NRT M-factor delivery document 20 Jul 2009

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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 06.01.

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: 14 Jul 2009– 20 Jul 2009
- Prediction: 21 Jul 2009– 27 Jul 2009

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
731140f0646dbf3a5c030dec1cc45e75	SCI_MF1_AXNIFE20090720_215321_20090714_181642_20090716_181642
571457e8340e5e6b0318d3e25dc5ad3e	SCI_MF1_AXNIFE20090720_215321_20090715_192541_20090717_192541
5b45c45d1e3e82d52eaad72e74ecdabe	SCI_MF1_AXNIFE20090720_215321_20090716_185403_20090718_185403
b695cc1797b98976ae94ddb40bc91e15	SCI_MF1_AXNIFE20090720_215321_20090717_182226_20090719_182226
bda916ebeb0934c4000859be76b61e7a	SCI_MF1_AXNIFE20090720_215321_20090718_193125_20090720_193125
5320d2b6dc1a226fecc738ac8d987b43	SCI_MF1_AXNIFE20090720_215321_20090719_185948_20090721_185948
5fc20e9610d44da48905ba9ae39fa0c4	SCI_MF1_AXNIFE20090720_215321_20090720_182811_20090722_182811
a070903a74f687deb1a5fd617f2fdcfa	SCI_MF1_AXNIFE20090720_215321_20090721_193710_20090723_193710
26376fba9a235b9faa1186035f43e1f7	SCI_MF1_AXNIFE20090720_215321_20090722_190533_20090724_190533
7abf927651132b20332c9fe8c4a4aca0	SCI_MF1_AXNIFE20090720_215321_20090723_183356_20090725_183356
8ad74d165c679f6480c48f95aaee5cc9	SCI_MF1_AXNIFE20090720_215321_20090724_194255_20090726_194255
1ad80ad1d38f04d26f3cca09003f4030	SCI_MF1_AXNIFE20090720_215321_20090725_191118_20090727_191118
c04c21e730ef9b9df268471a1d0429b2	SCI_MF1_AXNIFE20090720_215321_20090726_183941_20090728_183941
9e41b0dd547a0ca87ee9a3a31cbf2d06	SCI_MF1_AXNIFE20090720_215321_20090727_194840_20090824_194840

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

validity identifier	M_CAL	M_DL	M_DN
20090714_181642_20090716_181642	meas.	meas.	meas.
20090715_192541_20090717_192541	meas.	meas.	interp.
20090716_185403_20090718_185403	meas.	meas.	interp.
20090717_182226_20090719_182226	meas.	meas.	interp.
20090718_193125_20090720_193125	meas.	meas.	meas.
20090719_185948_20090721_185948	meas.	meas.	pred.
20090720_182811_20090722_182811	pred.	pred.	pred.
20090721_193710_20090723_193710	pred.	pred.	pred.
20090722_190533_20090724_190533	pred.	pred.	pred.
20090723_183356_20090725_183356	pred.	pred.	pred.
20090724_194255_20090726_194255	pred.	pred.	pred.
20090725_191118_20090727_191118	pred.	pred.	pred.
20090726_183941_20090728_183941	pred.	pred.	pred.
20090727_194840_20090824_194840	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	1.0196	1.0237	1.0078	1.0022	1.0077	1.0019	1.0400	OK
2	1.0036	1.0092	1.0051	1.0016	1.0033	1.0017	1.0200	OK
3	1.0011	1.0025	1.0023	1.0005	1.0007	0.9993	1.0100	OK
4	1.0018	1.0021	1.0026	1.0005	1.0005	0.9988	1.0100	OK
5	1.0016	1.0018	1.0019	1.0008	1.0009	1.0000	1.0120	OK
6	1.0021	1.0027	1.0026	1.0011	1.0012	1.0009	1.0100	OK
7	1.0016	1.0015	1.0017	–	–	–	1.0070	OK
8	1.0068	1.0078	1.0099	–	–	–	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 13 Jul 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090713_215415_20090713_184819_20090715_184819` .

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

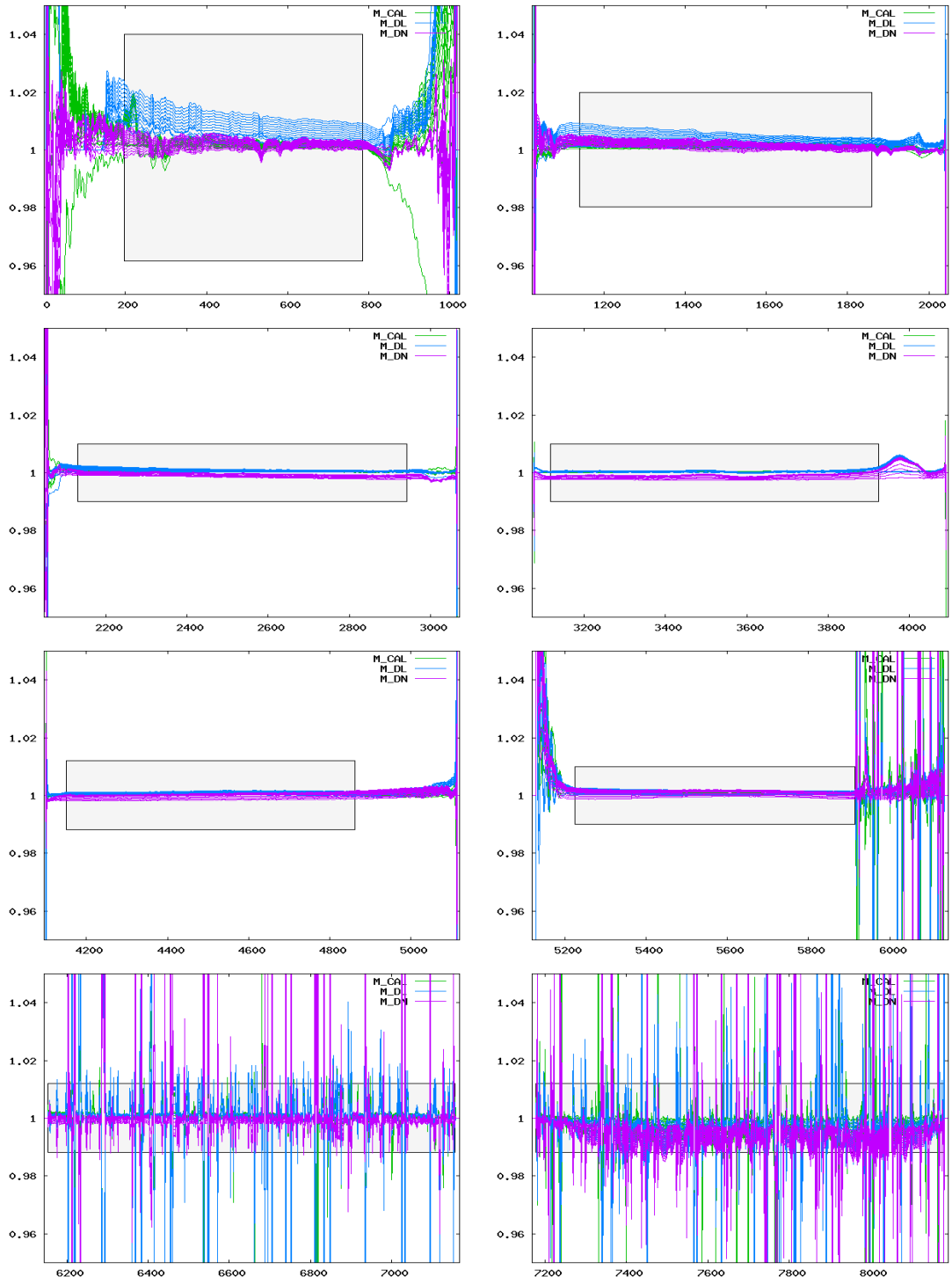

Figure 1: Ratio of delivered m-factors (14 Jul 2009– 27 Jul 2009) to the corresponding m-factor of the previous delivery day (13 Jul 2009). The grey boxes visualize the maximum ratio allowed.