NRT M-factor delivery document 30 Aug 2010

Klaus Bramstedt, ife Bremen

30 Aug 2010

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 07.01.

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: 24 Aug 2010– 30 Aug 2010
- Prediction: 31 Aug 2010– 06 Sep 2010

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
62c5696b1c7a36b46bec02d3e6cb1fd5	SCI_MF1_AXNIFE20100831_034245_20100824_185655_20100826_185655
d64758f501d4ca30d0c5dee3e5851866	SCI_MF1_AXNIFE20100831_034245_20100825_182518_20100827_182518
f89d2853839d7de9f07c04fb1b0adc53	SCI_MF1_AXNIFE20100831_034245_20100826_193417_20100828_193417
9b3aea1ccf9c12d3da3cad70846a38a2	SCI_MF1_AXNIFE20100831_034245_20100827_190240_20100829_190240
7e99777f3747d44badccbb565971c73c	SCI_MF1_AXNIFE20100831_034245_20100828_183103_20100830_183103
703b2a36dbfc866c015cf8ce1b0da763	SCI_MF1_AXNIFE20100831_034245_20100829_194002_20100831_194002
362e43c9d2fcae0ecdcbc97be7a05a9f	SCI_MF1_AXNIFE20100831_034245_20100830_190825_20100901_190825
63fb5a29c36d64cac45ea91e5f1dd8c8	SCI_MF1_AXNIFE20100831_034245_20100831_183648_20100902_183648
9d94f27ad94d77067a254cefa1c97d19	SCI_MF1_AXNIFE20100831_034245_20100901_194547_20100903_194547
5bf78b49878bbf1c18ca69b57de90613	SCI_MF1_AXNIFE20100831_034245_20100902_191410_20100904_191410
d3b28a3f36a9a79490e817717685f0a7	SCI_MF1_AXNIFE20100831_034245_20100903_184233_20100905_184233
732959f8c09fdc7f775c54ece5455959	SCI_MF1_AXNIFE20100831_034245_20100904_181056_20100906_181056
b0ec561794f58ec00693d12ebbf2a812	SCI_MF1_AXNIFE20100831_034245_20100905_191955_20100907_191955
a9e9ac1a7cc4df441a714b6c0bbbfcb9	SCI_MF1_AXNIFE20100831_034245_20100906_184818_20101004_184818

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

validity identifier	M_CAL	M_DL	M_DN
20100824_185655_20100826_185655	meas.	meas.	meas.
20100825_182518_20100827_182518	meas.	meas.	interp.
20100826_193417_20100828_193417	meas.	meas.	interp.
20100827_190240_20100829_190240	meas.	meas.	interp.
20100828_183103_20100830_183103	meas.	meas.	meas.
20100829_194002_20100831_194002	meas.	meas.	pred.
20100830_190825_20100901_190825	meas.	meas.	pred.
20100831_183648_20100902_183648	pred.	pred.	pred.
20100901_194547_20100903_194547	pred.	pred.	pred.
20100902_191410_20100904_191410	pred.	pred.	pred.
20100903_184233_20100905_184233	pred.	pred.	pred.
20100904_181056_20100906_181056	pred.	pred.	pred.
20100905_191955_20100907_191955	pred.	pred.	pred.
20100906_184818_20101004_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	1.0122	1.0068	1.0060	1.0011	1.0021	1.0021	1.0400	OK
2	1.0024	1.0051	1.0034	1.0011	1.0018	1.0016	1.0200	OK
3	1.0008	1.0015	1.0012	1.0004	1.0002	1.0003	1.0100	OK
4	1.0007	1.0005	1.0015	1.0004	1.0001	1.0004	1.0100	OK
5	1.0020	1.0020	1.0028	1.0007	1.0002	1.0010	1.0120	OK
6	1.0015	1.0012	1.0020	1.0007	1.0002	1.0011	1.0100	OK
7	1.0014	1.0010	1.0009	–	–	–	1.0070	OK
8	1.0068	1.0079	1.0057	–	–	–	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 23 Aug 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100824_034241_20100823_192832_20100825_192832` .

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

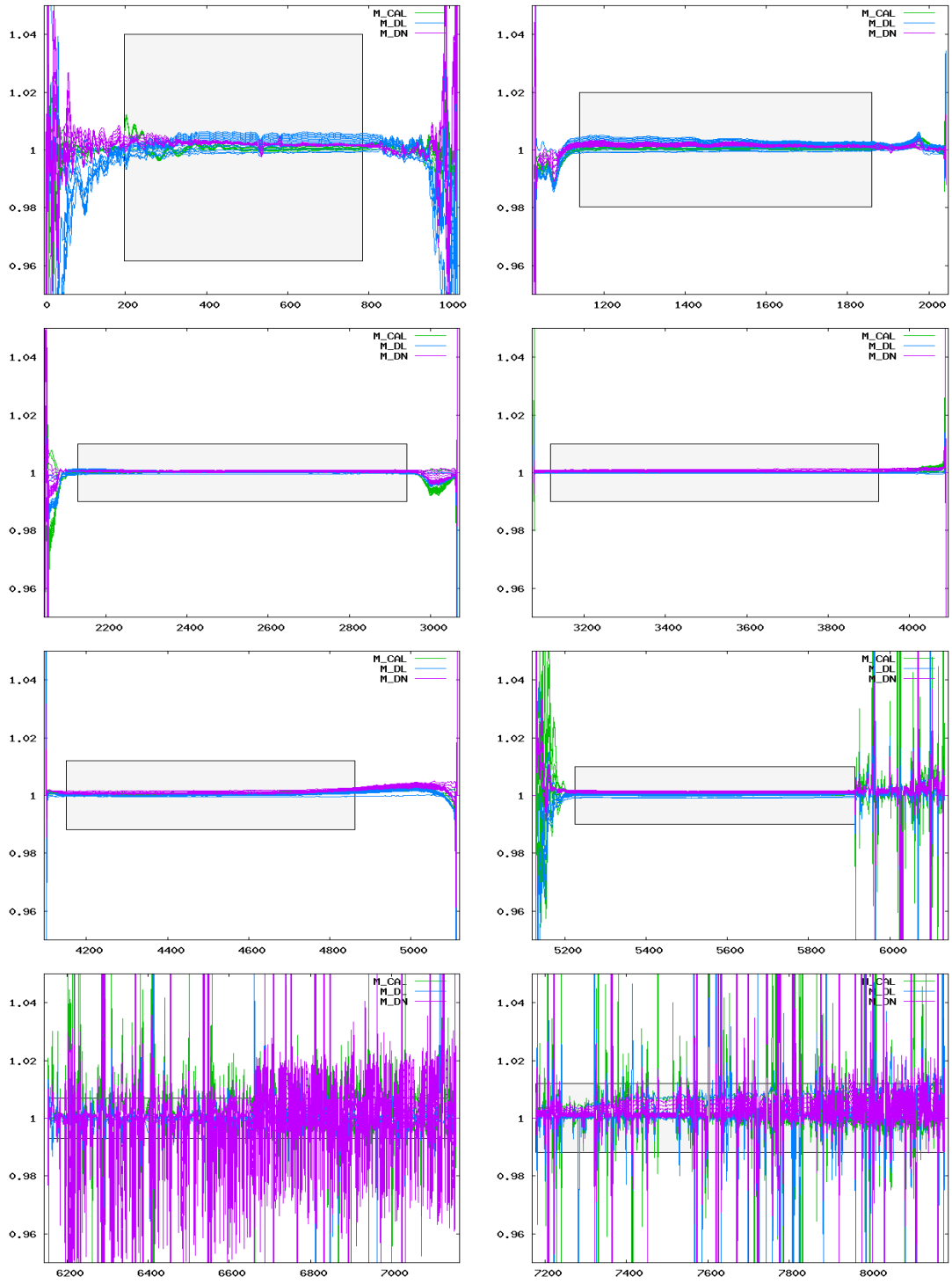

Figure 1: Ratio of delivered m-factors (24 Aug 2010– 06 Sep 2010) to the corresponding m-factor of the previous delivery day (23 Aug 2010). The grey boxes visualize the maximum ratio allowed.