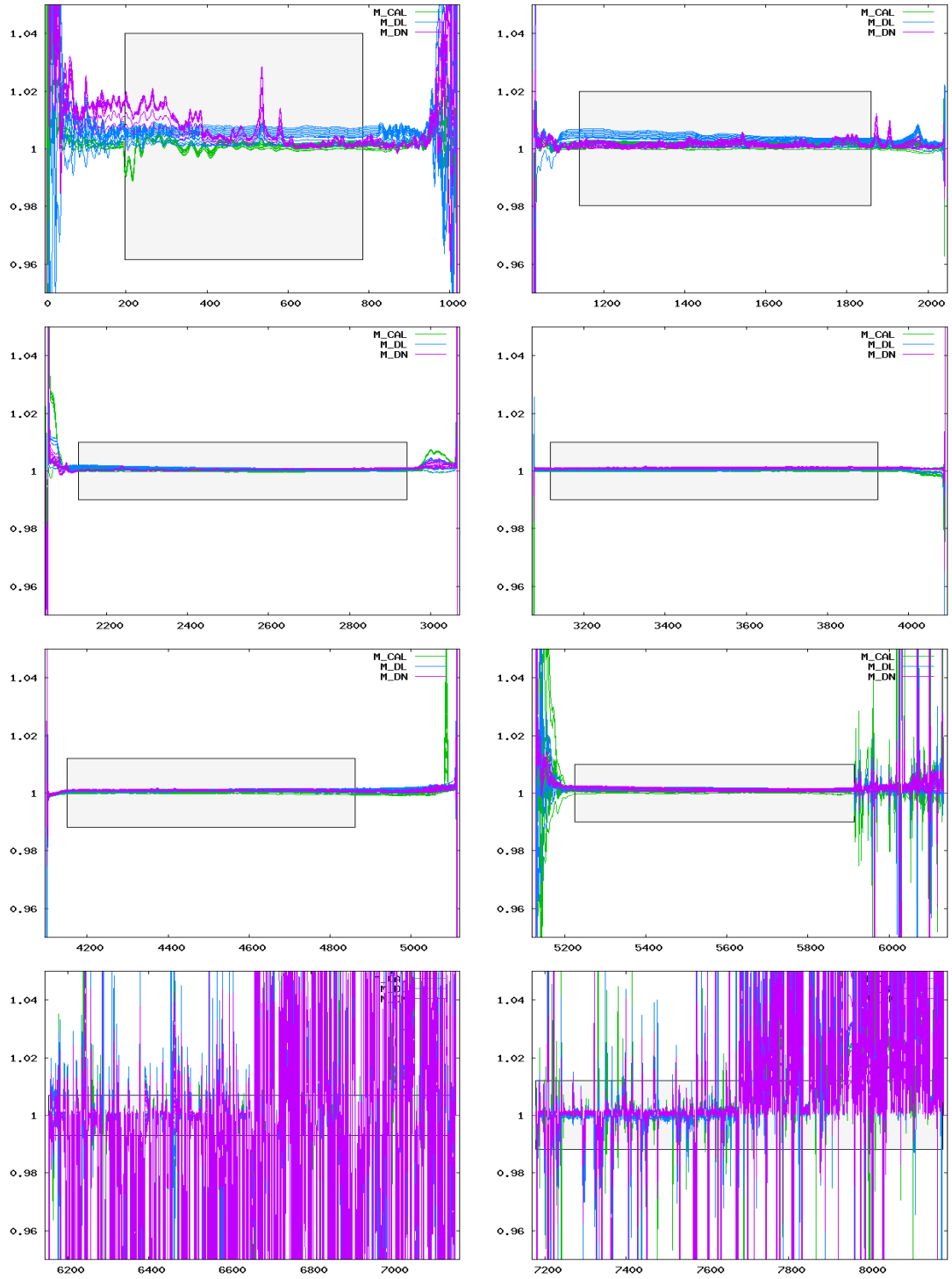
Figure 1: Ratio of delivered m-factors (27 Jul 2010– 09 Aug 2010) to the corresponding m-factor of the previous delivery day (26 Jul 2010). The grey boxes visualize the maximum ratio allowed.