

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: 07 Dec 2010– 13 Dec 2010
- Prediction: 14 Dec 2010– 20 Dec 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
3c3264aa347fd8c9e65d26fc1ad676a6	SCI_MF1_AXNIFE20101214_044257_20101207_182541_20101209_182541
243025b4581d7769155cbcb9c6577c58	SCI_MF1_AXNIFE20101214_044257_20101208_192909_20101210_192909
0e576d70e777fa4cf62b92ee4a507463	SCI_MF1_AXNIFE20101214_044257_20101209_185224_20101211_185224
66e3ac85bfa4f4844e4808db91eadd2	SCI_MF1_AXNIFE20101214_044257_20101210_181538_20101212_181538
74637bfc724241fe98313c249541f1c	SCI_MF1_AXNIFE20101214_044257_20101211_191907_20101213_191907
a898448eaeec25d9e61642f984fef243	SCI_MF1_AXNIFE20101214_044257_20101212_184221_20101214_184221
dd1c6dbf675f1da0a1b35d8432e08b31	SCI_MF1_AXNIFE20101214_044257_20101213_194550_20101215_194550
e3b2687dd5cfc3b9350eccfeefc9474	SCI_MF1_AXNIFE20101214_044257_20101214_190904_20101216_190904
f3d8fc7e64be3db177104a6f1625fa8b	SCI_MF1_AXNIFE20101214_044257_20101215_183219_20101217_183219
905c04038802d36033a8de2a5ee8109a	SCI_MF1_AXNIFE20101214_044257_20101216_193547_20101218_193547
2acd6034e12eb4f449b24782b2d30277	SCI_MF1_AXNIFE20101214_044257_20101217_185902_20101219_185902
bbdcd9c8037149f0375f92665de0d56e	SCI_MF1_AXNIFE20101214_044257_20101218_182216_20101220_182216
aefe800f5b9673faa78d0dca9de10d27	SCI_MF1_AXNIFE20101214_044257_20101219_192545_20101221_192545
e25ad51087d77e83f3b91f6ac445b75d	SCI_MF1_AXNIFE20101214_044257_20101220_184859_20110117_184859

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

validity identifier	M.CAL	M.DL	M.DN
20101207_182541_20101209_182541	meas.	meas.	meas.
20101208_192909_20101210_192909	meas.	meas.	interp.
20101209_185224_20101211_185224	meas.	meas.	interp.
20101210_181538_20101212_181538	meas.	meas.	interp.
20101211_191907_20101213_191907	meas.	meas.	meas.
20101212_184221_20101214_184221	pred.	meas.	pred.
20101213_194550_20101215_194550	pred.	meas.	pred.
20101214_190904_20101216_190904	pred.	pred.	pred.
20101215_183219_20101217_183219	pred.	pred.	pred.
20101216_193547_20101218_193547	pred.	pred.	pred.
20101217_185902_20101219_185902	pred.	pred.	pred.
20101218_182216_20101220_182216	pred.	pred.	pred.
20101219_192545_20101221_192545	pred.	pred.	pred.
20101220_184859_20110117_184859	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	1.0116	1.0123	1.0107	1.0004	1.0050	0.9986	1.0400	OK
2	1.0016	1.0072	1.0028	1.0005	1.0028	0.9996	1.0200	OK
3	1.0004	1.0014	1.0024	0.9998	1.0004	0.9980	1.0100	OK
4	1.0005	1.0008	1.0027	1.0000	1.0002	0.9977	1.0100	OK
5	1.0007	1.0022	1.0025	1.0002	1.0010	0.9980	1.0120	OK
6	1.0008	1.0029	1.0022	0.9999	1.0019	0.9990	1.0100	OK
7	1.0006	1.0028	1.0019	–	–	–	1.0070	OK
8	1.0014	1.0035	1.0020	–	–	–	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 06 Dec 2010, therefore M_{t_0} is taken from the m-factor file `SCI_MF1_AXNIFE20101207_085424_20101206_190226_20101208_190226` .

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

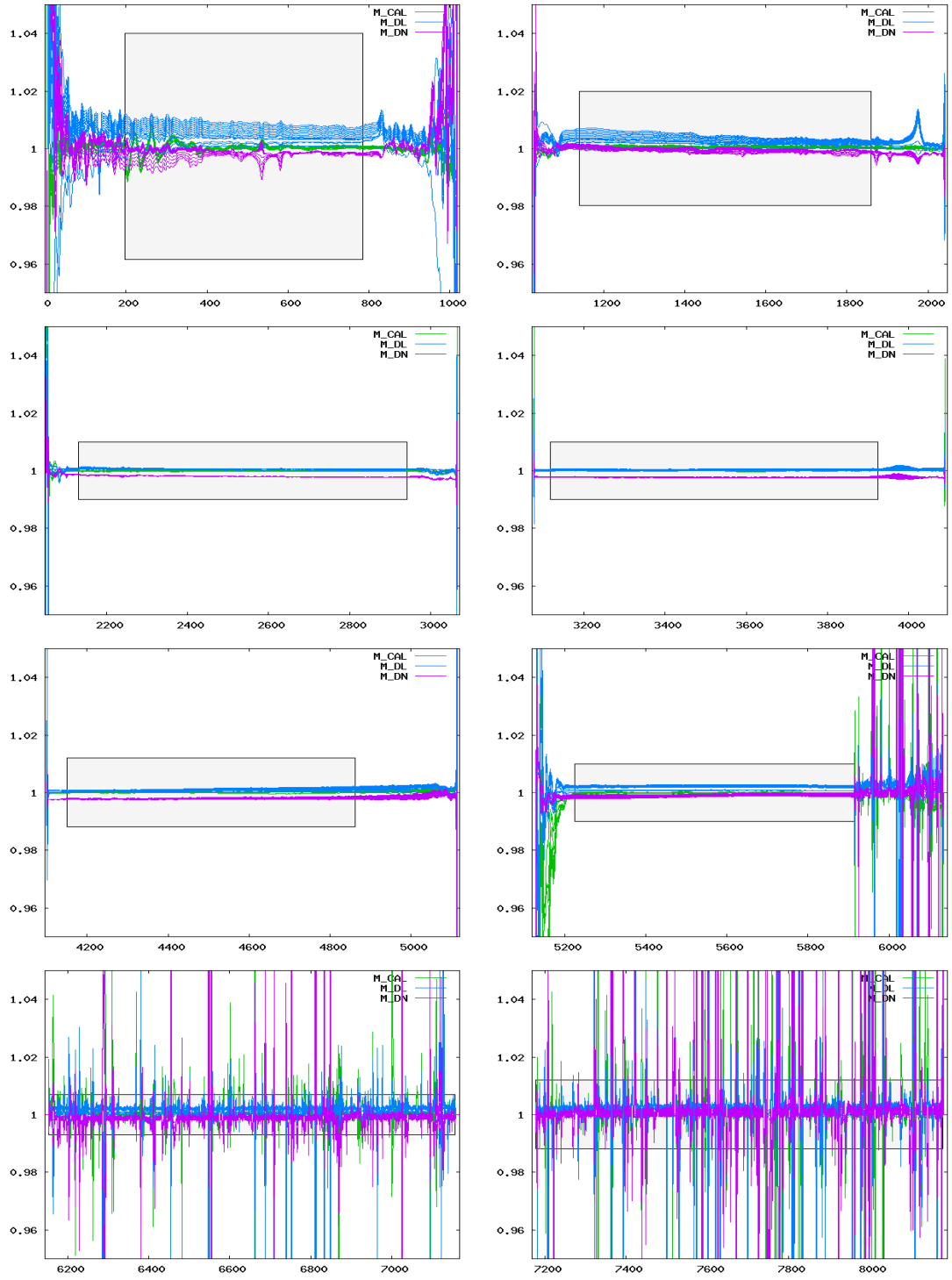


Figure 1: Ratio of delivered m-factors (07 Dec 2010– 20 Dec 2010) to the corresponding m-factor of the previous delivery day (06 Dec 2010). The grey boxes visualize the maximum ratio allowed.