NRT M-factor delivery document 18 Aug 2008

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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: 12 Aug 2008– 18 Aug 2008
- Prediction: 19 Aug 2008– 25 Aug 2008

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
e31dceb13bf2e9059d3807f925de50a8	SCI_MF1_AXNIFE20080818_215604_20080812_191704_20080814_191704
dd4d3e1435030544df1d87d0c135292f	SCI_MF1_AXNIFE20080818_215604_20080813_184527_20080815_184527
c791ab9cc80fb0185f73dfa3ac31c6c3	SCI_MF1_AXNIFE20080818_215604_20080814_181350_20080816_181350
da0f5e684b5e5e4d66f2b6156daa2d51	SCI_MF1_AXNIFE20080818_215604_20080815_192249_20080817_192249
14867127eeda810f536fb1f0b348adb5	SCI_MF1_AXNIFE20080818_215604_20080816_185112_20080818_185112
c2f5fd1d1d14e0fc4c1bdeecc7995d8e	SCI_MF1_AXNIFE20080818_215604_20080817_181935_20080819_181935
62f89089b7aff9fcb4d8c95766268679	SCI_MF1_AXNIFE20080818_215604_20080818_192834_20080820_192834
57c0ed0d4404891dee7d51d60b6488fa	SCI_MF1_AXNIFE20080818_215604_20080819_185657_20080821_185657
2ff625e09287abb3676952c43c84450d	SCI_MF1_AXNIFE20080818_215604_20080820_182520_20080822_182520
d7d8b17ff05867e2e8e6b35ad7489d4e	SCI_MF1_AXNIFE20080818_215604_20080821_193419_20080823_193419
bbece8cd3c50bc756b8fbca93f6f547f	SCI_MF1_AXNIFE20080818_215604_20080822_190242_20080824_190242
5e645e2580f27365e2ca40df8496856f	SCI_MF1_AXNIFE20080818_215604_20080823_183105_20080825_183105
297156540198b635e698f0934c16daff	SCI_MF1_AXNIFE20080818_215604_20080824_194003_20080826_194003
c182f12eb4a5393e7f22bee67998e447	SCI_MF1_AXNIFE20080818_215604_20080825_190826_20080922_190826

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

validity identifier	M_CAL	M_DL	M_DN
20080812_191704_20080814_191704	meas.	meas.	interp.
20080813_184527_20080815_184527	meas.	meas.	interp.
20080814_181350_20080816_181350	meas.	meas.	meas.
20080815_192249_20080817_192249	meas.	meas.	meas.
20080816_185112_20080818_185112	meas.	meas.	pred.
20080817_181935_20080819_181935	meas.	meas.	pred.
20080818_192834_20080820_192834	pred.	pred.	pred.
20080819_185657_20080821_185657	pred.	pred.	pred.
20080820_182520_20080822_182520	pred.	pred.	pred.
20080821_193419_20080823_193419	pred.	pred.	pred.
20080822_190242_20080824_190242	pred.	pred.	pred.
20080823_183105_20080825_183105	pred.	pred.	pred.
20080824_194003_20080826_194003	pred.	pred.	pred.
20080825_190826_20080922_190826	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	1.0049	1.0079	1.0040	1.0009	1.0030	1.0005	1.0400	OK
2	1.0021	1.0046	1.0025	1.0007	1.0017	1.0003	1.0200	OK
3	1.0007	1.0015	1.0014	1.0000	1.0003	0.9993	1.0100	OK
4	1.0004	1.0004	1.0018	1.0000	1.0002	0.9991	1.0100	OK
5	1.0006	1.0009	1.0024	1.0000	1.0003	0.9993	1.0120	OK
6	1.0010	1.0012	1.0015	0.9999	1.0006	1.0000	1.0100	OK
7	0.9989	1.0002	0.9992	–	–	–	1.0070	OK
8	1.0003	1.0020	1.0006	–	–	–	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 11 Aug 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080812_080515_20080811_194841_20080813_194841` .

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

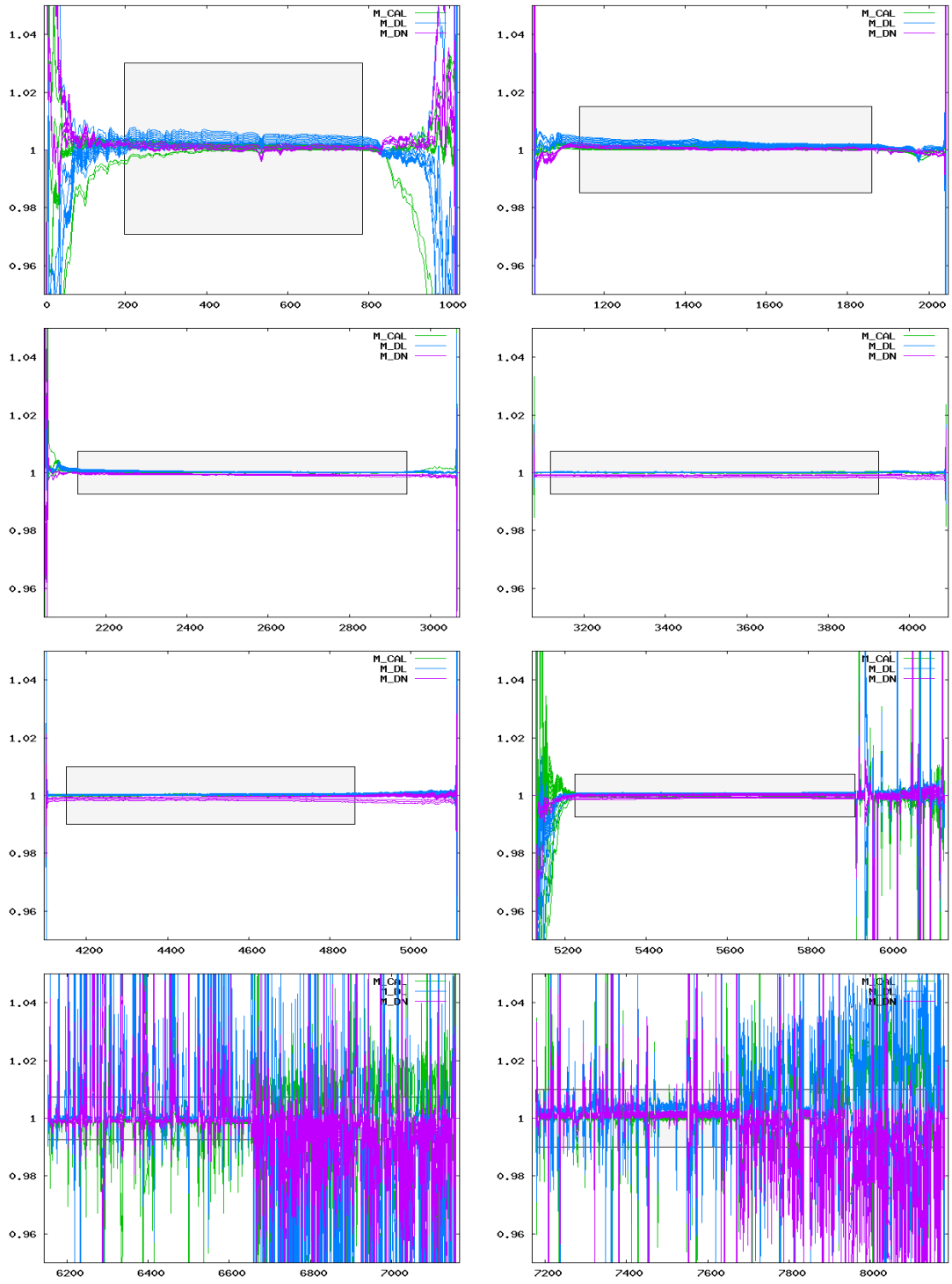

Figure 1: Ratio of delivered m-factors (12 Aug 2008– 25 Aug 2008) to the corresponding m-factor of the previous delivery day (11 Aug 2008). The grey boxes visualize the maximum ratio allowed.