NRT M-factor delivery document 12 Sep 2011

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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: 06 Sep 2011– 12 Sep 2011
- Prediction: 13 Sep 2011– 19 Sep 2011

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
32afa2259a628be1124a03443a0c3c97	SCI_MF1_AXNIFE20110913_075947_20110906_181400_20110908_181400
be02e4139e13d9d9ae34bfd1fe0b7aa2	SCI_MF1_AXNIFE20110913_075947_20110907_191728_20110909_191728
82890d67620b034a2eb4f163ac5abe6f	SCI_MF1_AXNIFE20110913_075947_20110908_184043_20110910_184043
fa027d743c59c473adc0a58ba2b3f654	SCI_MF1_AXNIFE20110913_075947_20110909_180357_20110911_180357
36812f80aff3bceef1e3e41a837d83f0	SCI_MF1_AXNIFE20110913_075947_20110910_190726_20110912_190726
76804dcc7f52b027bb18695e0586b7db	SCI_MF1_AXNIFE20110913_075947_20110911_183040_20110913_183040
eb66cb67498b70a4bd53817d9172f723	SCI_MF1_AXNIFE20110913_075947_20110912_193408_20110914_193408
3998ed5815103d84d62c8954b316f05c	SCI_MF1_AXNIFE20110913_075947_20110913_185723_20110915_185723
d062452d27113ad92569ddeb40a0a92a	SCI_MF1_AXNIFE20110913_075947_20110914_182038_20110916_182038
19f67f2bb6e0b574659cdd12871fd7d1	SCI_MF1_AXNIFE20110913_075947_20110915_192406_20110917_192406
378659b3c488fe43f3a0c83db66e15d0	SCI_MF1_AXNIFE20110913_075947_20110916_184721_20110918_184721
f3bbb5a9b8eaf893de568ae3aad6de6d	SCI_MF1_AXNIFE20110913_075947_20110917_181035_20110919_181035
c0882f239e6266636801bcbf95430bb9	SCI_MF1_AXNIFE20110913_075947_20110918_191404_20110920_191404
db68c581d9ddd884eaa7db5ce178dc71	SCI_MF1_AXNIFE20110913_075947_20110919_183718_20111017_183718

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

validity identifier	M_CAL	M_DL	M_DN
20110906_181400_20110908_181400	meas.	meas.	meas.
20110907_191728_20110909_191728	meas.	meas.	interp.
20110908_184043_20110910_184043	interp.	interp.	interp.
20110909_180357_20110911_180357	interp.	interp.	interp.
20110910_190726_20110912_190726	meas.	meas.	interp.
20110911_183040_20110913_183040	meas.	meas.	meas.
20110912_193408_20110914_193408	meas.	meas.	pred.
20110913_185723_20110915_185723	pred.	pred.	pred.
20110914_182038_20110916_182038	pred.	pred.	pred.
20110915_192406_20110917_192406	pred.	pred.	pred.
20110916_184721_20110918_184721	pred.	pred.	pred.
20110917_181035_20110919_181035	pred.	pred.	pred.
20110918_191404_20110920_191404	pred.	pred.	pred.
20110919_183718_20111017_183718	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	1.0087	1.0247	1.0106	1.0000	0.9917	0.9964	1.0400	OK
2	1.0014	1.0092	1.0071	1.0006	0.9967	0.9970	1.0200	OK
3	1.0016	1.0041	1.0032	1.0002	0.9992	0.9985	1.0100	OK
4	1.0008	1.0006	1.0016	1.0004	1.0000	0.9991	1.0100	OK
5	1.0013	1.0019	1.0018	1.0006	1.0007	0.9996	1.0120	OK
6	1.0015	1.0031	1.0016	1.0007	1.0016	1.0004	1.0100	OK
7	1.0009	1.0019	1.0012	–	–	–	1.0070	OK
8	1.0042	1.0039	1.0028	–	–	–	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 05 Sep 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110906_040415_20110905_185045_20110907_185045` .

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

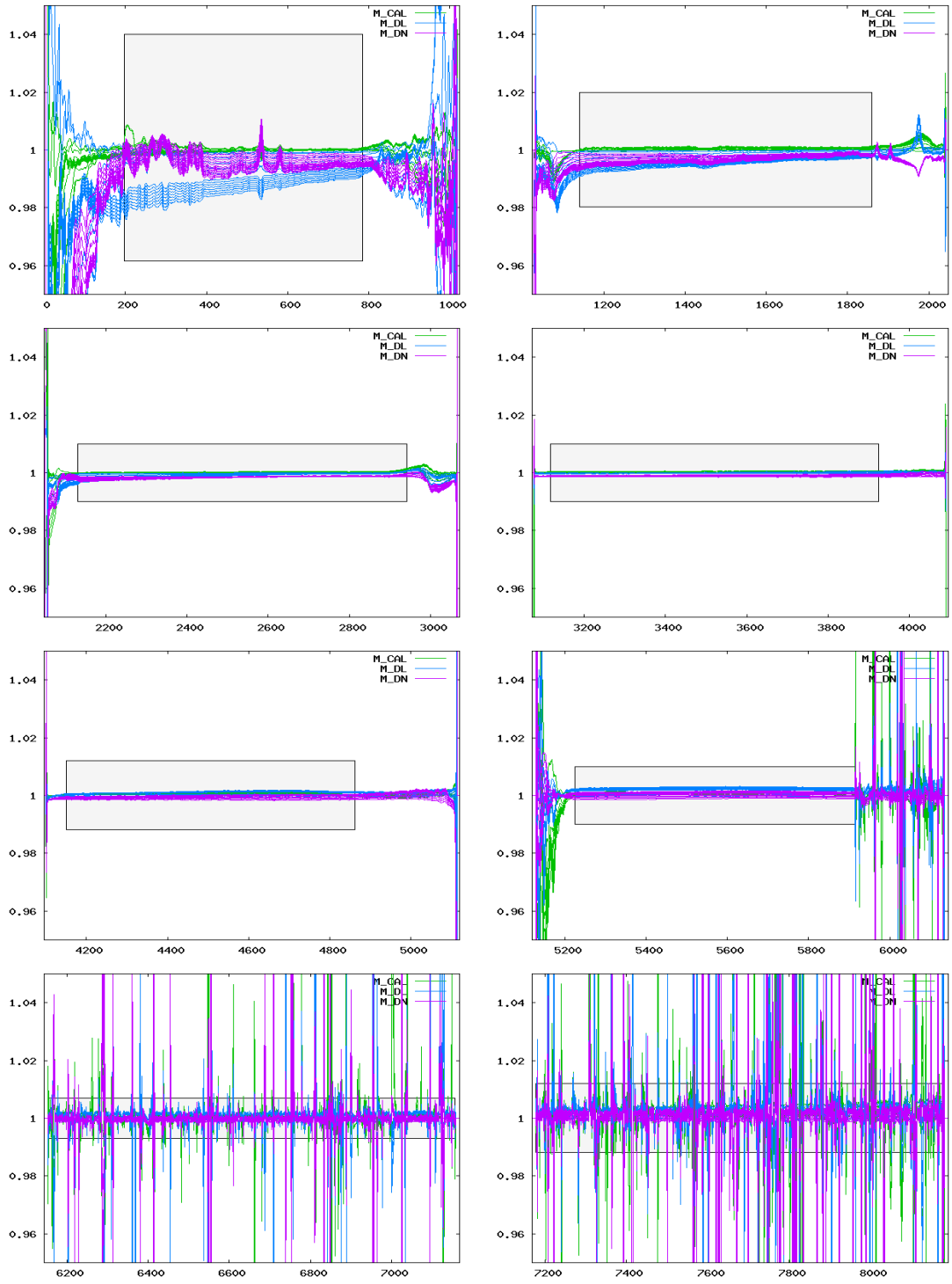

Figure 1: Ratio of delivered m-factors (06 Sep 2011– 19 Sep 2011) to the corresponding m-factor of the previous delivery day (05 Sep 2011). The grey boxes visualize the maximum ratio allowed.