NRT M-factor delivery document 25 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: 19 Aug 2008– 25 Aug 2008
- Prediction: 26 Aug 2008– 01 Sep 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
c0de3d8928e1c22a14f6d33cf29eff29	SCI_MF1_AXNIFE20080826_101919_20080819_185657_20080821_185657
7721bf85220ddffa7143d683ac7a0751	SCI_MF1_AXNIFE20080826_101919_20080820_182520_20080822_182520
dbe5290bcb0301e98500b7bad9e7cf7f	SCI_MF1_AXNIFE20080826_101919_20080821_193419_20080823_193419
e7e7a4b38d7c2f90ec23aaaf3c600885	SCI_MF1_AXNIFE20080826_101919_20080822_190242_20080824_190242
69c6b176e25da05252edf8c7073f0abd	SCI_MF1_AXNIFE20080826_101919_20080823_183105_20080825_183105
9cb1683c7cd3233c9a63aa1ca1248353	SCI_MF1_AXNIFE20080826_101919_20080824_194003_20080826_194003
9f2fbdab0623bca4093127cf3b6da7dd	SCI_MF1_AXNIFE20080826_101919_20080825_190826_20080827_190826
4184500bb9f86aedefa95601784b85dd	SCI_MF1_AXNIFE20080826_101919_20080826_183649_20080828_183649
842970b371f98aec7ffd1aaa6dfa5854	SCI_MF1_AXNIFE20080826_101919_20080827_194548_20080829_194548
dde0f4b0d01a2e53cb974a6218eb902c	SCI_MF1_AXNIFE20080826_101919_20080828_191411_20080830_191411
3a98a38b0e4ad121ec000f89e69b6570	SCI_MF1_AXNIFE20080826_101919_20080829_184234_20080831_184234
137c2b80bd0259bb834f5263c544ba6f	SCI_MF1_AXNIFE20080826_101919_20080830_181057_20080901_181057
1c4fbb1b529739ddb752a527ed2393c0	SCI_MF1_AXNIFE20080826_101919_20080831_191956_20080902_191956
62c3b6c5e00b20e97411dc8636034abd	SCI_MF1_AXNIFE20080826_101919_20080901_184819_20080929_184819

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

validity identifier	M_CAL	M_DL	M_DN
20080819_185657_20080821_185657	meas.	meas.	meas.
20080820_182520_20080822_182520	meas.	meas.	pred.
20080821_193419_20080823_193419	meas.	meas.	pred.
20080822_190242_20080824_190242	pred.	pred.	pred.
20080823_183105_20080825_183105	pred.	pred.	pred.
20080824_194003_20080826_194003	pred.	pred.	pred.
20080825_190826_20080827_190826	pred.	pred.	pred.
20080826_183649_20080828_183649	pred.	pred.	pred.
20080827_194548_20080829_194548	pred.	pred.	pred.
20080828_191411_20080830_191411	pred.	pred.	pred.
20080829_184234_20080831_184234	pred.	pred.	pred.
20080830_181057_20080901_181057	pred.	pred.	pred.
20080831_191956_20080902_191956	pred.	pred.	pred.
20080901_184819_20080929_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	1.0036	1.0161	1.0036	1.0013	1.0060	1.0014	1.0400	OK
2	1.0022	1.0072	1.0023	1.0010	1.0028	1.0010	1.0200	OK
3	1.0005	1.0017	1.0006	1.0002	1.0006	1.0003	1.0100	OK
4	1.0007	1.0008	1.0007	1.0003	1.0003	1.0004	1.0100	OK
5	1.0014	1.0030	1.0010	1.0007	1.0015	1.0005	1.0120	OK
6	1.0014	1.0034	1.0017	1.0006	1.0022	1.0009	1.0100	OK
7	1.0003	0.9999	1.0003	–	–	–	1.0070	OK
8	1.0017	1.0001	1.0008	–	–	–	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 18 Aug 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080818_215604_20080818_192834_20080820_192834` .

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

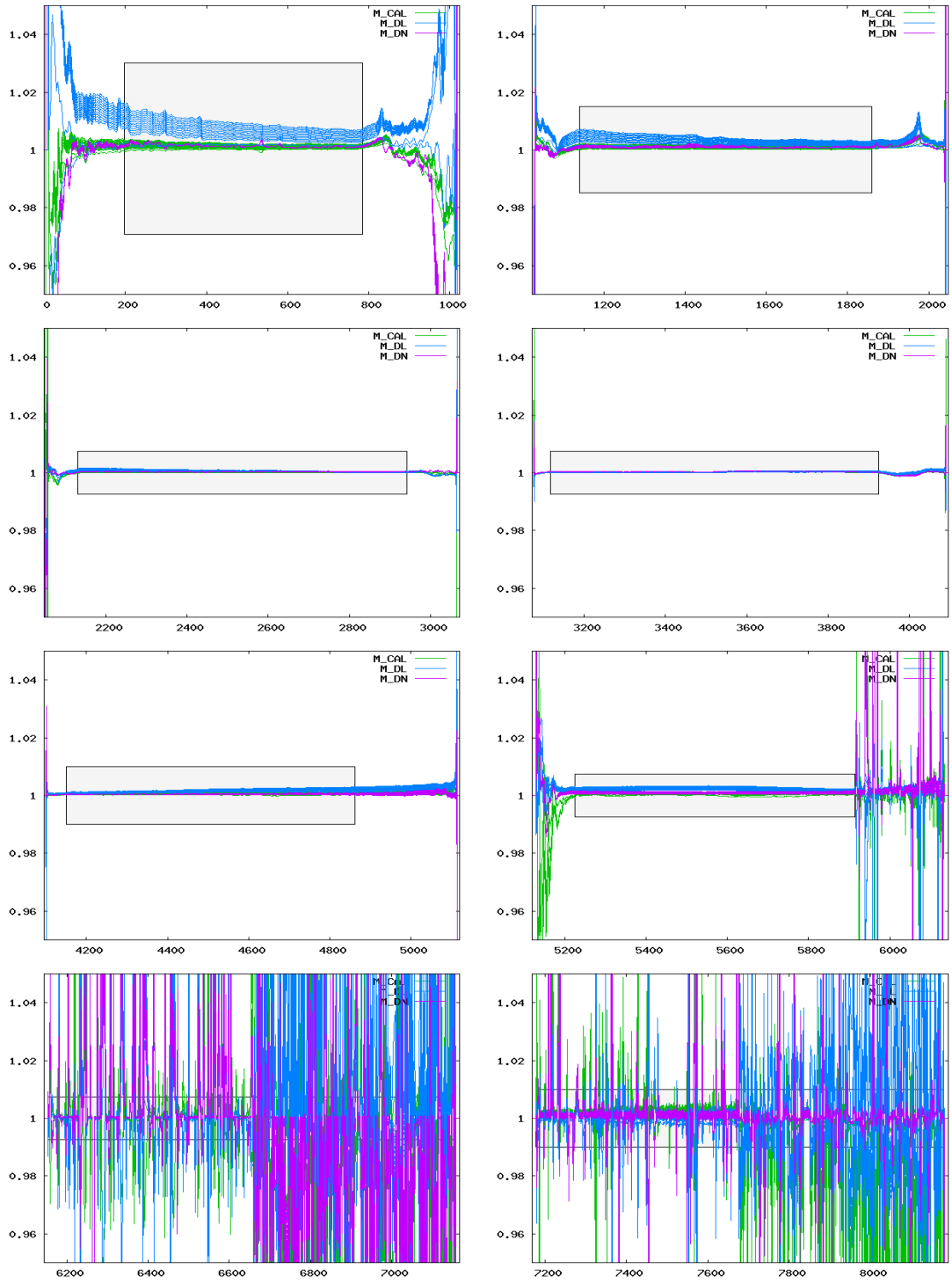

Figure 1: Ratio of delivered m-factors (19 Aug 2008– 01 Sep 2008) to the corresponding m-factor of the previous delivery day (18 Aug 2008). The grey boxes visualize the maximum ratio allowed.