NRT M-factor delivery document
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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: 09 Jun 2009– 15 Jun 2009
- Prediction: 16 Jun 2009– 22 Jun 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
67514ea23d1db6c7e8a34514a5acd157	SCI_MF1_AXNIFE20090615_215413_20090609_181642_20090611_181642
2e7bf92028f9dabe86be23d9497576e6	SCI_MF1_AXNIFE20090615_215413_20090610_192541_20090612_192541
8ea9798d34f5d669e0dd3b794a230e26	SCI_MF1_AXNIFE20090615_215413_20090611_185404_20090613_185404
201a9cf02897b6e426f2aafd641d3f68	SCI_MF1_AXNIFE20090615_215413_20090612_182227_20090614_182227
d2e8afbcfc7b405f2b45d4d1612820bf	SCI_MF1_AXNIFE20090615_215413_20090613_193125_20090615_193125
815c0c0a8f67dff34eb3856d4d83cae6	SCI_MF1_AXNIFE20090615_215413_20090614_185948_20090616_185948
dc485e34e1ad30ce1925c2f88406af26	SCI_MF1_AXNIFE20090615_215413_20090615_182811_20090617_182811
db45f8f3b9db6cecd45d97232a764b74	SCI_MF1_AXNIFE20090615_215413_20090616_193710_20090618_193710
e83ad1540fe0b45920218f795252d169	SCI_MF1_AXNIFE20090615_215413_20090617_190533_20090619_190533
dd41ee7e7ea6e48bbdd8facc442ef706	SCI_MF1_AXNIFE20090615_215413_20090618_183356_20090620_183356
3012e3b928c6bc6a4a1a16896f788f84	SCI_MF1_AXNIFE20090615_215413_20090619_194255_20090621_194255
4f0c6f3a7853ab1cb4517e87745dc740	SCI_MF1_AXNIFE20090615_215413_20090620_191118_20090622_191118
7fdc96937fa0ae0a8814ce4a4cab4439	SCI_MF1_AXNIFE20090615_215413_20090621_183941_20090623_183941
18b16782aa75c6f2bf0bd181cff255ce	SCI_MF1_AXNIFE20090615_215413_20090622_194840_20090720_194840

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

validity identifier	M_CAL	M_DL	M_DN
20090609_181642_20090611_181642	meas.	meas.	interp.
20090610_192541_20090612_192541	meas.	meas.	interp.
20090611_185404_20090613_185404	meas.	meas.	meas.
20090612_182227_20090614_182227	meas.	meas.	pred.
20090613_193125_20090615_193125	meas.	meas.	pred.
20090614_185948_20090616_185948	meas.	meas.	pred.
20090615_182811_20090617_182811	pred.	pred.	pred.
20090616_193710_20090618_193710	pred.	pred.	pred.
20090617_190533_20090619_190533	pred.	pred.	pred.
20090618_183356_20090620_183356	pred.	pred.	pred.
20090619_194255_20090621_194255	pred.	pred.	pred.
20090620_191118_20090622_191118	pred.	pred.	pred.
20090621_183941_20090623_183941	pred.	pred.	pred.
20090622_194840_20090720_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	1.0166	1.0328	1.0134	1.0020	1.0099	1.0036	1.0400	OK
2	1.0037	1.0089	1.0085	1.0016	1.0035	1.0025	1.0200	OK
3	1.0011	1.0027	1.0019	1.0004	1.0009	0.9999	1.0100	OK
4	1.0012	1.0014	1.0011	1.0004	1.0005	0.9992	1.0100	OK
5	1.0008	1.0014	1.0014	1.0004	1.0001	0.9993	1.0120	OK
6	1.0016	1.0017	1.0012	1.0002	0.9999	1.0000	1.0100	OK
7	1.0009	1.0005	1.0006	–	–	–	1.0070	OK
8	1.0022	1.0007	1.0023	–	–	–	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 08 Jun 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090609_071432_20090608_184819_20090610_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

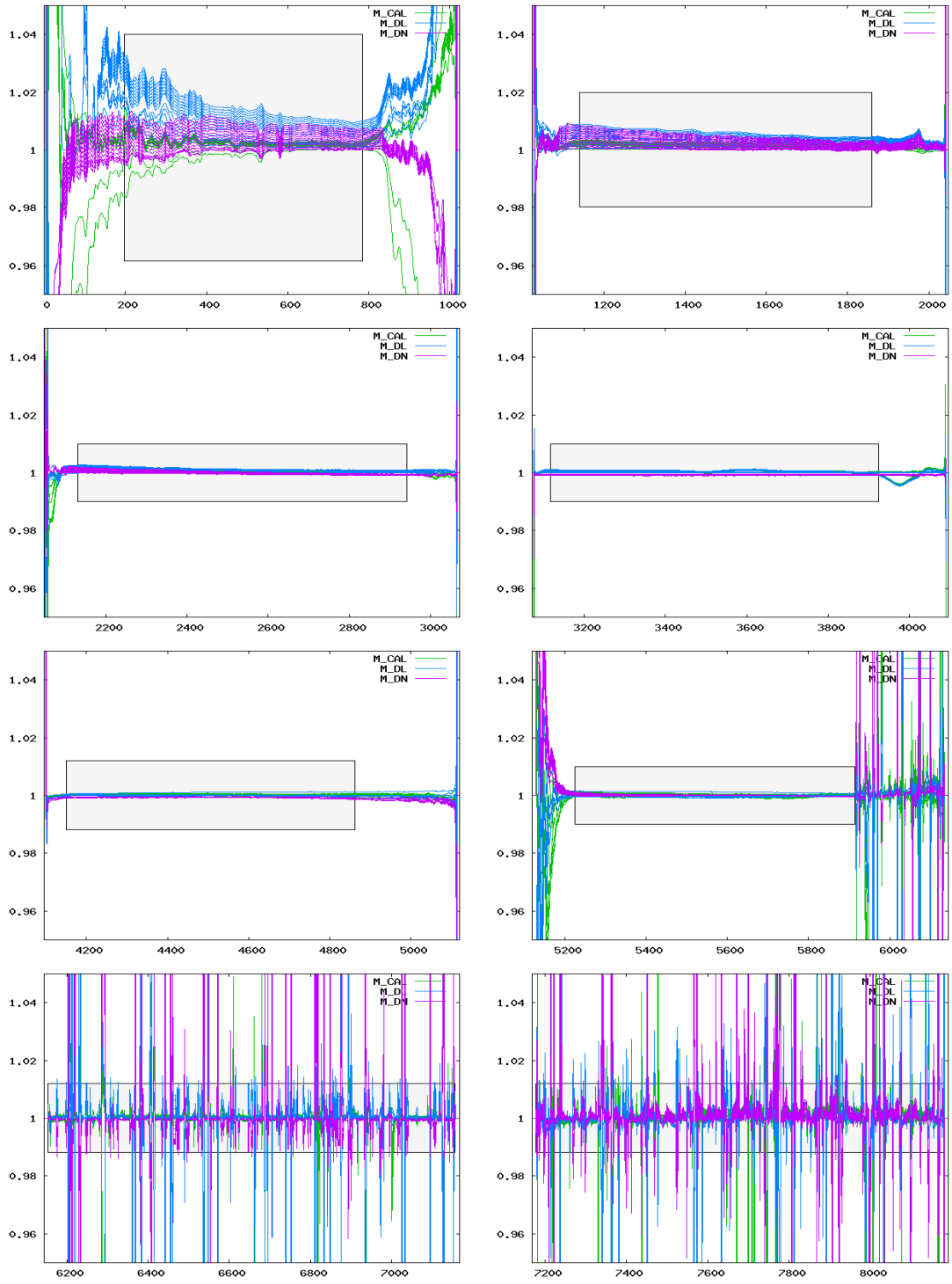

Figure 1: Ratio of delivered m-factors (09 Jun 2009– 22 Jun 2009) to the corresponding m-factor of the previous delivery day (08 Jun 2009). The grey boxes visualize the maximum ratio allowed.