NRT M-factor delivery document 08 Feb 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: 02 Feb 2010– 08 Feb 2010
- Prediction: 09 Feb 2010– 15 Feb 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
fd9515f73fe19a78907f27d4f6c4082b	SCI_MF1_AXNIFE20100408_094816_20100202_183648_20100204_183648
7b8462ac487f2bed96c4e65351454bd4	SCI_MF1_AXNIFE20100408_094816_20100203_194547_20100205_194547
5d79ccbe9f67fd50ae262d259ca5eb93	SCI_MF1_AXNIFE20100408_094816_20100204_191410_20100206_191410
3d90ced0ba8cefaad46927b8ed24464a	SCI_MF1_AXNIFE20100408_094816_20100205_184233_20100207_184233
76e9124c62531c83cf0bd167d94c11cc	SCI_MF1_AXNIFE20100408_094816_20100206_181056_20100208_181056
1d810cc575f5e7a4eab855979857d12e	SCI_MF1_AXNIFE20100408_094816_20100207_191955_20100209_191955
b75c9ccfc644e14fb53382c190a7b21d	SCI_MF1_AXNIFE20100408_094816_20100208_184818_20100210_184818
933ad1802c27e9d3cf485b6d81edcb10	SCI_MF1_AXNIFE20100408_094816_20100209_181641_20100211_181641
1f00241592a07cb790409d710e824828	SCI_MF1_AXNIFE20100408_094816_20100210_192540_20100212_192540
bdaad82ffd9a448e99643fd7b039f1c0	SCI_MF1_AXNIFE20100408_094816_20100211_185403_20100213_185403
7716b3118b79563092753b8e261fe206	SCI_MF1_AXNIFE20100408_094816_20100212_182226_20100214_182226
cfdcf065081dccbc68596878013c815f	SCI_MF1_AXNIFE20100408_094816_20100213_193125_20100215_193125
4f22118c57d1b6a60884f59fc45be446	SCI_MF1_AXNIFE20100408_094816_20100214_185948_20100216_185948
075f9b402624998af40c6657e3f08353	SCI_MF1_AXNIFE20100408_094816_20100215_182811_20100315_182811

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

validity identifier	M_CAL	M_DL	M_DN
20100202_183648_20100204_183648	meas.	meas.	interp.
20100203_194547_20100205_194547	meas.	meas.	interp.
20100204_191410_20100206_191410	meas.	meas.	interp.
20100205_184233_20100207_184233	meas.	meas.	meas.
20100206_181056_20100208_181056	meas.	interp.	pred.
20100207_191955_20100209_191955	meas.	meas.	pred.
20100208_184818_20100210_184818	meas.	meas.	pred.
20100209_181641_20100211_181641	pred.	pred.	pred.
20100210_192540_20100212_192540	pred.	pred.	pred.
20100211_185403_20100213_185403	pred.	pred.	pred.
20100212_182226_20100214_182226	pred.	pred.	pred.
20100213_193125_20100215_193125	pred.	pred.	pred.
20100214_185948_20100216_185948	pred.	pred.	pred.
20100215_182811_20100315_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	1.0200	1.0239	1.0098	1.0000	1.0055	1.0030	1.0400	OK
2	1.0032	1.0065	1.0032	1.0012	1.0020	1.0013	1.0200	OK
3	1.0010	1.0024	1.0006	1.0002	1.0004	0.9999	1.0100	OK
4	1.0013	1.0016	1.0016	1.0002	1.0002	0.9999	1.0100	OK
5	1.0025	1.0013	1.0007	1.0007	0.9994	0.9998	1.0120	OK
6	1.0032	1.0020	1.0011	1.0008	0.9988	0.9994	1.0100	OK
7	1.0015	1.0007	1.0003	–	–	–	1.0070	OK
8	1.0031	1.0047	1.0009	–	–	–	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 Feb 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_092910_20100201_190825_20100203_190825` .

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

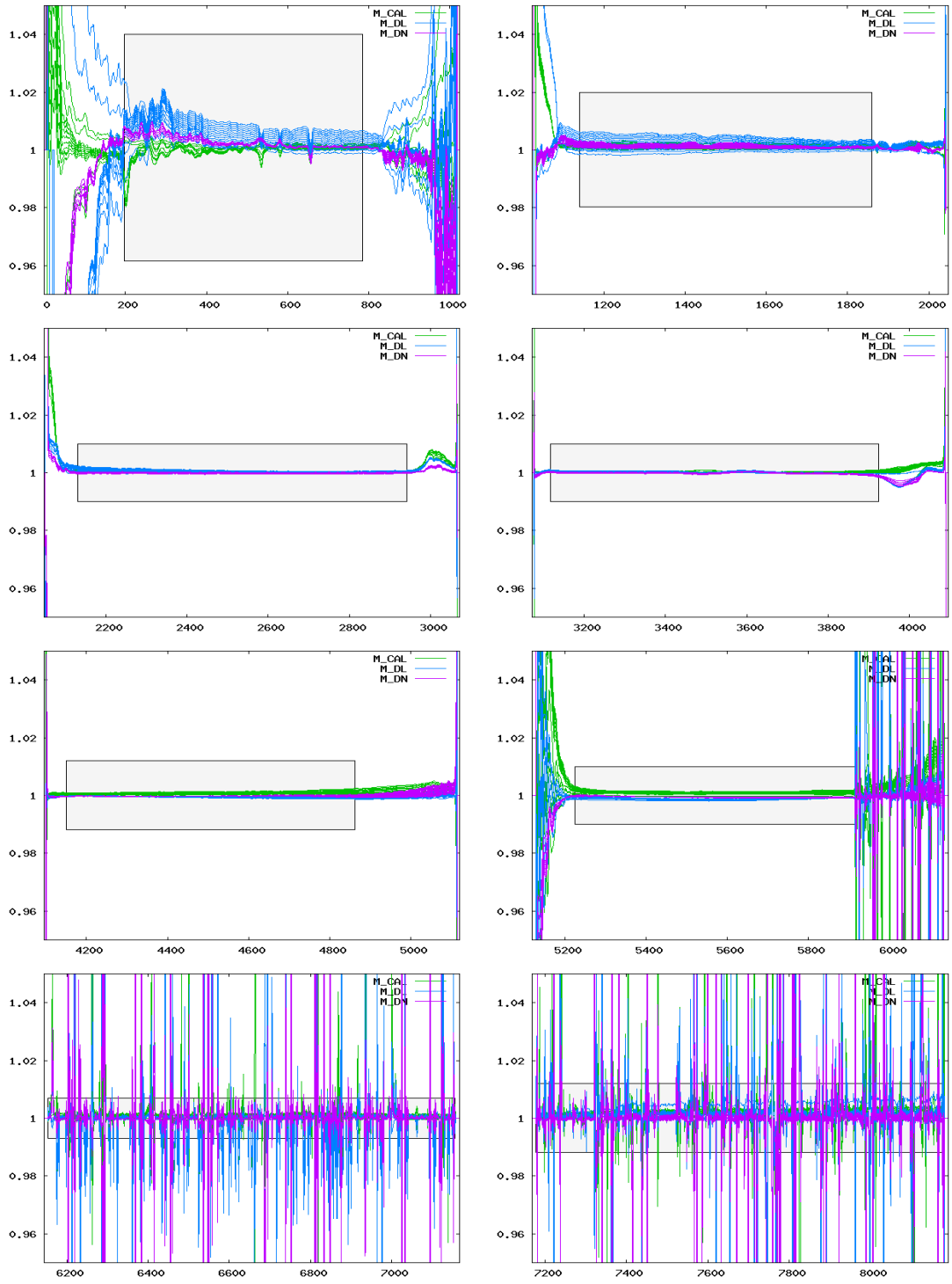

Figure 1: Ratio of delivered m-factors (02 Feb 2010– 15 Feb 2010) to the corresponding m-factor of the previous delivery day (01 Feb 2010). The grey boxes visualize the maximum ratio allowed.