NRT M-factor delivery document 08 Aug 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: 02 Aug 2011– 08 Aug 2011
- Prediction: 09 Aug 2011– 15 Aug 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
1c229193da1cea7c4ceb36a0b746fabf	SCI_MF1_AXNIFE20110809_040337_20110802_193744_20110804_193744
586c89d66a7e92719b78f0633fc729bf	SCI_MF1_AXNIFE20110809_040337_20110803_190058_20110805_190058
6bddcf9e128e2d36357fc84ed9a4c289	SCI_MF1_AXNIFE20110809_040337_20110804_182413_20110806_182413
d109c82f3cb01256d7fecca2fc0dd164	SCI_MF1_AXNIFE20110809_040337_20110805_192741_20110807_192741
3da44a00dfafda59f53bdeb6ab41fae1	SCI_MF1_AXNIFE20110809_040337_20110806_185056_20110808_185056
1096f4a285ba1bd513b29cf81f9e98ea	SCI_MF1_AXNIFE20110809_040337_20110807_181411_20110809_181411
bd89b05723a3c443e6f60c7ef077e76e	SCI_MF1_AXNIFE20110809_040337_20110808_191739_20110810_191739
3d0d7a7111bfdb9afb1a9568e2b495b7	SCI_MF1_AXNIFE20110809_040337_20110809_184054_20110811_184054
e5deba740963eea3daa5af2b9d98b07d	SCI_MF1_AXNIFE20110809_040337_20110810_194422_20110812_194422
b7783426d11257da290d4c06d0d7b526	SCI_MF1_AXNIFE20110809_040337_20110811_190736_20110813_190736
ee2f529cb4540dc6e23b664f70a35470	SCI_MF1_AXNIFE20110809_040337_20110812_183051_20110814_183051
19db4ef771a64c14b60525f4619c375d	SCI_MF1_AXNIFE20110809_040337_20110813_193419_20110815_193419
8d4228eac71a4ae7b525b0969fc6d8e3	SCI_MF1_AXNIFE20110809_040337_20110814_185734_20110816_185734
30e36ace072be1c4d130efd6bfdd29eb	SCI_MF1_AXNIFE20110809_040337_20110815_182049_20110912_182049

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

validity identifier	M_CAL	M_DL	M_DN
20110802_193744_20110804_193744	meas.	meas.	interp.
20110803_190058_20110805_190058	meas.	meas.	interp.
20110804_182413_20110806_182413	meas.	meas.	meas.
20110805_192741_20110807_192741	meas.	meas.	pred.
20110806_185056_20110808_185056	meas.	meas.	pred.
20110807_181411_20110809_181411	meas.	meas.	pred.
20110808_191739_20110810_191739	meas.	meas.	pred.
20110809_184054_20110811_184054	pred.	pred.	pred.
20110810_194422_20110812_194422	pred.	pred.	pred.
20110811_190736_20110813_190736	pred.	pred.	pred.
20110812_183051_20110814_183051	pred.	pred.	pred.
20110813_193419_20110815_193419	pred.	pred.	pred.
20110814_185734_20110816_185734	pred.	pred.	pred.
20110815_182049_20110912_182049	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	1.0024	1.0106	1.0283	0.9993	0.9963	1.0008	1.0400	OK
2	1.0019	1.0049	1.0036	0.9992	0.9980	0.9993	1.0200	OK
3	1.0020	1.0027	1.0019	0.9989	0.9988	0.9996	1.0100	OK
4	1.0012	1.0010	1.0009	0.9993	0.9994	1.0004	1.0100	OK
5	1.0010	1.0011	1.0016	0.9996	0.9998	1.0005	1.0120	OK
6	1.0018	1.0014	1.0011	0.9996	1.0002	1.0002	1.0100	OK
7	1.0006	1.0006	1.0010	–	–	–	1.0070	OK
8	1.0022	1.0029	1.0032	–	–	–	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 01 Aug 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110802_040246_20110801_183416_20110803_183416` .

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

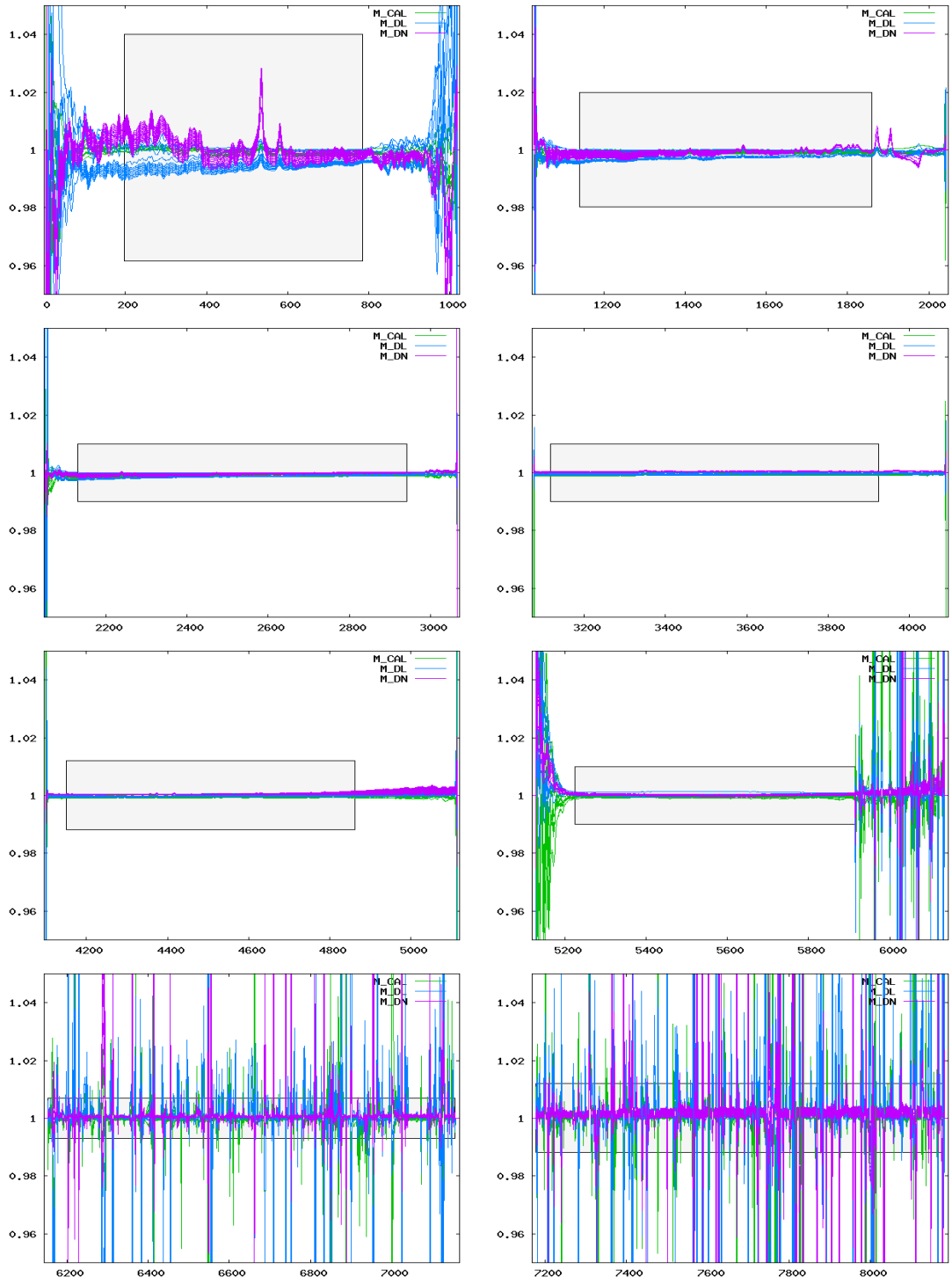

Figure 1: Ratio of delivered m-factors (02 Aug 2011– 15 Aug 2011) to the corresponding m-factor of the previous delivery day (01 Aug 2011). The grey boxes visualize the maximum ratio allowed.