NRT M-factor delivery document 14 Sep 2009

Klaus Bramstedt, ife Bremen

14 Sep 2009

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: 08 Sep 2009– 14 Sep 2009
- Prediction: 15 Sep 2009– 21 Sep 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
5cd30ab7bb41acee4c9405a0aa3ae495	SCI_MF1_AXNIFE20090914_215423_20090908_185656_20090910_185656
1b185ac7b5398f71a936e8c8f73cd748	SCI_MF1_AXNIFE20090914_215423_20090909_182519_20090911_182519
a58a41aebdeb9c280a41761123a6b352	SCI_MF1_AXNIFE20090914_215423_20090910_193418_20090912_193418
1cc6870382cbf8c19d65d0729428d1e9	SCI_MF1_AXNIFE20090914_215423_20090911_190241_20090913_190241
080186bcf10b72bd189320f9ef3230ad	SCI_MF1_AXNIFE20090914_215423_20090912_183104_20090914_183104
c020b141246f22cae2f94c95cf795fda	SCI_MF1_AXNIFE20090914_215423_20090913_194003_20090915_194003
f52e892bcf79ad5646ede4b04c22087f	SCI_MF1_AXNIFE20090914_215423_20090914_190826_20090916_190826
5617b7ed6e81d45ab254f3cadf7b9b7c	SCI_MF1_AXNIFE20090914_215423_20090915_183649_20090917_183649
984a6f20c5698f6c76b07e985a7fdaab	SCI_MF1_AXNIFE20090914_215423_20090916_194548_20090918_194548
cd7930336a7444a459e064b06b81f849	SCI_MF1_AXNIFE20090914_215423_20090917_191411_20090919_191411
ecf04a7da0b686a68011a3f01454b16b	SCI_MF1_AXNIFE20090914_215423_20090918_184234_20090920_184234
9c076f6a90bf0c597a2b350f8bdddc18	SCI_MF1_AXNIFE20090914_215423_20090919_181057_20090921_181057
84814a81cb52001dc7581ce705dc1167	SCI_MF1_AXNIFE20090914_215423_20090920_191955_20090922_191955
a0c59b5ab378548371812e71c1d6b82b	SCI_MF1_AXNIFE20090914_215423_20090921_184818_20091019_184818

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

validity identifier	M_CAL	M_DL	M_DN
20090908_185656_20090910_185656	meas.	meas.	interp.
20090909_182519_20090911_182519	meas.	meas.	interp.
20090910_193418_20090912_193418	meas.	meas.	interp.
20090911_190241_20090913_190241	meas.	meas.	meas.
20090912_183104_20090914_183104	meas.	meas.	pred.
20090913_194003_20090915_194003	meas.	meas.	pred.
20090914_190826_20090916_190826	meas.	pred.	pred.
20090915_183649_20090917_183649	pred.	pred.	pred.
20090916_194548_20090918_194548	pred.	pred.	pred.
20090917_191411_20090919_191411	pred.	pred.	pred.
20090918_184234_20090920_184234	pred.	pred.	pred.
20090919_181057_20090921_181057	pred.	pred.	pred.
20090920_191955_20090922_191955	pred.	pred.	pred.
20090921_184818_20091019_184818	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	1.0179	1.0152	1.0177	1.0042	1.0069	1.0072	1.0400	OK
2	1.0033	1.0076	1.0064	1.0016	1.0030	1.0032	1.0200	OK
3	1.0011	1.0019	1.0023	1.0005	1.0006	1.0013	1.0100	OK
4	1.0013	1.0012	1.0022	1.0003	1.0004	1.0013	1.0100	OK
5	1.0011	1.0012	1.0024	1.0003	1.0004	1.0014	1.0120	OK
6	1.0017	1.0020	1.0040	1.0006	1.0011	1.0017	1.0100	OK
7	1.0012	1.0017	1.0011	–	–	–	1.0070	OK
8	1.0014	1.0013	1.0030	–	–	–	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 07 Sep 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090907_215424_20090907_192833_20090909_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 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

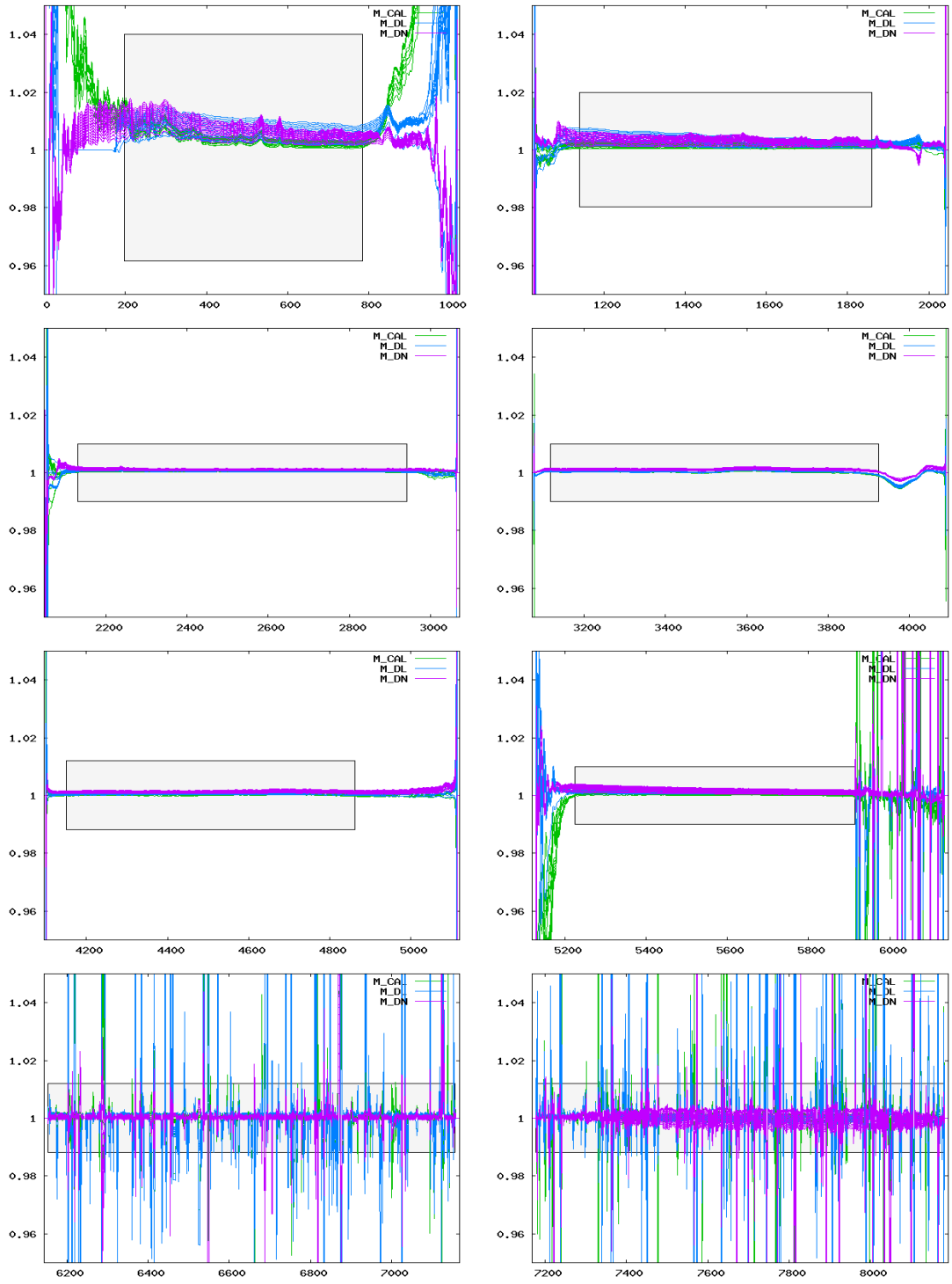

Figure 1: Ratio of delivered m-factors (08 Sep 2009– 21 Sep 2009) to the corresponding m-factor of the previous delivery day (07 Sep 2009). The grey boxes visualize the maximum ratio allowed.