NRT M-factor delivery document 13 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: 07 Jul 2009– 13 Jul 2009
- Prediction: 14 Jul 2009– 20 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
f88e6435cfe9d447c93129a2ae4207f4	SCI_MF1_AXNIFE20090713_215415_20090707_183649_20090709_183649
106c18064ef541a9be26f626dccdea15	SCI_MF1_AXNIFE20090713_215415_20090708_194548_20090710_194548
82eaf4b89b9218f2b23d27080609ad17	SCI_MF1_AXNIFE20090713_215415_20090709_191411_20090711_191411
2693603a2fc54d2c79a6af821edee283	SCI_MF1_AXNIFE20090713_215415_20090710_184234_20090712_184234
c51b78c73c08b876b47d153cb8f54b4b	SCI_MF1_AXNIFE20090713_215415_20090711_181057_20090713_181057
16464f7c799106950a4333b3a29b5702	SCI_MF1_AXNIFE20090713_215415_20090712_191956_20090714_191956
957fca4cfd47eb3c7b4963962850bff5	SCI_MF1_AXNIFE20090713_215415_20090713_184819_20090715_184819
9c796153519dfe2df3b29095de71726a	SCI_MF1_AXNIFE20090713_215415_20090714_181642_20090716_181642
53f98c7b342a795d2f7f46ab50aa1e37	SCI_MF1_AXNIFE20090713_215415_20090715_192541_20090717_192541
502d7f4981a0a98039000fad03d00bb7	SCI_MF1_AXNIFE20090713_215415_20090716_185403_20090718_185403
dedca10550b835a89a749f565adbda68	SCI_MF1_AXNIFE20090713_215415_20090717_182226_20090719_182226
dfacdf79be4a2ff08ec61051b178292b	SCI_MF1_AXNIFE20090713_215415_20090718_193125_20090720_193125
2a52d3629916d3cf527134f3f4f0827a	SCI_MF1_AXNIFE20090713_215415_20090719_185948_20090721_185948
aebe5a4eaf6d77ff1f67d7c6df421a54	SCI_MF1_AXNIFE20090713_215415_20090720_182811_20090817_182811

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

validity identifier	M_CAL	M_DL	M_DN
20090707_183649_20090709_183649	meas.	meas.	interp.
20090708_194548_20090710_194548	meas.	meas.	interp.
20090709_191411_20090711_191411	meas.	meas.	interp.
20090710_184234_20090712_184234	meas.	meas.	meas.
20090711_181057_20090713_181057	meas.	meas.	pred.
20090712_191956_20090714_191956	meas.	meas.	pred.
20090713_184819_20090715_184819	pred.	pred.	pred.
20090714_181642_20090716_181642	pred.	pred.	pred.
20090715_192541_20090717_192541	pred.	pred.	pred.
20090716_185403_20090718_185403	pred.	pred.	pred.
20090717_182226_20090719_182226	pred.	pred.	pred.
20090718_193125_20090720_193125	pred.	pred.	pred.
20090719_185948_20090721_185948	pred.	pred.	pred.
20090720_182811_20090817_182811	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	1.0088	1.0111	1.0192	1.0014	1.0029	1.0034	1.0400	OK
2	1.0034	1.0084	1.0045	1.0013	1.0031	1.0010	1.0200	OK
3	1.0006	1.0023	1.0018	0.9999	1.0004	1.0006	1.0100	OK
4	1.0011	1.0011	1.0028	1.0000	1.0003	1.0014	1.0100	OK
5	1.0009	1.0009	1.0026	1.0003	1.0002	1.0015	1.0120	OK
6	1.0016	1.0012	1.0025	0.9993	0.9998	1.0010	1.0100	OK
7	1.0004	1.0006	1.0024	–	–	–	1.0070	OK
8	1.0086	1.0085	1.0064	–	–	–	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 Jul 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090706_215423_20090706_190826_20090708_190826` .

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

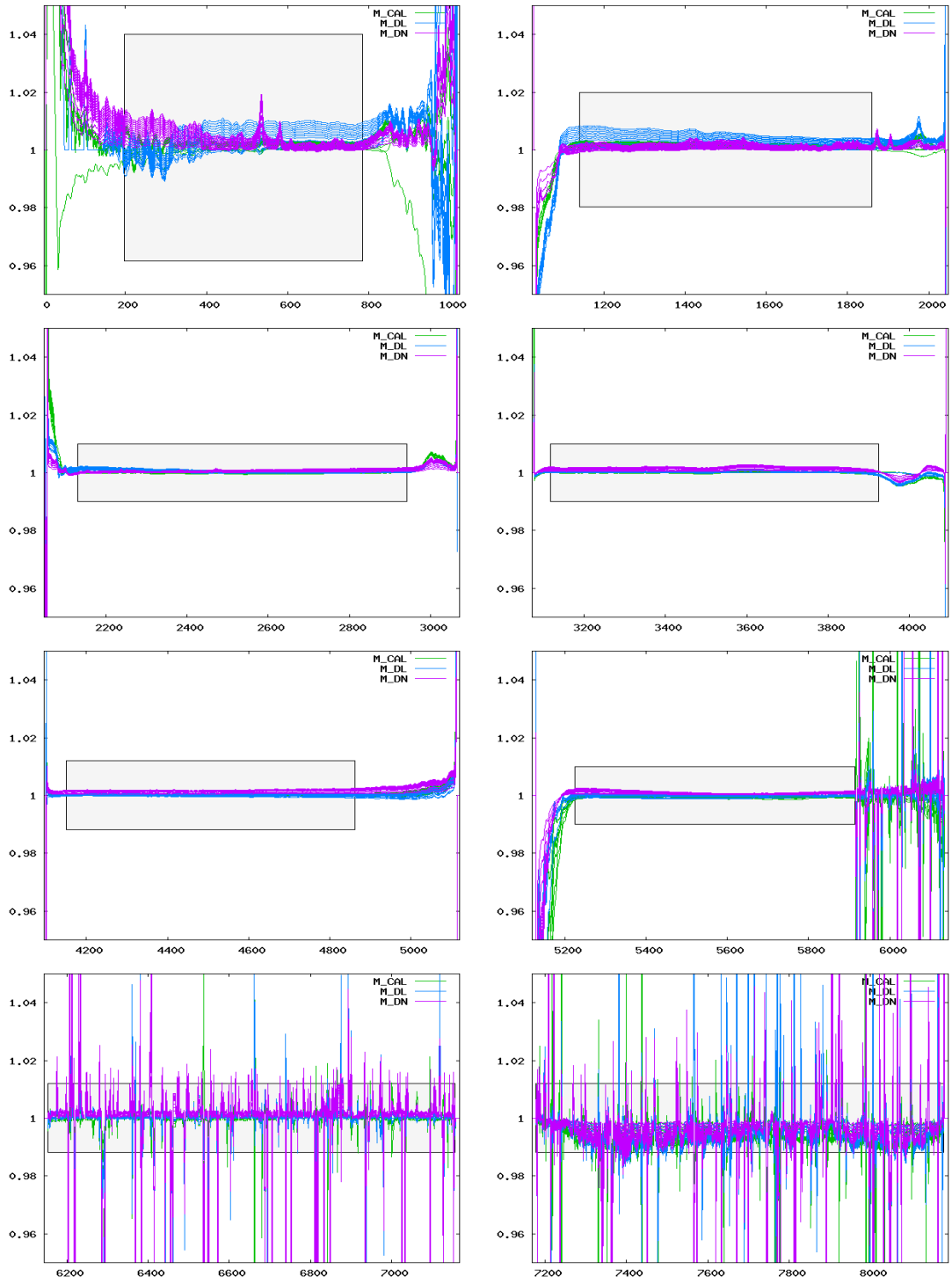

Figure 1: Ratio of delivered m-factors (07 Jul 2009– 20 Jul 2009) to the corresponding m-factor of the previous delivery day (06 Jul 2009). The grey boxes visualize the maximum ratio allowed.