NRT M-factor delivery document 12 Jan 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: 06 Jan 2009– 12 Jan 2009
- Prediction: 13 Jan 2009– 19 Jan 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
320ae4aa5ba2b6eaeb44f86addfe63f4	SCI_MF1_AXNIFE20090123_095416_20090106_185656_20090108_185656
2e8ebf07e3403839f8e418b0e5da41eb	SCI_MF1_AXNIFE20090123_095416_20090107_182519_20090109_182519
4dc1522da254dc0885d56b429b8704a9	SCI_MF1_AXNIFE20090123_095416_20090108_193418_20090110_193418
f5b4e274264b00f597fa6b49df327080	SCI_MF1_AXNIFE20090123_095416_20090109_190241_20090111_190241
41c128700b3ec6a5096534c062bd8e99	SCI_MF1_AXNIFE20090123_095416_20090110_183104_20090112_183104
078a56b1826749ba350a1eaf66eb58c3	SCI_MF1_AXNIFE20090123_095416_20090111_194003_20090113_194003
8b593e8609016efb46fa0fa91ab0fc3e	SCI_MF1_AXNIFE20090123_095416_20090112_190826_20090114_190826
a10087e706e0ddfd1e8cc3e81788ef3b	SCI_MF1_AXNIFE20090123_095416_20090113_183649_20090115_183649
9f23e442b9f385c2fad858d52c37e501	SCI_MF1_AXNIFE20090123_095416_20090114_194548_20090116_194548
45e4622e98ecf27798edbbeea4bf1ef2	SCI_MF1_AXNIFE20090123_095416_20090115_191411_20090117_191411
c3293246d75f0db10401def2e657291a	SCI_MF1_AXNIFE20090123_095416_20090116_184234_20090118_184234
42f9a37bf146a65b95fbc4ac4e6c71af	SCI_MF1_AXNIFE20090123_095416_20090117_181057_20090119_181057
8f104cdd74fb50dd96da866127e00b64	SCI_MF1_AXNIFE20090123_095416_20090118_191956_20090120_191956
ba469eeb278503c3f1cfe13747a50b2b	SCI_MF1_AXNIFE20090123_095416_20090119_184819_20090216_184819

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

validity identifier	M_CAL	M_DL	M_DN
20090106_185656_20090108_185656	interp.	interp.	interp.
20090107_182519_20090109_182519	meas.	meas.	interp.
20090108_193418_20090110_193418	meas.	meas.	interp.
20090109_190241_20090111_190241	meas.	meas.	meas.
20090110_183104_20090112_183104	meas.	meas.	pred.
20090111_194003_20090113_194003	meas.	meas.	pred.
20090112_190826_20090114_190826	meas.	meas.	pred.
20090113_183649_20090115_183649	pred.	pred.	pred.
20090114_194548_20090116_194548	pred.	pred.	pred.
20090115_191411_20090117_191411	pred.	pred.	pred.
20090116_184234_20090118_184234	pred.	pred.	pred.
20090117_181057_20090119_181057	pred.	pred.	pred.
20090118_191956_20090120_191956	pred.	pred.	pred.
20090119_184819_20090216_184819	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	1.0276	1.2264	1.1644	1.0046	0.9885	1.0211	1.0400	Not OK
2	1.0163	1.0188	1.1521	1.0074	1.0053	1.0387	1.0200	Not OK
3	1.0067	1.0041	1.1369	0.9981	0.9998	0.9866	1.0100	Not OK
4	1.0076	1.0028	1.1065	0.9996	0.9991	1.0297	1.0100	Not OK
5	1.0420	1.0170	1.6136	1.0115	0.9998	1.2603	1.0120	Not OK
6	1.1844	1.0798	1.1156	0.9962	0.9971	0.9772	1.0100	Not OK
7	1.1315	1.1922	0.3315	–	–	–	1.0070	Not OK
8	1.7078	1.8989	0.4407	–	–	–	1.0120	Not 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 05 Jan 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090123_095301_20090105_192833_20090107_192833` .

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 exceeds the limits. Additional checks are necessary.

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

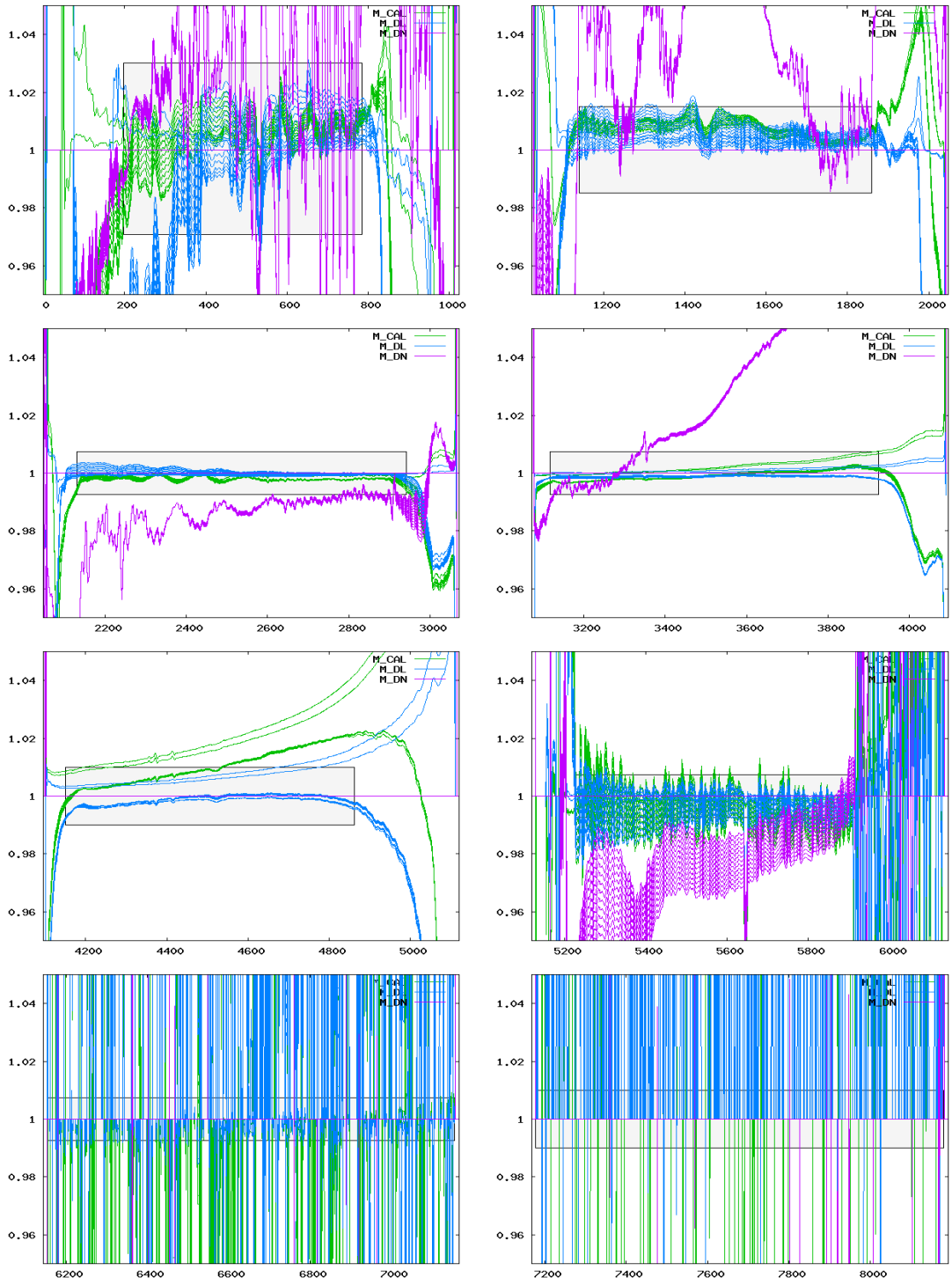

Figure 1: Ratio of delivered m-factors (06 Jan 2009– 19 Jan 2009) to the corresponding m-factor of the previous delivery day (05 Jan 2009). The grey boxes visualize the maximum ratio allowed.