NRT M-factor delivery document 20 Jun 2011

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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: 14 Jun 2011– 20 Jun 2011
- Prediction: 21 Jun 2011– 27 Jun 2011

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
6dc106ab1cdda16682524d48923a2796	SCI_MF1_AXNIFE20110621_075135_20110614_193441_20110616_193441
b42e18aa89f65ba5a0d01a6d891c000b	SCI_MF1_AXNIFE20110621_075135_20110615_185756_20110617_185756
2b92a3597f50759e8c391ddfd2a00051	SCI_MF1_AXNIFE20110621_075135_20110616_182110_20110618_182110
7c5643f5798f7fd3f367c747a5133c6b	SCI_MF1_AXNIFE20110621_075135_20110617_192439_20110619_192439
d27ae414b5b7be0438f6e4d5c699d610	SCI_MF1_AXNIFE20110621_075135_20110618_184753_20110620_184753
c5d937de0570f65613c68567a459752d	SCI_MF1_AXNIFE20110621_075135_20110619_181108_20110621_181108
98ae63948afa9ded7f8ca7d7dce24cfa	SCI_MF1_AXNIFE20110621_075135_20110620_191436_20110622_191436
fec93ee09127bb8be53a589c4516982a	SCI_MF1_AXNIFE20110621_075135_20110621_183751_20110623_183751
49e5028680e707cf3ecbb6f008995c72	SCI_MF1_AXNIFE20110621_075135_20110622_194119_20110624_194119
ad301cdbf26816174b1fc90bad84dd13	SCI_MF1_AXNIFE20110621_075135_20110623_190434_20110625_190434
a9bc1cd1f895ac6540e89b24aca28aff	SCI_MF1_AXNIFE20110621_075135_20110624_182748_20110626_182748
3c94567f547d03ebc6935fc0bc8dcd3d	SCI_MF1_AXNIFE20110621_075135_20110625_193117_20110627_193117
76ec26dd69263b9bf4b294b911977f63	SCI_MF1_AXNIFE20110621_075135_20110626_185431_20110628_185431
224eaf26bfd4d211c78133a18dd37c4d	SCI_MF1_AXNIFE20110621_075135_20110627_181746_20110725_181746

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

validity identifier	M_CAL	M_DL	M_DN
20110614_193441_20110616_193441	meas.	meas.	interp.
20110615_185756_20110617_185756	meas.	meas.	meas.
20110616_182110_20110618_182110	meas.	meas.	pred.
20110617_192439_20110619_192439	meas.	meas.	pred.
20110618_184753_20110620_184753	meas.	meas.	pred.
20110619_181108_20110621_181108	meas.	meas.	pred.
20110620_191436_20110622_191436	meas.	meas.	pred.
20110621_183751_20110623_183751	pred.	pred.	pred.
20110622_194119_20110624_194119	pred.	pred.	pred.
20110623_190434_20110625_190434	pred.	pred.	pred.
20110624_182748_20110626_182748	pred.	pred.	pred.
20110625_193117_20110627_193117	pred.	pred.	pred.
20110626_185431_20110628_185431	pred.	pred.	pred.
20110627_181746_20110725_181746	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	1.0143	1.0172	1.0155	0.9976	0.9957	0.9951	1.0400	OK
2	1.0024	1.0043	1.0025	1.0000	0.9995	0.9994	1.0200	OK
3	1.0018	1.0014	1.0014	1.0001	1.0003	0.9992	1.0100	OK
4	1.0016	1.0007	1.0016	1.0001	1.0002	0.9988	1.0100	OK
5	1.0020	1.0015	1.0010	1.0003	1.0003	0.9996	1.0120	OK
6	1.0020	1.0018	1.0006	1.0007	1.0005	1.0002	1.0100	OK
7	1.0017	1.0017	1.0008	–	–	–	1.0070	OK
8	1.0014	1.0018	1.0010	–	–	–	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 13 Jun 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20110614_034307_20110613_183113_20110615_183113` .

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

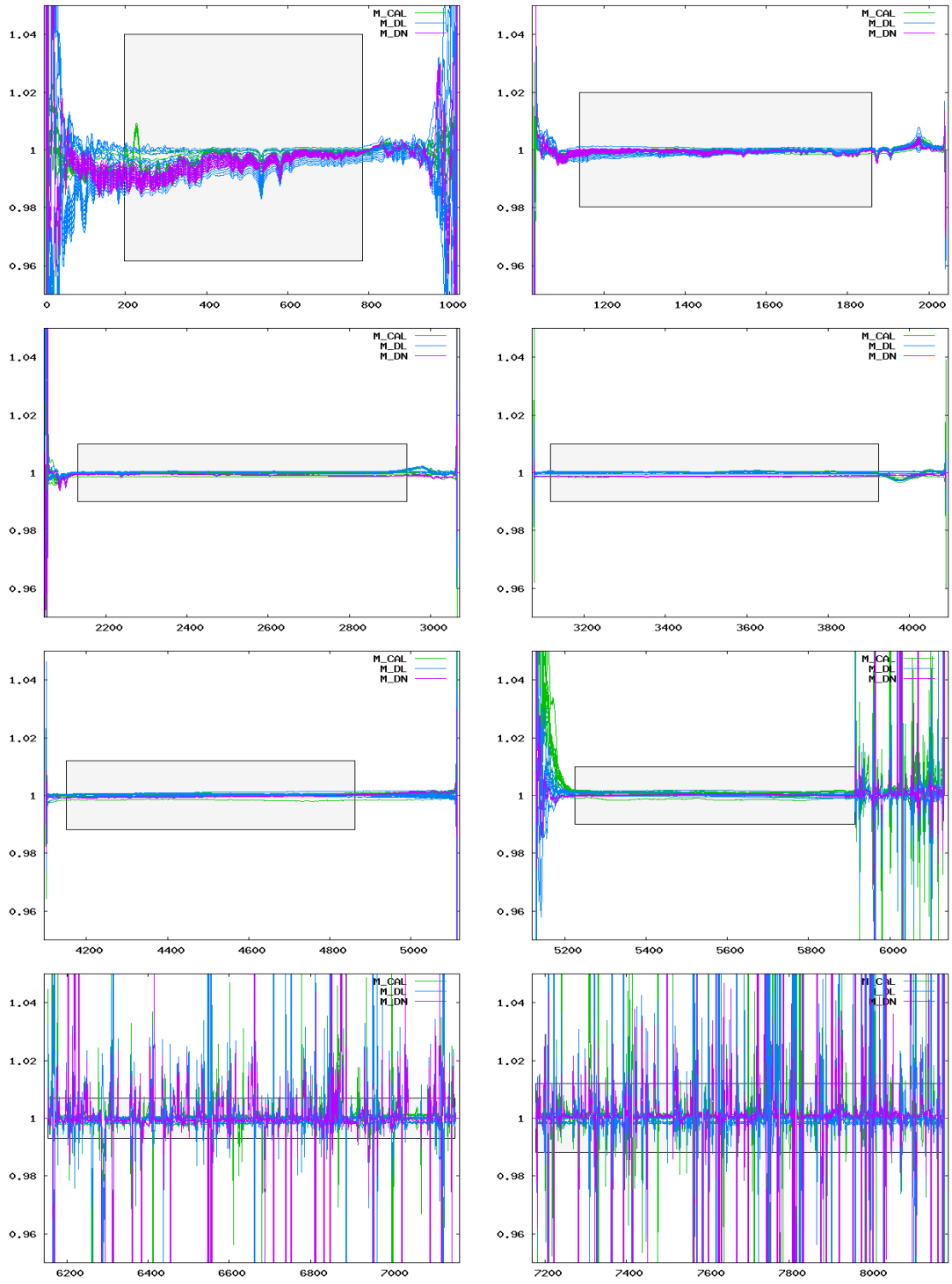

Figure 1: Ratio of delivered m-factors (14 Jun 2011– 27 Jun 2011) to the corresponding m-factor of the previous delivery day (13 Jun 2011). The grey boxes visualize the maximum ratio allowed.