

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 06.01.

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: 06 Oct 2009– 12 Oct 2009
- Prediction: 13 Oct 2009– 19 Oct 2009

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
1dbe91e3a11c879dd37cd0500d20e872	SCI_MF1_AXNIFE20091012_215420_20091006_191703_20091008_191703
cd03951beb57a75a5059e4739171931	SCI_MF1_AXNIFE20091012_215420_20091007_184526_20091009_184526
1d9ff7f6a7a4598987987d720cb38291	SCI_MF1_AXNIFE20091012_215420_20091008_181349_20091010_181349
87d2b13127029e6a7b3188e27eb48374	SCI_MF1_AXNIFE20091012_215420_20091009_192248_20091011_192248
e75c06a8fc30f44c01986f932659688e	SCI_MF1_AXNIFE20091012_215420_20091010_185111_20091012_185111
68756397ef0b032bd318c28b1f546a2b	SCI_MF1_AXNIFE20091012_215420_20091011_181934_20091013_181934
b70ebb2b12bd63c6bbe8a8440ce1bb8	SCI_MF1_AXNIFE20091012_215420_20091012_192833_20091014_192833
36a2a2294f22dbed522b5d90868c1875	SCI_MF1_AXNIFE20091012_215420_20091013_185656_20091015_185656
c89cbaf8c37427262a00d0e19ae09831	SCI_MF1_AXNIFE20091012_215420_20091014_182519_20091016_182519
ad5c9d4aceac212c40fb1ad8a39e12ed	SCI_MF1_AXNIFE20091012_215420_20091015_193418_20091017_193418
bc8d8287309289ed3eb6e4b1e2c2e4a1	SCI_MF1_AXNIFE20091012_215420_20091016_190241_20091018_190241
e8105ccd8384526eefdc390e05b2e4e4f	SCI_MF1_AXNIFE20091012_215420_20091017_183104_20091019_183104
9627220d27da9f2d51d749d2cade8bc8	SCI_MF1_AXNIFE20091012_215420_20091018_194003_20091020_194003
ec7a157510cd491714e144281f247974	SCI_MF1_AXNIFE20091012_215420_20091019_190826_20091116_190826

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

validity identifier	M.CAL	M.DL	M.DN
20091006_191703_20091008_191703	meas.	meas.	interp.
20091007_184526_20091009_184526	meas.	meas.	meas.
20091008_181349_20091010_181349	meas.	meas.	interp.
20091009_192248_20091011_192248	meas.	meas.	interp.
20091010_185111_20091012_185111	meas.	meas.	interp.
20091011_181934_20091013_181934	meas.	meas.	meas.
20091012_192833_20091014_192833	pred.	pred.	pred.
20091013_185656_20091015_185656	pred.	pred.	pred.
20091014_182519_20091016_182519	pred.	pred.	pred.
20091015_193418_20091017_193418	pred.	pred.	pred.
20091016_190241_20091018_190241	pred.	pred.	pred.
20091017_183104_20091019_183104	pred.	pred.	pred.
20091018_194003_20091020_194003	pred.	pred.	pred.
20091019_190826_20091116_190826	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	1.0100	1.0127	1.0157	1.0012	1.0048	1.0062	1.0400	OK
2	1.0026	1.0060	1.0072	1.0009	1.0019	1.0030	1.0200	OK
3	1.0008	1.0019	1.0028	1.0002	1.0003	1.0014	1.0100	OK
4	1.0024	1.0013	1.0024	0.9998	1.0001	1.0013	1.0100	OK
5	1.0037	1.0021	1.0014	0.9992	0.9991	1.0006	1.0120	OK
6	1.0040	1.0011	1.0030	0.9998	0.9998	1.0014	1.0100	OK
7	1.0008	1.0017	1.0030	–	–	–	1.0070	OK
8	1.0020	1.0008	1.0006	–	–	–	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 05 Oct 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20091005_215431_20091005_194840_20091007_194840 .

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

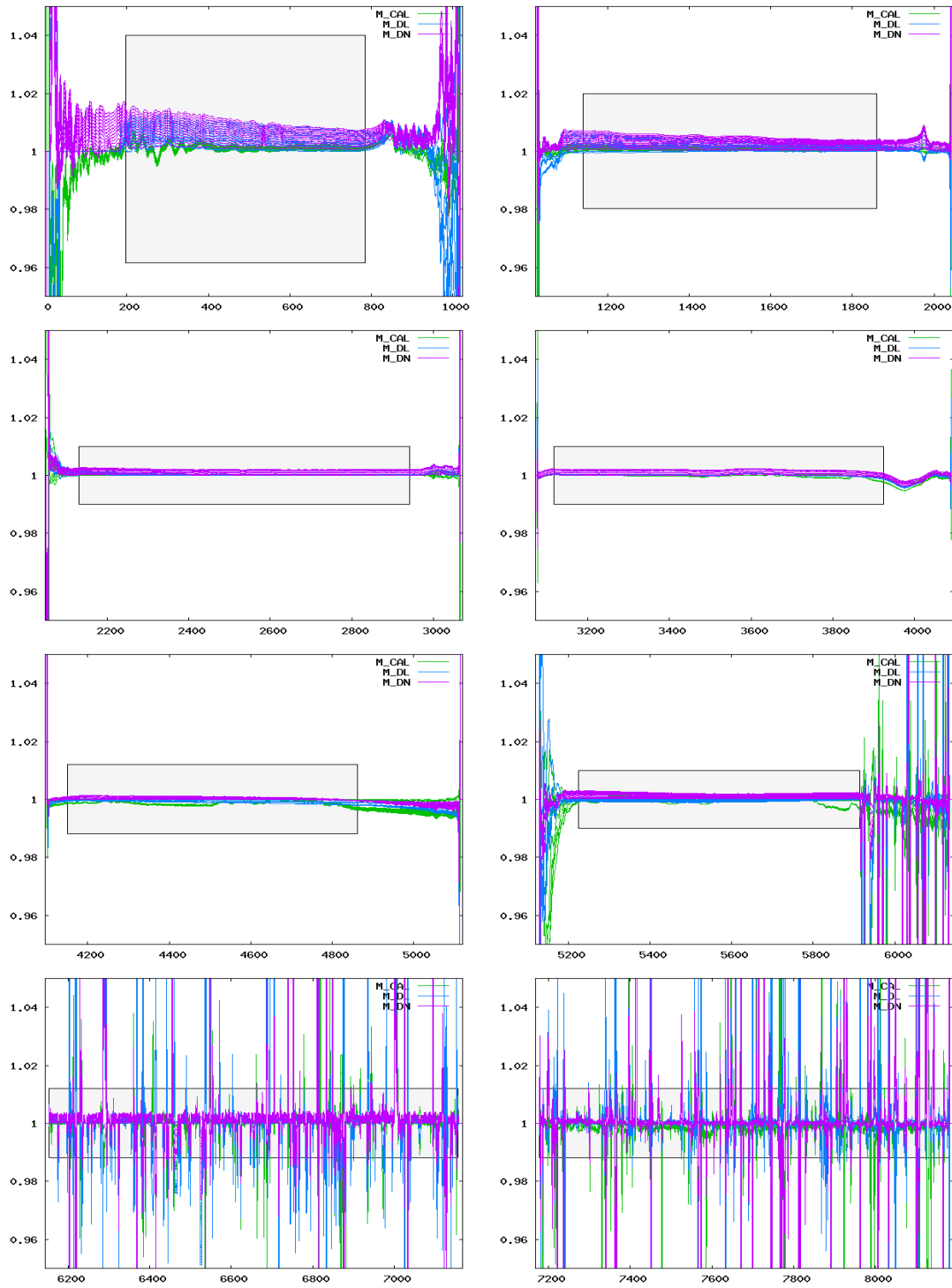


Figure 1: Ratio of delivered m-factors (06 Oct 2009– 19 Oct 2009) to the corresponding m-factor of the previous delivery day (05 Oct 2009). The grey boxes visualize the maximum ratio allowed.