

NRT M-factor delivery document

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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: 17 Jan 2012– 23 Jan 2012
- Prediction: 24 Jan 2012– 30 Jan 2012

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
72f20c164b36ec86b31e977dabfbaf4b	SCI_MF1_AXNIFE20120124_095053_20120117_183634_20120119_183634
2a0c5171b3899fb88fe5944dd64a67ab	SCI_MF1_AXNIFE20120124_095053_20120118_194003_20120120_194003
5a08b24ed9895f9cceddb7b4955da39a5	SCI_MF1_AXNIFE20120124_095053_20120119_190317_20120121_190317
64d096a8d28ea8e4d53374362d07e02c	SCI_MF1_AXNIFE20120124_095053_20120120_182632_20120122_182632
83144bb06e2e37a537499cd71b9fdb36	SCI_MF1_AXNIFE20120124_095053_20120121_193000_20120123_193000
19454e0d6c18bbcd85b82c6445bce7e0	SCI_MF1_AXNIFE20120124_095053_20120122_185315_20120124_185315
652437e7963f5932e7207257b932d64e	SCI_MF1_AXNIFE20120124_095053_20120123_181629_20120125_181629
05af0845706b5cda6c6923edab0c951c	SCI_MF1_AXNIFE20120124_095053_20120124_191958_20120126_191958
a72d297dc60ae6857afb78b9bd3129ce	SCI_MF1_AXNIFE20120124_095053_20120125_184312_20120127_184312
110770c4e6036843acc95e89288535fe	SCI_MF1_AXNIFE20120124_095053_20120126_180627_20120128_180627
af1ec8ed3f6ebab941633eed4de63453	SCI_MF1_AXNIFE20120124_095053_20120127_190955_20120129_190955
21f217d5abc328581b330c52a783552d	SCI_MF1_AXNIFE20120124_095053_20120128_183310_20120130_183310
3d11d5f1435fe3139f9313bfab6c24f5	SCI_MF1_AXNIFE20120124_095053_20120129_193638_20120131_193638
ef15064e0f61ec4f2a80c7429a72c99	SCI_MF1_AXNIFE20120124_095053_20120130_185953_20120227_185953

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

validity identifier	M.CAL	M.DL	M.DN
20120117_183634_20120119_183634	meas.	meas.	meas.
20120118_194003_20120120_194003	meas.	meas.	meas.
20120119_190317_20120121_190317	meas.	meas.	meas.
20120120_182632_20120122_182632	meas.	meas.	interp.
20120121_193000_20120123_193000	meas.	meas.	meas.
20120122_185315_20120124_185315	meas.	meas.	meas.
20120123_181629_20120125_181629	pred.	meas.	pred.
20120124_191958_20120126_191958	pred.	pred.	pred.
20120125_184312_20120127_184312	pred.	pred.	pred.
20120126_180627_20120128_180627	pred.	pred.	pred.
20120127_190955_20120129_190955	pred.	pred.	pred.
20120128_183310_20120130_183310	pred.	pred.	pred.
20120129_193638_20120131_193638	pred.	pred.	pred.
20120130_185953_20120227_185953	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. SCIA-MACHY 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			limit	status
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN		
1	1.0053	1.0642	1.0313	0.9999	0.9790	0.9906	1.0700	OK
2	1.0017	1.0223	1.0146	1.0009	0.9932	0.9965	1.0300	OK
3	1.0009	1.0086	1.0065	1.0002	0.9982	0.9994	1.0100	OK
4	1.0007	1.0016	1.0023	1.0000	0.9995	1.0008	1.0100	OK
5	1.0016	1.0026	1.0024	1.0005	1.0005	1.0013	1.0120	OK
6	1.0018	1.0008	1.0017	0.9996	1.0004	1.0007	1.0100	OK
7	1.0011	1.0008	1.0018	–	–	–	1.0070	OK
8	1.0041	1.0043	1.0056	–	–	–	1.0120	OK

certain limit l :

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \quad \text{with} \quad M_{ratio,i} < l \quad \text{and} \quad \frac{1}{M_{ratio,i}} < l \quad (1)$$

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 16 Jan 2012, therefore M_{t_0} is taken from the m-factor file `SCI MF1 AXNIFE20120124.090858_20120116_191320_20120118_191320` .

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 Slijkhuis, 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

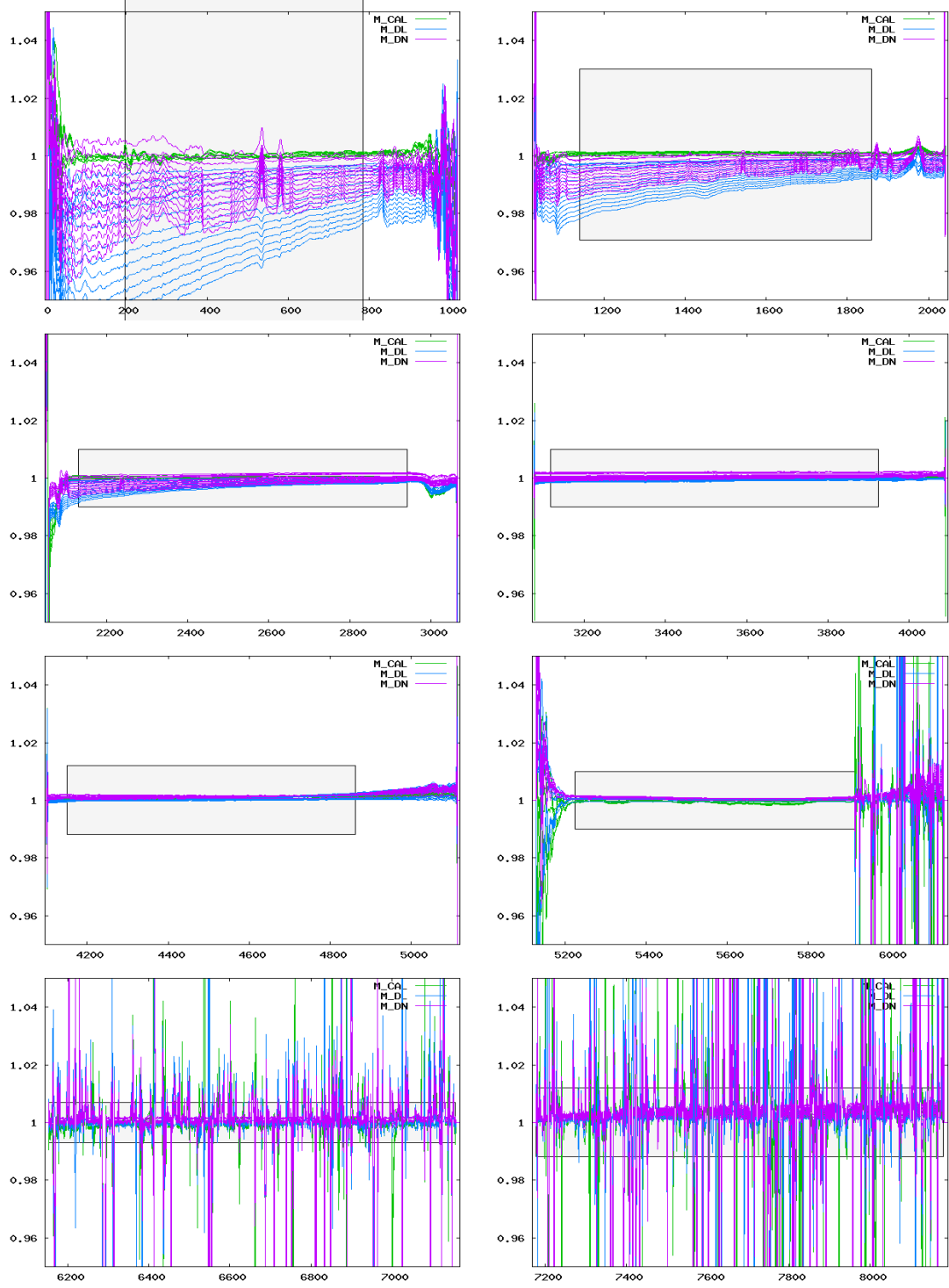


Figure 1: Ratio of delivered m-factors (17 Jan 2012– 30 Jan 2012) to the corresponding m-factor of the previous delivery day (16 Jan 2012). The grey boxes visualize the maximum ratio allowed.