NRT M-factor delivery document 19 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: 13 Sep 2011– 19 Sep 2011
- Prediction: 20 Sep 2011– 26 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
dd0f4a39194528b86fcb227c82677b79	SCI_MF1_AXNIFE20110920_072459_20110913_185723_20110915_185723
5032e6ad92397dee43734b9108cccf59	SCI_MF1_AXNIFE20110920_072459_20110914_182038_20110916_182038
ebd9d835e81fdba94accce6a44308f3b	SCI_MF1_AXNIFE20110920_072459_20110915_192406_20110917_192406
105e3a9c0bc02240879fb51208e34ee8	SCI_MF1_AXNIFE20110920_072459_20110916_184721_20110918_184721
da1c7d2d9ae2cd421df01942c2431c57	SCI_MF1_AXNIFE20110920_072459_20110917_181035_20110919_181035
27ffdeb0d8baa2c8e479eadd860adfe3	SCI_MF1_AXNIFE20110920_072459_20110918_191404_20110920_191404
94984f81055fadbc5f5e484b7e2c9c20	SCI_MF1_AXNIFE20110920_072459_20110919_183718_20110921_183718
724f1c1ffc52a30bb3b85e55c280f514	SCI_MF1_AXNIFE20110920_072459_20110920_194046_20110922_194046
ecd15c396e3a82d2e54d5d7e7ec91c49	SCI_MF1_AXNIFE20110920_072459_20110921_190401_20110923_190401
f24eaec8e68788672173746ca62edf62	SCI_MF1_AXNIFE20110920_072459_20110922_182716_20110924_182716
f91d179579f501533a7d3933d963fa9f	SCI_MF1_AXNIFE20110920_072459_20110923_193044_20110925_193044
ba1b634b2e183c99298caa3cefd3d98b	SCI_MF1_AXNIFE20110920_072459_20110924_185359_20110926_185359
a3cea4a93f4baa6b8cc0bee4836c8522	SCI_MF1_AXNIFE20110920_072459_20110925_181713_20110927_181713
cb57ad3c2c4fb09cc78311b774416d6b	SCI_MF1_AXNIFE20110920_072459_20110926_192042_20111024_192042

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

validity identifier	M_CAL	M_DL	M_DN
20110913_185723_20110915_185723	meas.	meas.	interp.
20110914_182038_20110916_182038	meas.	meas.	interp.
20110915_192406_20110917_192406	meas.	meas.	meas.
20110916_184721_20110918_184721	meas.	meas.	interp.
20110917_181035_20110919_181035	meas.	meas.	interp.
20110918_191404_20110920_191404	meas.	meas.	interp.
20110919_183718_20110921_183718	meas.	meas.	meas.
20110920_194046_20110922_194046	pred.	pred.	pred.
20110921_190401_20110923_190401	pred.	pred.	pred.
20110922_182716_20110924_182716	pred.	pred.	pred.
20110923_193044_20110925_193044	pred.	pred.	pred.
20110924_185359_20110926_185359	pred.	pred.	pred.
20110925_181713_20110927_181713	pred.	pred.	pred.
20110926_192042_20111024_192042	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	1.0149	1.0465	1.0536	0.9967	0.9786	0.9828	1.0600	OK
2	1.0019	1.0231	1.0178	0.9993	0.9908	0.9944	1.0300	OK
3	1.0009	1.0075	1.0032	0.9999	0.9977	0.9998	1.0100	OK
4	1.0017	1.0024	1.0025	0.9997	0.9989	1.0008	1.0100	OK
5	1.0012	1.0020	1.0018	0.9994	0.9985	1.0004	1.0120	OK
6	1.0018	1.0023	1.0035	1.0004	0.9993	1.0014	1.0100	OK
7	1.0004	1.0014	1.0036	–	–	–	1.0070	OK
8	1.0007	1.0009	1.0017	–	–	–	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 12 Sep 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110913_075947_20110912_193408_20110914_193408` .

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

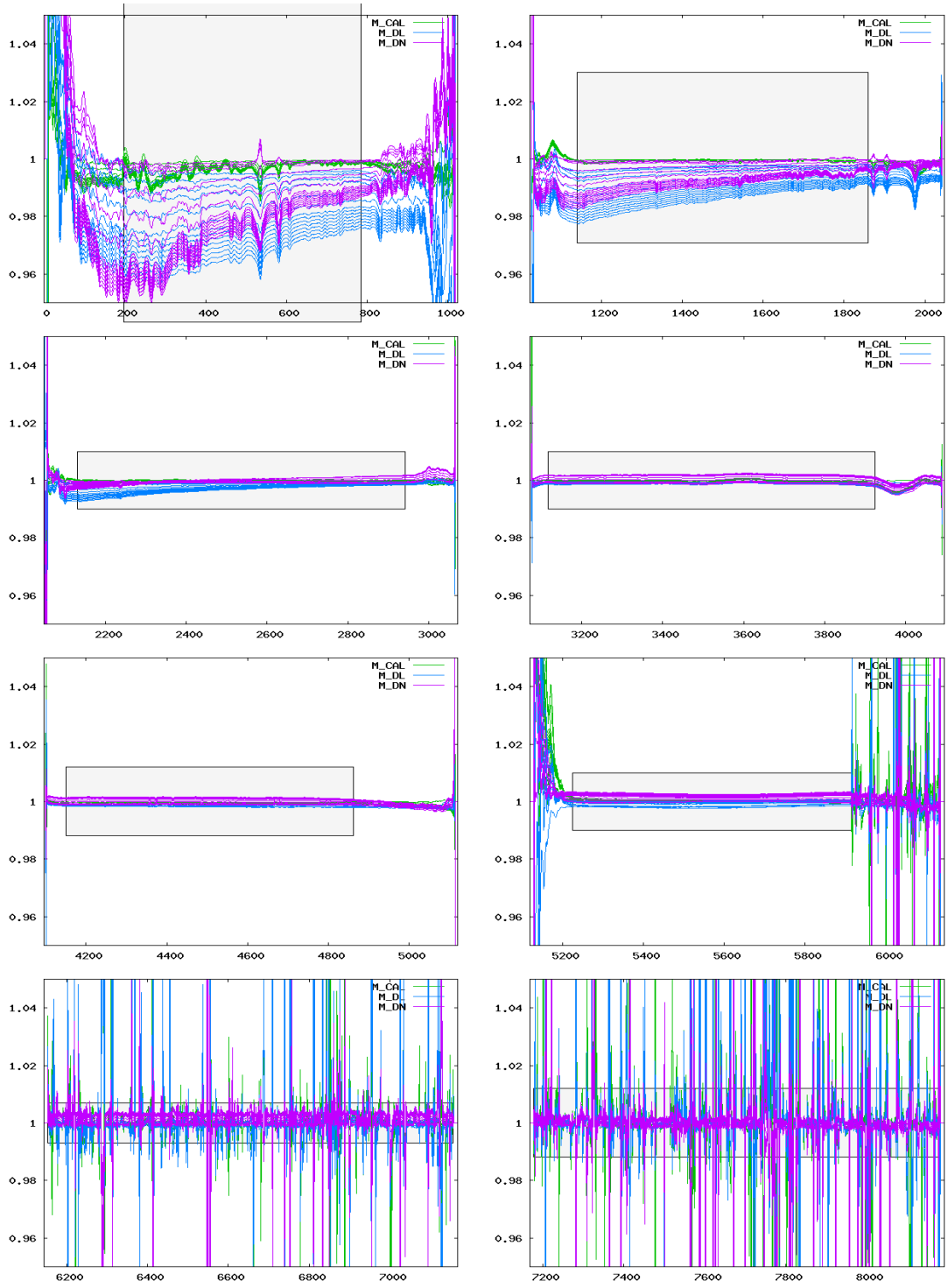

Figure 1: Ratio of delivered m-factors (13 Sep 2011– 26 Sep 2011) to the corresponding m-factor of the previous delivery day (12 Sep 2011). The grey boxes visualize the maximum ratio allowed.