NRT M-factor delivery document 07 Sep 2009

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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: 01 Sep 2009– 07 Sep 2009
- Prediction: 08 Sep 2009– 14 Sep 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
117dfacf499d87d50d10eefa9ce1fc3d	SCI_MF1_AXNIFE20090907_215424_20090901_191703_20090903_191703
dd769f0c4e11ed3b9b63d79808a35c4b	SCI_MF1_AXNIFE20090907_215424_20090902_184526_20090904_184526
b4b674525b7f311fef576422789820da	SCI_MF1_AXNIFE20090907_215424_20090903_181349_20090905_181349
f411fdcd6c630c7619f471d84b70b966	SCI_MF1_AXNIFE20090907_215424_20090904_192248_20090906_192248
f34970906e10ebddca2204a21c457835	SCI_MF1_AXNIFE20090907_215424_20090905_185111_20090907_185111
95dd665c90c9069fa27ac746eb3c8edb	SCI_MF1_AXNIFE20090907_215424_20090906_181934_20090908_181934
fede19e397c52d7394de7f210840df46	SCI_MF1_AXNIFE20090907_215424_20090907_192833_20090909_192833
07226c9a540cf1ddd4e89e3ddca98d81	SCI_MF1_AXNIFE20090907_215424_20090908_185656_20090910_185656
dc4100067d2e5c6e8db82fab384deab5	SCI_MF1_AXNIFE20090907_215424_20090909_182519_20090911_182519
f8b0d1c0920887db23f6c9af4484cf5c	SCI_MF1_AXNIFE20090907_215424_20090910_193418_20090912_193418
f903c74541e4c6c59f7697fb9aad47a7	SCI_MF1_AXNIFE20090907_215424_20090911_190241_20090913_190241
d09df800420f450e272aa377827c4cf5	SCI_MF1_AXNIFE20090907_215424_20090912_183104_20090914_183104
2c494404505ec4190e051dbae6d3fb1d	SCI_MF1_AXNIFE20090907_215424_20090913_194003_20090915_194003
c6d8151cc88edd3573d0e4573a703615	SCI_MF1_AXNIFE20090907_215424_20090914_190826_20091012_190826

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

validity identifier	M_CAL	M_DL	M_DN
20090901_191703_20090903_191703	meas.	meas.	interp.
20090902_184526_20090904_184526	meas.	meas.	meas.
20090903_181349_20090905_181349	meas.	meas.	meas.
20090904_192248_20090906_192248	meas.	meas.	pred.
20090905_185111_20090907_185111	meas.	meas.	pred.
20090906_181934_20090908_181934	meas.	meas.	pred.
20090907_192833_20090909_192833	pred.	pred.	pred.
20090908_185656_20090910_185656	pred.	pred.	pred.
20090909_182519_20090911_182519	pred.	pred.	pred.
20090910_193418_20090912_193418	pred.	pred.	pred.
20090911_190241_20090913_190241	pred.	pred.	pred.
20090912_183104_20090914_183104	pred.	pred.	pred.
20090913_194003_20090915_194003	pred.	pred.	pred.
20090914_190826_20091012_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. 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	1.0085	1.0120	1.0074	1.0010	1.0047	1.0025	1.0400	OK
2	1.0026	1.0064	1.0046	1.0012	1.0021	1.0017	1.0200	OK
3	1.0006	1.0013	1.0005	1.0002	1.0000	1.0001	1.0100	OK
4	1.0004	1.0004	1.0004	1.0000	0.9999	1.0000	1.0100	OK
5	1.0006	1.0010	1.0014	0.9998	0.9997	1.0003	1.0120	OK
6	1.0023	1.0013	1.0027	1.0003	1.0003	1.0010	1.0100	OK
7	1.0005	1.0013	1.0036	–	–	–	1.0070	OK
8	1.0102	1.0089	1.0079	–	–	–	1.0120	OK

certain limit l:

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

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 31 Aug 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20090831_215431_20090831_194840_20090902_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 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

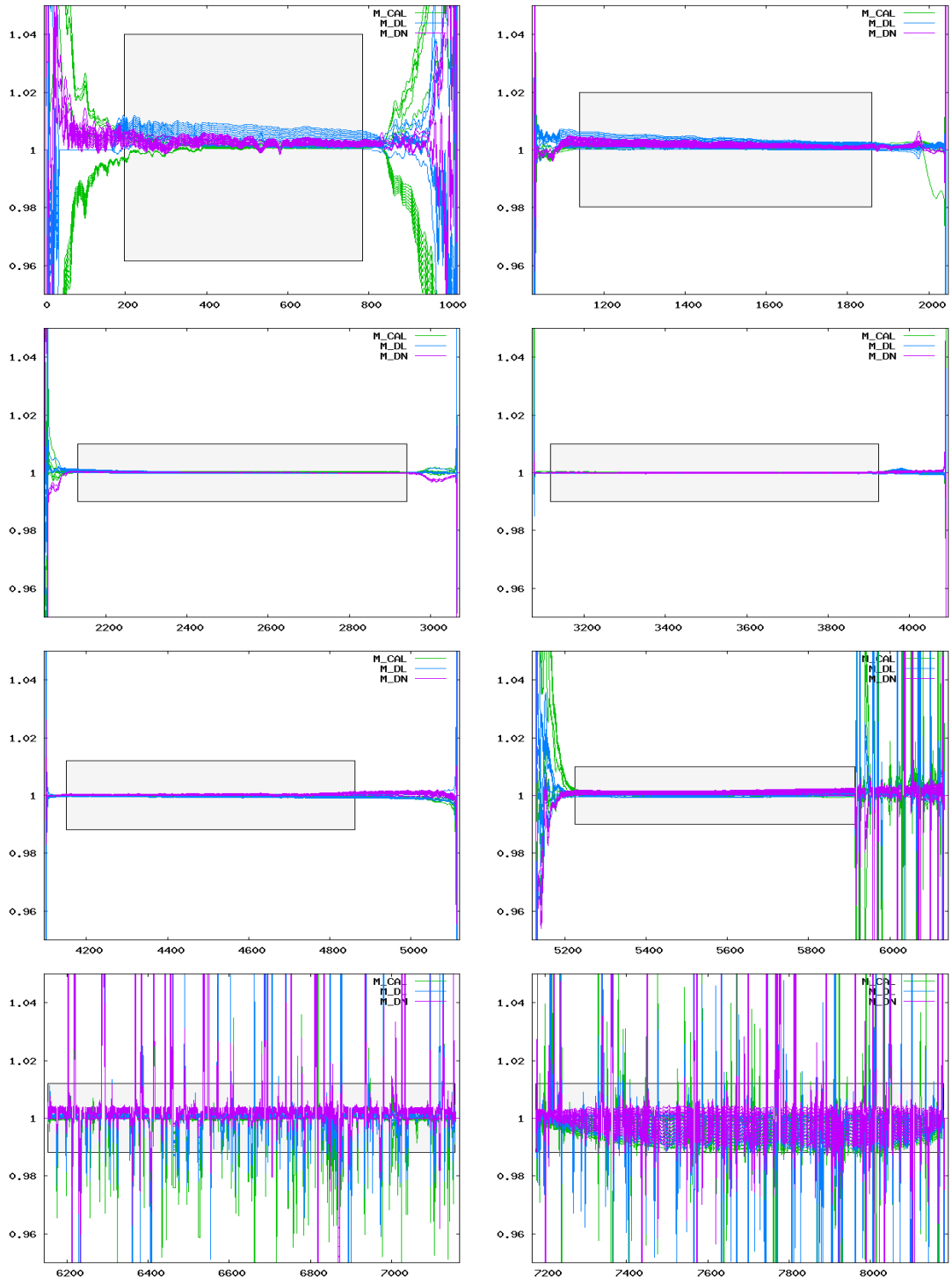

Figure 1: Ratio of delivered m-factors (01 Sep 2009– 14 Sep 2009) to the corresponding m-factor of the previous delivery day (31 Aug 2009). The grey boxes visualize the maximum ratio allowed.