NRT M-factor delivery document 21 Dec 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: 15 Dec 2009– 21 Dec 2009
- Prediction: 22 Dec 2009– 28 Dec 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
bac1e7dc009ddbf23b7decf2bedd2733	SCI_MF1_AXNIFE20091221_225434_20091215_191703_20091217_191703
b2fb16e6bd17874b7730cb562bc4b3ec	SCI_MF1_AXNIFE20091221_225434_20091216_184526_20091218_184526
077a4f40134c74451cefa03bc18861d3	SCI_MF1_AXNIFE20091221_225434_20091217_181349_20091219_181349
e9304f56866442d36a40ef8a6edaf597	SCI_MF1_AXNIFE20091221_225434_20091218_192248_20091220_192248
5d3226d1c15edab14805f92aa4c52c61	SCI_MF1_AXNIFE20091221_225434_20091219_185111_20091221_185111
bb22e5f2eeec5346df64a9608b014818	SCI_MF1_AXNIFE20091221_225434_20091220_181934_20091222_181934
2bc472487cf3948db5c3339c28b742d0	SCI_MF1_AXNIFE20091221_225434_20091221_192833_20091223_192833
0857c80c6f5b52cc374b1cfe51fe92d2	SCI_MF1_AXNIFE20091221_225434_20091222_185656_20091224_185656
2a4e9d74bc5d87761af75deffaf3663d	SCI_MF1_AXNIFE20091221_225434_20091223_182519_20091225_182519
82a8a437b9b8611fa34712f9d23883fa	SCI_MF1_AXNIFE20091221_225434_20091224_193418_20091226_193418
8d3275b311d01d08fc4785b1cc45bca0	SCI_MF1_AXNIFE20091221_225434_20091225_190241_20091227_190241
31b403b7b0fff39b9ff233593014e9ed	SCI_MF1_AXNIFE20091221_225434_20091226_183104_20091228_183104
4a2fa21794877b372a7194c299dced9e	SCI_MF1_AXNIFE20091221_225434_20091227_194002_20091229_194002
900c08956db4da78c76b77ba9757d9e0	SCI_MF1_AXNIFE20091221_225434_20091228_190825_20100125_190825

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

validity identifier	M_CAL	M_DL	M_DN
20091215_191703_20091217_191703	meas.	meas.	interp.
20091216_184526_20091218_184526	meas.	meas.	meas.
20091217_181349_20091219_181349	meas.	meas.	interp.
20091218_192248_20091220_192248	meas.	meas.	interp.
20091219_185111_20091221_185111	meas.	meas.	interp.
20091220_181934_20091222_181934	meas.	meas.	interp.
20091221_192833_20091223_192833	meas.	pred.	meas.
20091222_185656_20091224_185656	pred.	pred.	pred.
20091223_182519_20091225_182519	pred.	pred.	pred.
20091224_193418_20091226_193418	pred.	pred.	pred.
20091225_190241_20091227_190241	pred.	pred.	pred.
20091226_183104_20091228_183104	pred.	pred.	pred.
20091227_194002_20091229_194002	pred.	pred.	pred.
20091228_190825_20100125_190825	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	1.0089	1.0257	1.0030	1.0023	1.0076	0.9996	1.0400	OK
2	1.0036	1.0086	1.0017	1.0016	1.0034	1.0001	1.0200	OK
3	1.0011	1.0021	1.0028	0.9999	1.0001	0.9985	1.0100	OK
4	1.0008	1.0004	1.0020	0.9998	0.9998	0.9986	1.0100	OK
5	1.0009	1.0013	1.0014	1.0001	1.0001	0.9999	1.0120	OK
6	1.0021	1.0015	1.0014	0.9992	1.0000	1.0007	1.0100	OK
7	1.0016	1.0005	1.0005	–	–	–	1.0070	OK
8	1.0012	1.0026	1.0027	–	–	–	1.0120	OK

certain limit l:

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

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 14 Dec 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091214_225431_20091214_194840_20091216_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

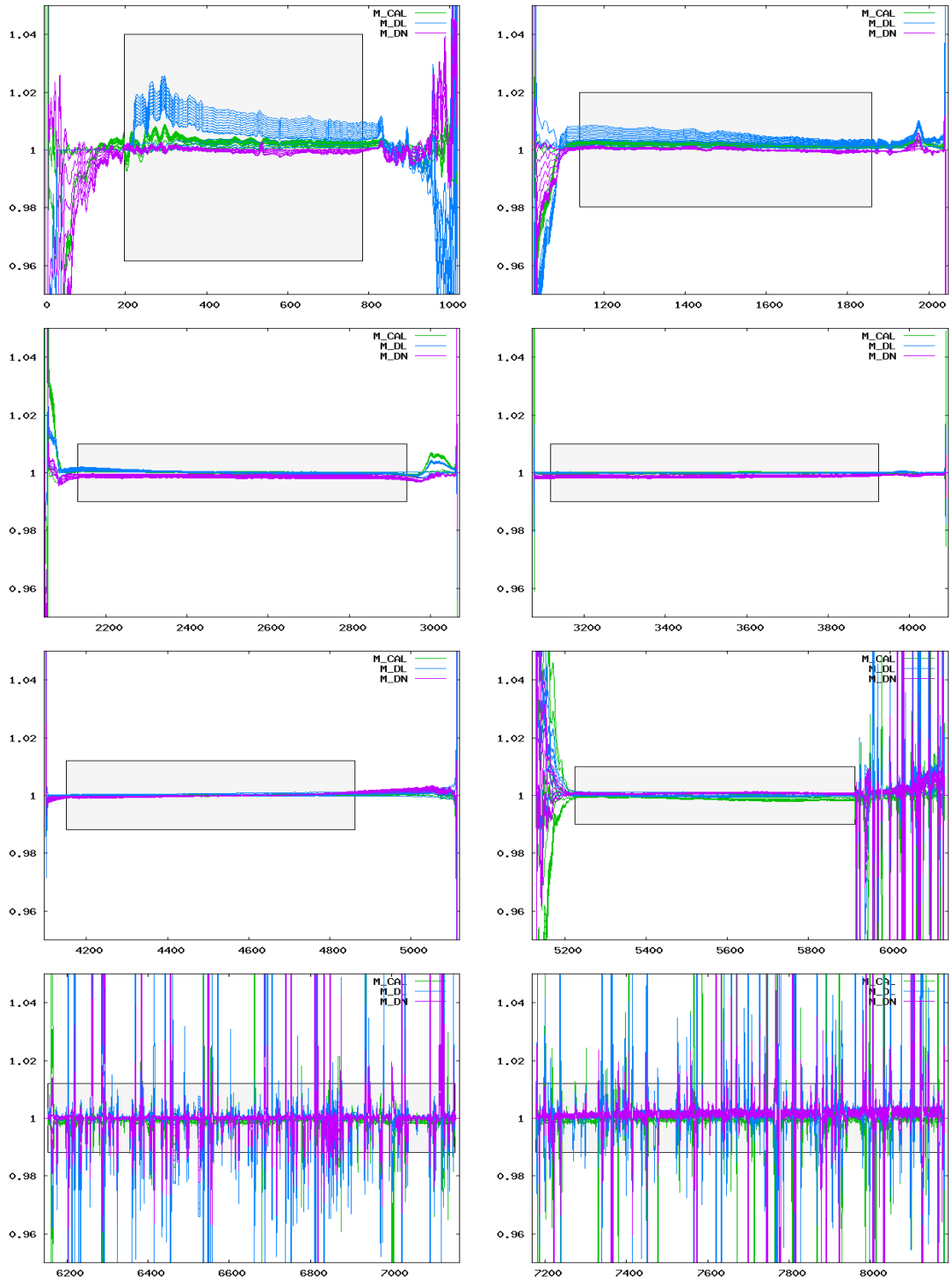

Figure 1: Ratio of delivered m-factors (15 Dec 2009– 28 Dec 2009) to the corresponding m-factor of the previous delivery day (14 Dec 2009). The grey boxes visualize the maximum ratio allowed.