NRT M-factor delivery document 13 Sep 2010

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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: 07 Sep 2010– 13 Sep 2010
- Prediction: 14 Sep 2010– 20 Sep 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
8877c59dd9b498d9303d68d7a6ffd950	SCI_MF1_AXNIFE20100914_034305_20100907_181641_20100909_181641
03b07c4d13159ef726e3bc36cfd72fe0	SCI_MF1_AXNIFE20100914_034305_20100908_192540_20100910_192540
9400d47be1349c0f1276004fa036bef0	SCI_MF1_AXNIFE20100914_034305_20100909_185403_20100911_185403
0bccd225a8c46dd6e79acf13d442878b	SCI_MF1_AXNIFE20100914_034305_20100910_182226_20100912_182226
a2bd07a9e56a443a9b61226ddd83e207	SCI_MF1_AXNIFE20100914_034305_20100911_193125_20100913_193125
5ea4b4e417ca27e3beeafb4842c55890	SCI_MF1_AXNIFE20100914_034305_20100912_185948_20100914_185948
524886885e253ed1f5087312a7f6efbb	SCI_MF1_AXNIFE20100914_034305_20100913_182811_20100915_182811
e204db82043403025ad4c85e1c5a0118	SCI_MF1_AXNIFE20100914_034305_20100914_193709_20100916_193709
4a9642251165a8dab8edb906e6e658be	SCI_MF1_AXNIFE20100914_034305_20100915_190532_20100917_190532
45450aba096cf5dbfd156491e55d25d1	SCI_MF1_AXNIFE20100914_034305_20100916_183355_20100918_183355
9bb9829274bd7686f537ab2cebc89e6c	SCI_MF1_AXNIFE20100914_034305_20100917_194254_20100919_194254
810e32f199fd8a5b026e5d8e97c787bf	SCI_MF1_AXNIFE20100914_034305_20100918_191117_20100920_191117
48f49e18728673937e53102b259ec286	SCI_MF1_AXNIFE20100914_034305_20100919_183940_20100921_183940
e51efed017e2b7494d9f95095c6b6522	SCI_MF1_AXNIFE20100914_034305_20100920_194839_20101018_194839

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

validity identifier	M_CAL	M_DL	M_DN
20100907_181641_20100909_181641	meas.	meas.	interp.
20100908_192540_20100910_192540	meas.	meas.	interp.
20100909_185403_20100911_185403	meas.	meas.	meas.
20100910_182226_20100912_182226	meas.	meas.	interp.
20100911_193125_20100913_193125	meas.	meas.	interp.
20100912_185948_20100914_185948	meas.	meas.	interp.
20100913_182811_20100915_182811	meas.	meas.	meas.
20100914_193709_20100916_193709	pred.	pred.	pred.
20100915_190532_20100917_190532	pred.	pred.	pred.
20100916_183355_20100918_183355	pred.	pred.	pred.
20100917_194254_20100919_194254	pred.	pred.	pred.
20100918_191117_20100920_191117	pred.	pred.	pred.
20100919_183940_20100921_183940	pred.	pred.	pred.
20100920_194839_20101018_194839	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	1.0029	1.0104	1.0176	1.0007	1.0039	1.0071	1.0400	OK
2	1.0017	1.0059	1.0075	1.0008	1.0020	1.0031	1.0200	OK
3	1.0005	1.0015	1.0014	1.0001	1.0001	0.9998	1.0100	OK
4	1.0009	1.0003	1.0013	1.0003	0.9999	0.9991	1.0100	OK
5	1.0012	1.0005	1.0010	1.0004	1.0000	0.9995	1.0120	OK
6	1.0018	1.0012	1.0014	1.0005	1.0004	1.0004	1.0100	OK
7	1.0009	1.0015	1.0014	–	–	–	1.0070	OK
8	1.0003	1.0014	1.0009	–	–	–	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 06 Sep 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100907_034312_20100906_184818_20100908_184818` .

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

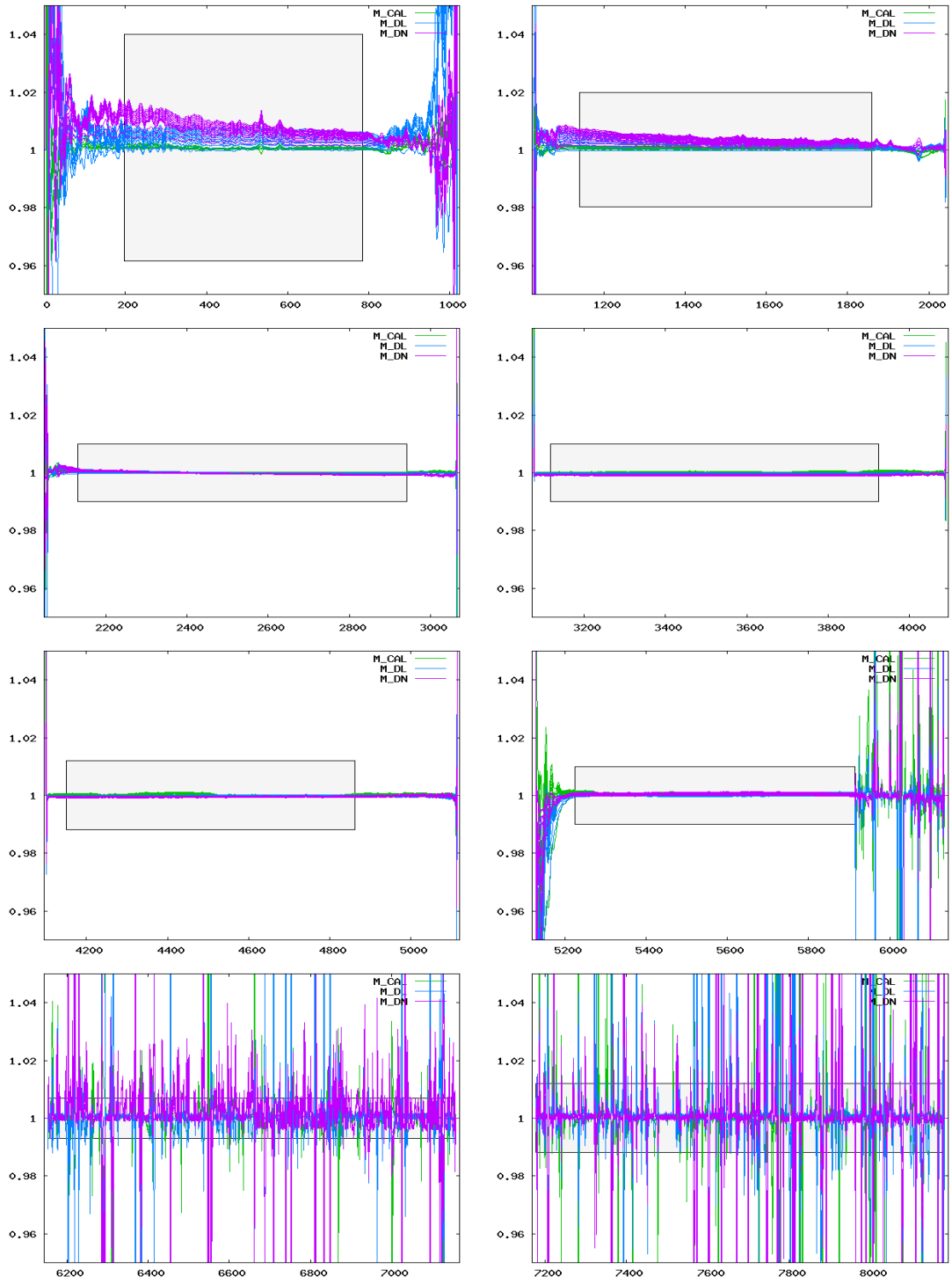

Figure 1: Ratio of delivered m-factors (07 Sep 2010– 20 Sep 2010) to the corresponding m-factor of the previous delivery day (06 Sep 2010). The grey boxes visualize the maximum ratio allowed.