NRT M-factor delivery document 19 Dec 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: 13 Dec 2011– 19 Dec 2011
- Prediction: 20 Dec 2011– 26 Dec 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
50298785ac38e019c8a850044ddb0504	SCI_MF1_AXNIFE20111220_080227_20111213_182005_20111215_182005
1ebe321ec38f18f6d962ca2e729be100	SCI_MF1_AXNIFE20111220_080227_20111214_192333_20111216_192333
21a03dc772cd938367f3205479e56903	SCI_MF1_AXNIFE20111220_080227_20111215_184648_20111217_184648
c7b66334838e863bfc4eb09b5ea13849	SCI_MF1_AXNIFE20111220_080227_20111216_181002_20111218_181002
c87c21530e1365589e298087408eae09	SCI_MF1_AXNIFE20111220_080227_20111217_191331_20111219_191331
af2347d29bd93abd49fe32907b6d7f12	SCI_MF1_AXNIFE20111220_080227_20111218_183645_20111220_183645
59af6cfbf7e768ba6e5fd38891eec077	SCI_MF1_AXNIFE20111220_080227_20111219_194014_20111221_194014
dc7e963e802a1dc98b051447547e0b60	SCI_MF1_AXNIFE20111220_080227_20111220_190328_20111222_190328
a2dafc5fdd69184b64b2194c4075a942	SCI_MF1_AXNIFE20111220_080227_20111221_182643_20111223_182643
30941e60e093e5c7b0dd4c1a9a356269	SCI_MF1_AXNIFE20111220_080227_20111222_193011_20111224_193011
9b9446c56702dcbda40be5f07cfcaace	SCI_MF1_AXNIFE20111220_080227_20111223_185326_20111225_185326
1482d0a0d5655259c1548e594ded777c	SCI_MF1_AXNIFE20111220_080227_20111224_181640_20111226_181640
ec1ba15e5d670cd04bcf36452d024856	SCI_MF1_AXNIFE20111220_080227_20111225_192009_20111227_192009
a47c43929000bef969fcd81e6ca1efdc	SCI_MF1_AXNIFE20111220_080227_20111226_184323_20120123_184323

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

validity identifier	M_CAL	M_DL	M_DN
20111213_182005_20111215_182005	meas.	meas.	meas.
20111214_192333_20111216_192333	meas.	meas.	interp.
20111215_184648_20111217_184648	meas.	meas.	interp.
20111216_181002_20111218_181002	meas.	meas.	interp.
20111217_191331_20111219_191331	meas.	meas.	meas.
20111218_183645_20111220_183645	meas.	meas.	pred.
20111219_194014_20111221_194014	pred.	meas.	pred.
20111220_190328_20111222_190328	pred.	pred.	pred.
20111221_182643_20111223_182643	pred.	pred.	pred.
20111222_193011_20111224_193011	pred.	pred.	pred.
20111223_185326_20111225_185326	pred.	pred.	pred.
20111224_181640_20111226_181640	pred.	pred.	pred.
20111225_192009_20111227_192009	pred.	pred.	pred.
20111226_184323_20120123_184323	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	1.0053	1.1227	1.0892	0.9986	0.9642	0.9810	1.1300	OK
2	1.0010	1.0417	1.0286	1.0003	0.9882	0.9943	1.0500	OK
3	1.0005	1.0116	1.0078	0.9999	0.9974	0.9999	1.0200	OK
4	1.0010	1.0019	1.0035	1.0000	0.9994	1.0016	1.0100	OK
5	1.0017	1.0013	1.0032	1.0004	0.9994	1.0020	1.0120	OK
6	1.0009	1.0017	1.0028	1.0002	0.9991	1.0016	1.0100	OK
7	1.0005	1.0008	1.0022	–	–	–	1.0070	OK
8	1.0042	1.0055	1.0062	–	–	–	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 12 Dec 2011, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20111213_081206_20111212_185650_20111214_185650` .

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

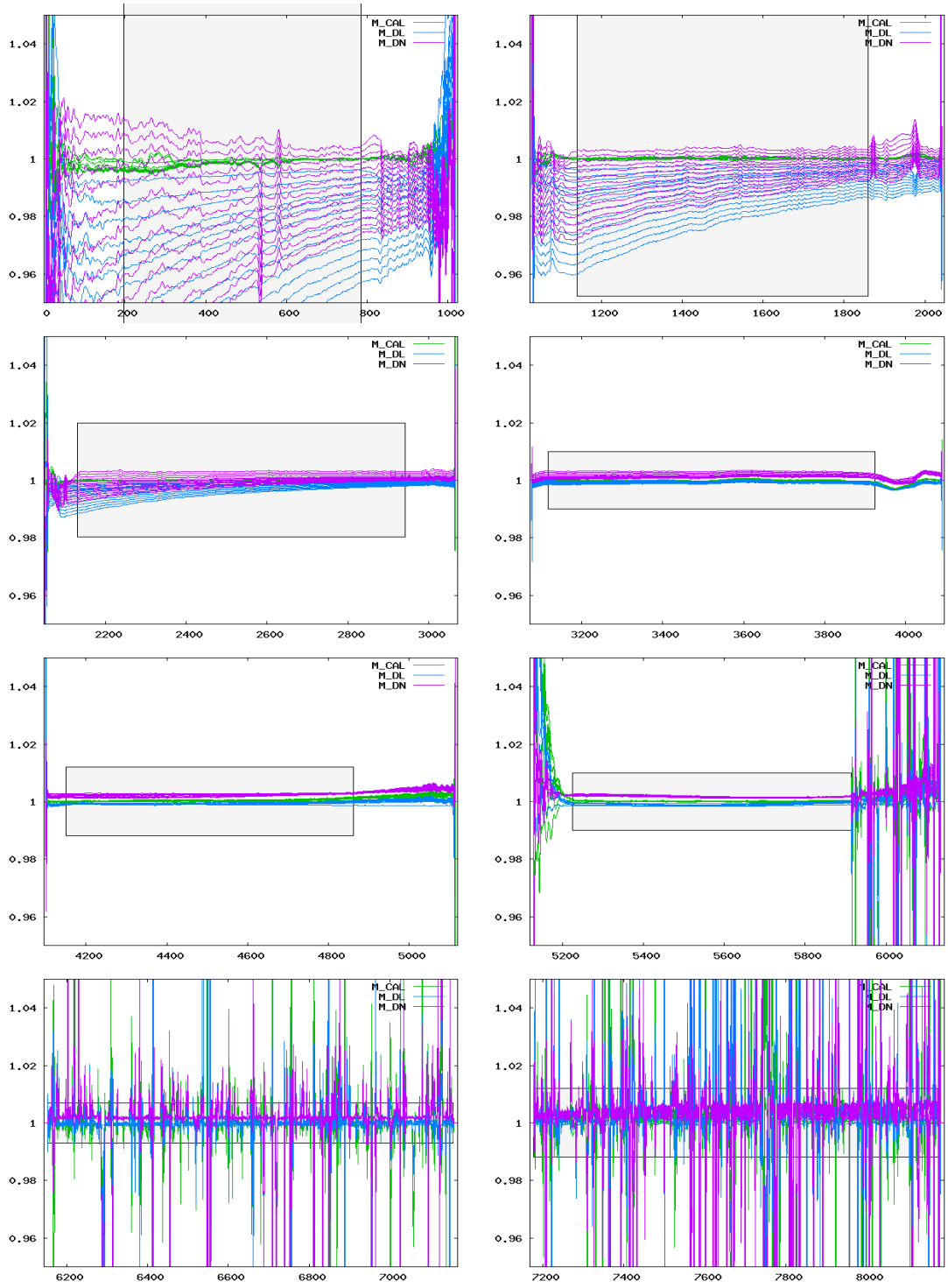

Figure 1: Ratio of delivered m-factors (13 Dec 2011– 26 Dec 2011) to the corresponding m-factor of the previous delivery day (12 Dec 2011). The grey boxes visualize the maximum ratio allowed.