

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: 10 Mar 2009– 16 Mar 2009
- Prediction: 17 Mar 2009– 23 Mar 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
69f54731a72e98bcf5031f358dc02548	SCI_MF1_AXNIFE20090316_225430_20090310_191703_20090312_191703
9b1762a7096a439b2850df74ee1d147c	SCI_MF1_AXNIFE20090316_225430_20090311_184526_20090313_184526
fc998d2cdde6c009695e98fc26a67eea	SCI_MF1_AXNIFE20090316_225430_20090312_181349_20090314_181349
79ff321ea2bc532e7cbaca892f007159	SCI_MF1_AXNIFE20090316_225430_20090313_192248_20090315_192248
5ecc22c03762bd8ba7dcecc6e729a0cf	SCI_MF1_AXNIFE20090316_225430_20090314_185111_20090316_185111
7b5967e4cb48bd15ebf8b93f7f44f1f9	SCI_MF1_AXNIFE20090316_225430_20090315_181934_20090317_181934
b09a3c011ae183a547544ef914e5710c	SCI_MF1_AXNIFE20090316_225430_20090316_192833_20090318_192833
d70c22c86e6561e00d7dd28216962086	SCI_MF1_AXNIFE20090316_225430_20090317_185656_20090319_185656
a19a3698d98b7ae16628e6570f9224f6	SCI_MF1_AXNIFE20090316_225430_20090318_182519_20090320_182519
40cd9bdb933b6e880aca4ba101b11b28	SCI_MF1_AXNIFE20090316_225430_20090319_193418_20090321_193418
91b030d2337362e4b5d9df55f2fa4246	SCI_MF1_AXNIFE20090316_225430_20090320_190241_20090322_190241
96ae8c6b52edf6aa87c7cbe858a8f7ed	SCI_MF1_AXNIFE20090316_225430_20090321_183104_20090323_183104
834addc4d22a828f3d88fd7f81a22693	SCI_MF1_AXNIFE20090316_225430_20090322_194003_20090324_194003
302187cdae871aef5dae213ba7a8f620	SCI_MF1_AXNIFE20090316_225430_20090323_190826_20090420_190826

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

validity identifier	M.CAL	M.DL	M.DN
20090310_191703_20090312_191703	meas.	meas.	interp.
20090311_184526_20090313_184526	meas.	meas.	interp.
20090312_181349_20090314_181349	meas.	meas.	interp.
20090313_192248_20090315_192248	meas.	meas.	meas.
20090314_185111_20090316_185111	meas.	meas.	pred.
20090315_181934_20090317_181934	meas.	meas.	pred.
20090316_192833_20090318_192833	pred.	pred.	pred.
20090317_185656_20090319_185656	pred.	pred.	pred.
20090318_182519_20090320_182519	pred.	pred.	pred.
20090319_193418_20090321_193418	pred.	pred.	pred.
20090320_190241_20090322_190241	pred.	pred.	pred.
20090321_183104_20090323_183104	pred.	pred.	pred.
20090322_194003_20090324_194003	pred.	pred.	pred.
20090323_190826_20090420_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	1.0255	1.0408	1.0367	1.0028	1.0104	1.0089	1.0400	Not OK
2	1.0053	1.0114	1.0124	1.0019	1.0038	1.0042	1.0200	OK
3	1.0048	1.0043	1.0037	1.0008	1.0010	1.0006	1.0100	OK
4	1.0031	1.0029	1.0013	1.0007	1.0004	0.9997	1.0100	OK
5	1.0022	1.0022	1.0014	1.0000	1.0005	0.9993	1.0120	OK
6	1.0031	1.0036	1.0019	1.0008	1.0014	0.9995	1.0100	OK
7	1.0006	1.0002	1.0009	—	—	—	1.0070	OK
8	1.0091	1.0072	1.0091	—	—	—	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 09 Mar 2009, therefore M_{t_0} is taken from the m-factor file SCI MF1 AXNIFE20090309_225441_20090309_194840_20090311_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 exceeds the limits. Additional checks are necessary.

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

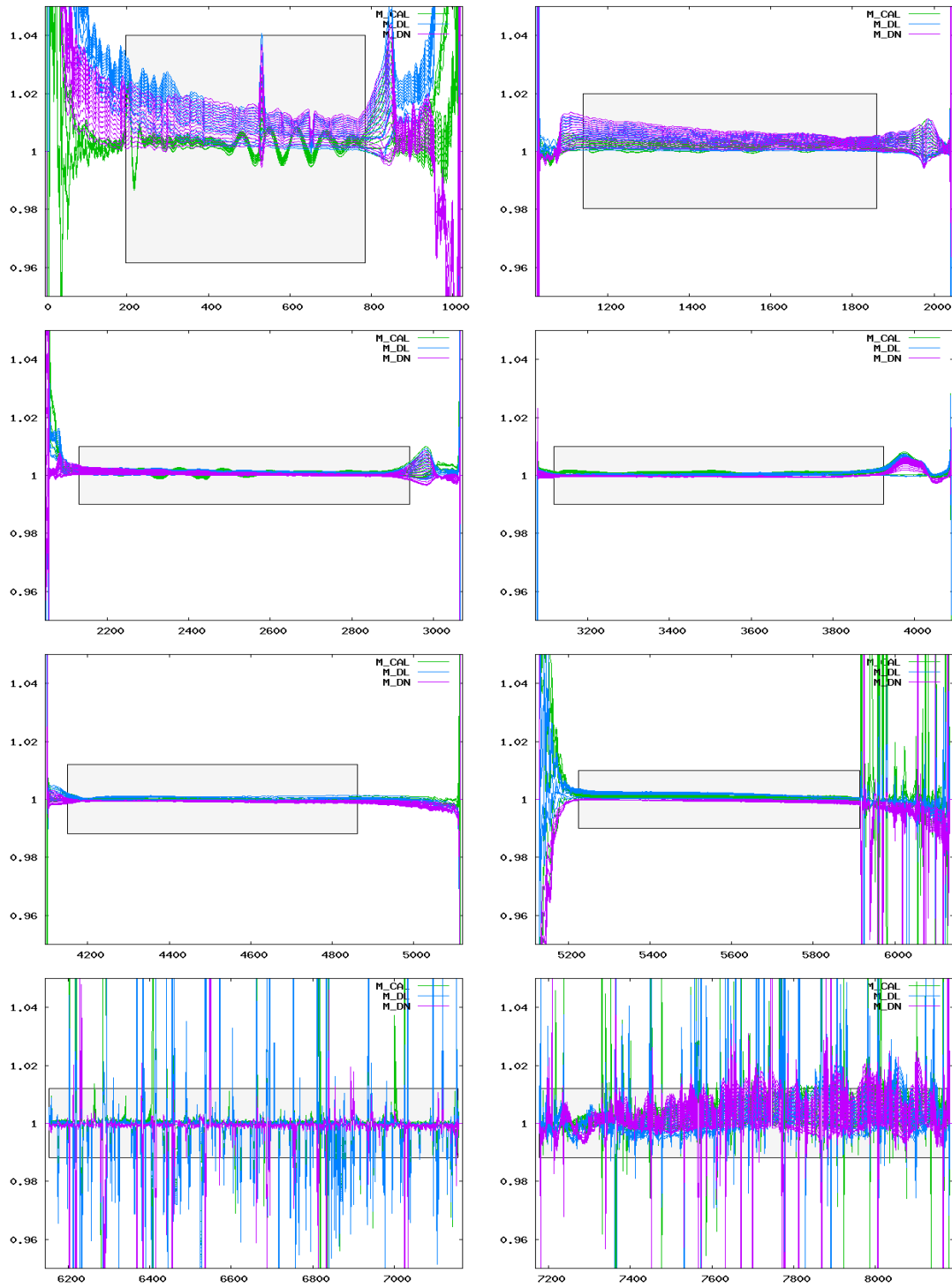


Figure 1: Ratio of delivered m-factors (10 Mar 2009– 23 Mar 2009) to the corresponding m-factor of the previous delivery day (09 Mar 2009). The grey boxes visualize the maximum ratio allowed.