NRT M-factor delivery document 01 Sep 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: 26 Aug 2008– 01 Sep 2008
- Prediction: 02 Sep 2008– 08 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
e63a4ac9b3f7b873d8dca4a8f53adcb9	SCI_MF1_AXNIFE20080901_215542_20080826_183649_20080828_183649
c6de1ba3d6caee1aa3e1e96e5b01abd0	SCI_MF1_AXNIFE20080901_215542_20080827_194548_20080829_194548
7a88b27e2714cb465c66fb9d4cbde1b3	SCI_MF1_AXNIFE20080901_215542_20080828_191411_20080830_191411
d43423376abc1174bab4bae37664a2f8	SCI_MF1_AXNIFE20080901_215542_20080829_184234_20080831_184234
ea12326e1c390c414deb31789982ea98	SCI_MF1_AXNIFE20080901_215542_20080830_181057_20080901_181057
6e5135c608177f6e416c29f34923661e	SCI_MF1_AXNIFE20080901_215542_20080831_191956_20080902_191956
3b95b7bed6bcb212167b1e7e690c245e	SCI_MF1_AXNIFE20080901_215542_20080901_184819_20080903_184819
dc90237497c2d495aab772dd009e9401	SCI_MF1_AXNIFE20080901_215542_20080902_181642_20080904_181642
2edc1065affccb343c44db81370ef106	SCI_MF1_AXNIFE20080901_215542_20080903_192541_20080905_192541
7c67a651b1644f5bea49c3c56642a8ec	SCI_MF1_AXNIFE20080901_215542_20080904_185404_20080906_185404
9efd9d9124f35b8cb19e134703c0a7dd	SCI_MF1_AXNIFE20080901_215542_20080905_182227_20080907_182227
69aee379cb094e094c9105206714cc73	SCI_MF1_AXNIFE20080901_215542_20080906_193126_20080908_193126
bc0d5124327f1928c3952df88b4d67b9	SCI_MF1_AXNIFE20080901_215542_20080907_185949_20080909_185949
7bda21645553d5873d0708cd496bf403	SCI_MF1_AXNIFE20080901_215542_20080908_182812_20081006_182812

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

validity identifier	M_CAL	M_DL	M_DN
20080826_183649_20080828_183649	interp.	interp.	interp.
20080827_194548_20080829_194548	meas.	meas.	meas.
20080828_191411_20080830_191411	meas.	meas.	interp.
20080829_184234_20080831_184234	meas.	meas.	interp.
20080830_181057_20080901_181057	meas.	meas.	interp.
20080831_191956_20080902_191956	meas.	meas.	meas.
20080901_184819_20080903_184819	pred.	pred.	pred.
20080902_181642_20080904_181642	pred.	pred.	pred.
20080903_192541_20080905_192541	pred.	pred.	pred.
20080904_185404_20080906_185404	pred.	pred.	pred.
20080905_182227_20080907_182227	pred.	pred.	pred.
20080906_193126_20080908_193126	pred.	pred.	pred.
20080907_185949_20080909_185949	pred.	pred.	pred.
20080908_182812_20081006_182812	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	1.0033	1.0066	1.0071	1.0008	1.0008	1.0023	1.0400	OK
2	1.0019	1.0026	1.0026	1.0006	1.0002	1.0010	1.0200	OK
3	1.0003	1.0009	1.0004	1.0000	0.9998	0.9999	1.0100	OK
4	1.0005	1.0006	1.0006	0.9999	0.9999	0.9999	1.0100	OK
5	1.0006	1.0016	1.0015	0.9998	0.9993	1.0000	1.0120	OK
6	1.0013	1.0017	1.0016	1.0000	0.9995	1.0005	1.0100	OK
7	0.9993	0.9997	1.0002	–	–	–	1.0070	OK
8	1.0004	1.0016	1.0013	–	–	–	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 25 Aug 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080826_101919_20080825_190826_20080827_190826` .

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

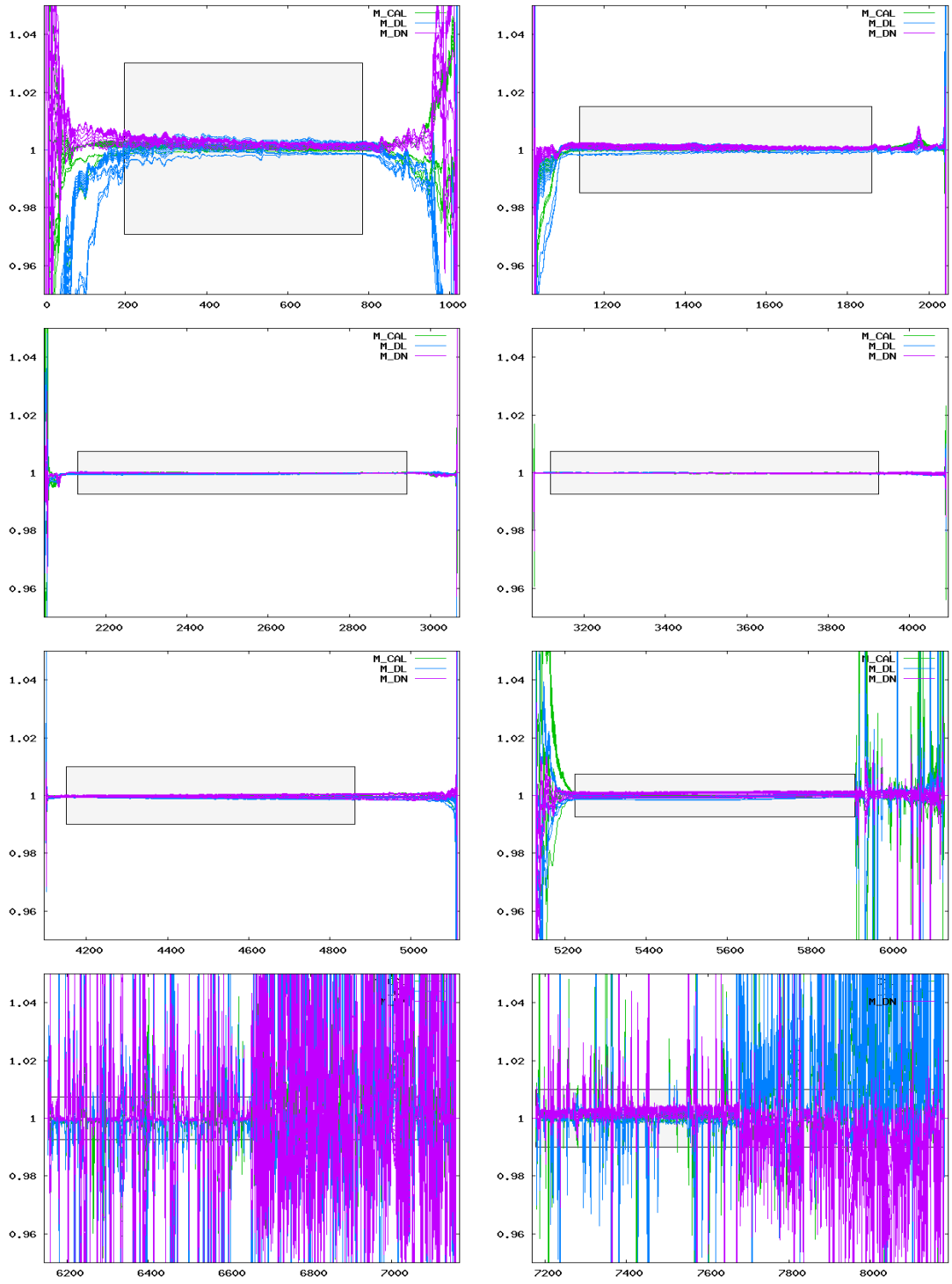

Figure 1: Ratio of delivered m-factors (26 Aug 2008– 08 Sep 2008) to the corresponding m-factor of the previous delivery day (25 Aug 2008). The grey boxes visualize the maximum ratio allowed.