NRT M-factor delivery document 08 Nov 2010

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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 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: 02 Nov 2010– 08 Nov 2010
- Prediction: 09 Nov 2010– 15 Nov 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
071063be55c09ad56ffb25a52b295970	SCI_MF1_AXNIFE20101109_135846_20101102_062734_20101104_062734
d1e3c1834fe69790e37bc4c4eafbe2db	SCI_MF1_AXNIFE20101109_135846_20101103_055049_20101105_055049
938b259ea510e739f4caa4215ee3e7e5	SCI_MF1_AXNIFE20101109_135846_20101104_065417_20101106_065417
2f2e51db4f6eec5c6dbe1d8340e76455	SCI_MF1_AXNIFE20101109_135846_20101105_061732_20101107_061732
342657c0e021188e4ee8af06eddf6958	SCI_MF1_AXNIFE20101109_135846_20101106_054046_20101108_054046
01b9b835f4aec7f3239dc87dc0009e34	SCI_MF1_AXNIFE20101109_135846_20101107_064415_20101205_064415
cd77c88dd80a66116913b57fb1adb7b7	SCI_MF1_AXNIFE20101109_135846_20101108_192920_20101110_192920
6d253578468e73b3bf1d3fcfc199cec0	SCI_MF1_AXNIFE20101109_135846_20101109_185235_20101111_185235
3158bbe9c7f17c82c42da57ec6407c58	SCI_MF1_AXNIFE20101109_135846_20101110_181549_20101112_181549
a6f9f6f3195780d6baa42b7e9431427c	SCI_MF1_AXNIFE20101109_135846_20101111_191918_20101113_191918
ff00bdd2c8fe3d55f345b2ad01c1a7f4	SCI_MF1_AXNIFE20101109_135846_20101112_184232_20101114_184232
b09b83f3e2eb7eb630ca9ac985e522ac	SCI_MF1_AXNIFE20101109_135846_20101113_194601_20101115_194601
5794294c5f8f5b9202bf7170cede8249	SCI_MF1_AXNIFE20101109_135846_20101114_190915_20101116_190915
0bec0902f4766668bbb3f96ae0d2f36a	SCI_MF1_AXNIFE20101109_135846_20101115_183230_20101213_183230

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

validity identifier	M_CAL	M_DL	M_DN
20101102_062734_20101104_062734	meas.	meas.	pred.
20101103_055049_20101105_055049	meas.	meas.	pred.
20101104_065417_20101106_065417	interp.	meas.	pred.
20101105_061732_20101107_061732	interp.	interp.	pred.
20101106_054046_20101108_054046	meas.	interp.	pred.
20101107_064415_20101205_064415	meas.	meas.	pred.
20101108_192920_20101110_192920	meas.	meas.	pred.
20101109_185235_20101111_185235	pred.	pred.	pred.
20101110_181549_20101112_181549	pred.	pred.	pred.
20101111_191918_20101113_191918	pred.	pred.	pred.
20101112_184232_20101114_184232	pred.	pred.	pred.
20101113_194601_20101115_194601	pred.	pred.	pred.
20101114_190915_20101116_190915	pred.	pred.	pred.
20101115_183230_20101213_183230	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	1.0211	1.0401	1.0103	1.0015	1.0095	1.0038	1.0500	OK
2	1.0020	1.0070	1.0072	1.0014	1.0030	1.0018	1.0200	OK
3	1.0017	1.0030	1.0016	1.0012	1.0012	0.9996	1.0100	OK
4	1.0015	1.0016	1.0017	1.0013	1.0010	0.9992	1.0100	OK
5	1.0017	1.0022	1.0028	1.0013	1.0014	0.9989	1.0120	OK
6	1.0029	1.0050	1.0007	1.0019	1.0033	0.9998	1.0100	OK
7	1.0022	1.0051	1.0000	–	–	–	1.0070	OK
8	1.0031	1.0038	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 01 Nov 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20101102_092627_20101101_052406_20101103_052406` .

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

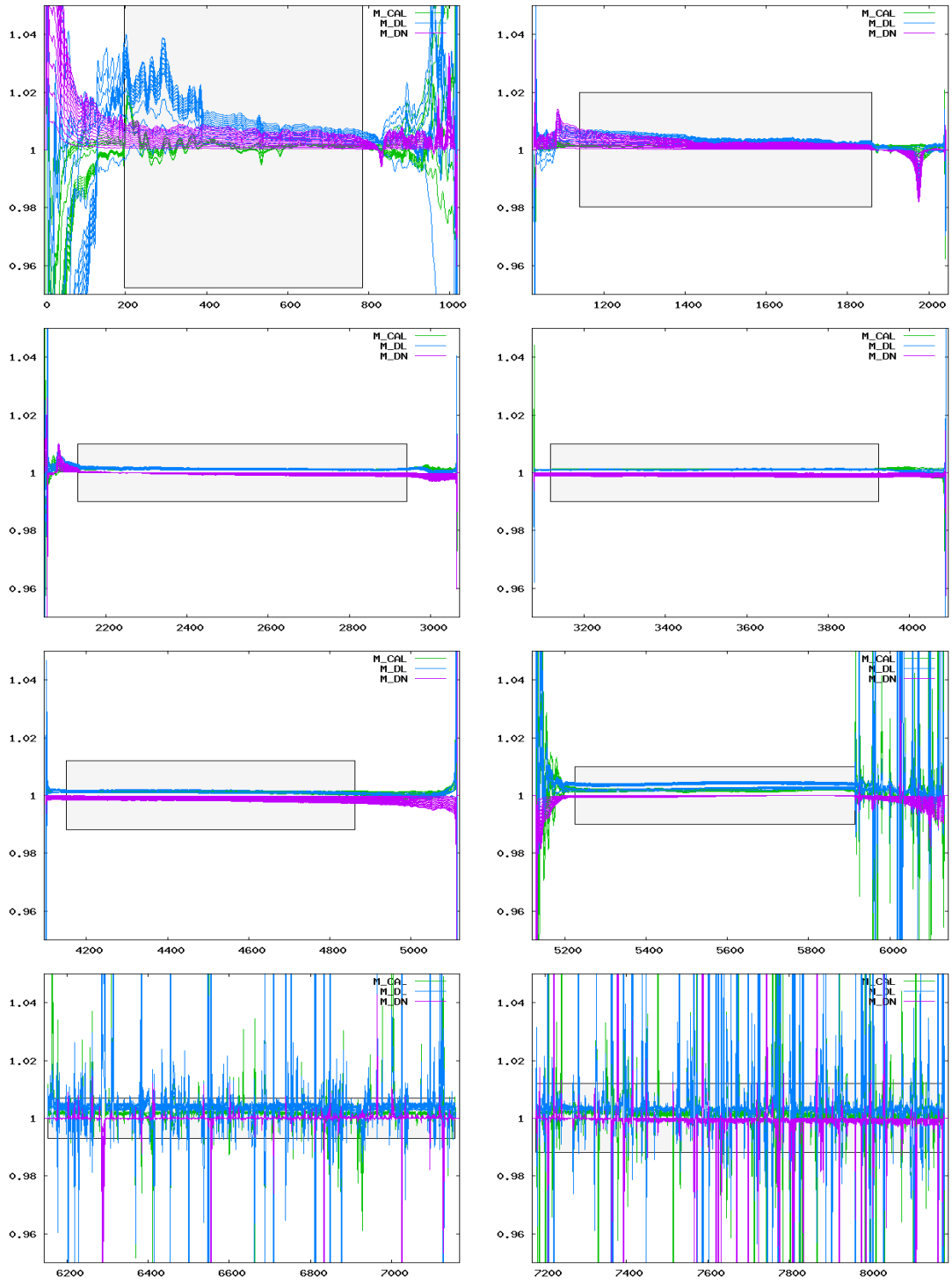

Figure 1: Ratio of delivered m-factors (02 Nov 2010– 15 Nov 2010) to the corresponding m-factor of the previous delivery day (01 Nov 2010). The grey boxes visualize the maximum ratio allowed.