NRT M-factor delivery document 28 Dec 2009

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28 Dec 2009

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: 22 Dec 2009– 28 Dec 2009
- Prediction: 29 Dec 2009– 04 Jan 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
baacba6c9c87900ccf108d2a9e0c9a12	SCI_MF1_AXNIFE20091228_225421_20091222_185656_20091224_185656
4437296bda943150df97b3dc8b7d5daf	SCI_MF1_AXNIFE20091228_225421_20091223_182519_20091225_182519
daa60566f017b2b4b75a999b191defdf	SCI_MF1_AXNIFE20091228_225421_20091224_193418_20091226_193418
b5876eae6b2e9a8fcebc1ec8e60b82fa	SCI_MF1_AXNIFE20091228_225421_20091225_190241_20091227_190241
0061018a36d78fcf1bec7a0dc4ec75ed	SCI_MF1_AXNIFE20091228_225421_20091226_183104_20091228_183104
49c9d36c745e92a29440b787f3f9599f	SCI_MF1_AXNIFE20091228_225421_20091227_194002_20091229_194002
45b80f3cb45f22773373d10450e45232	SCI_MF1_AXNIFE20091228_225421_20091228_190825_20091230_190825
2ae00b7a73b89978fdf664e856c0e2bd	SCI_MF1_AXNIFE20091228_225421_20091229_183648_20091231_183648
b37a9bb6adf9c7704261f2b50815f615	SCI_MF1_AXNIFE20091228_225421_20091230_194547_20100101_194547
47dfb521e7be2e3780ed39b53e416ae2	SCI_MF1_AXNIFE20091228_225421_20091231_191410_20100102_191410
5deef61ddc01be460e065cb549c57a45	SCI_MF1_AXNIFE20091228_225421_20100101_184233_20100103_184233
8bd9731e6afdb7c5f427c2b59770a56d	SCI_MF1_AXNIFE20091228_225421_20100102_181056_20100104_181056
a4ff197c68d0fc97b60dad16ce241f4c	SCI_MF1_AXNIFE20091228_225421_20100103_191955_20100105_191955
3cf77d07593126c932243d338bc1b315	SCI_MF1_AXNIFE20091228_225421_20100104_184818_20100201_184818

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

validity identifier	M_CAL	M_DL	M_DN
20091222_185656_20091224_185656	meas.	meas.	interp.
20091223_182519_20091225_182519	meas.	meas.	interp.
20091224_193418_20091226_193418	meas.	meas.	meas.
20091225_190241_20091227_190241	meas.	meas.	pred.
20091226_183104_20091228_183104	meas.	meas.	pred.
20091227_194002_20091229_194002	meas.	meas.	pred.
20091228_190825_20091230_190825	pred.	pred.	pred.
20091229_183648_20091231_183648	pred.	pred.	pred.
20091230_194547_20100101_194547	pred.	pred.	pred.
20091231_191410_20100102_191410	pred.	pred.	pred.
20100101_184233_20100103_184233	pred.	pred.	pred.
20100102_181056_20100104_181056	pred.	pred.	pred.
20100103_191955_20100105_191955	pred.	pred.	pred.
20100104_184818_20100201_184818	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	1.0073	1.0225	1.0033	1.0028	1.0085	0.9996	1.0400	OK
2	1.0038	1.0111	1.0025	1.0017	1.0044	1.0006	1.0200	OK
3	1.0007	1.0028	1.0007	1.0000	1.0007	1.0003	1.0100	OK
4	1.0003	1.0008	1.0010	1.0000	1.0004	1.0007	1.0100	OK
5	1.0014	1.0033	1.0023	1.0005	1.0013	1.0008	1.0120	OK
6	1.0012	1.0024	1.0026	1.0004	1.0013	1.0010	1.0100	OK
7	1.0009	1.0016	1.0021	–	–	–	1.0070	OK
8	1.0029	1.0040	1.0039	–	–	–	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 21 Dec 2009, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20091221_225434_20091221_192833_20091223_192833` .

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

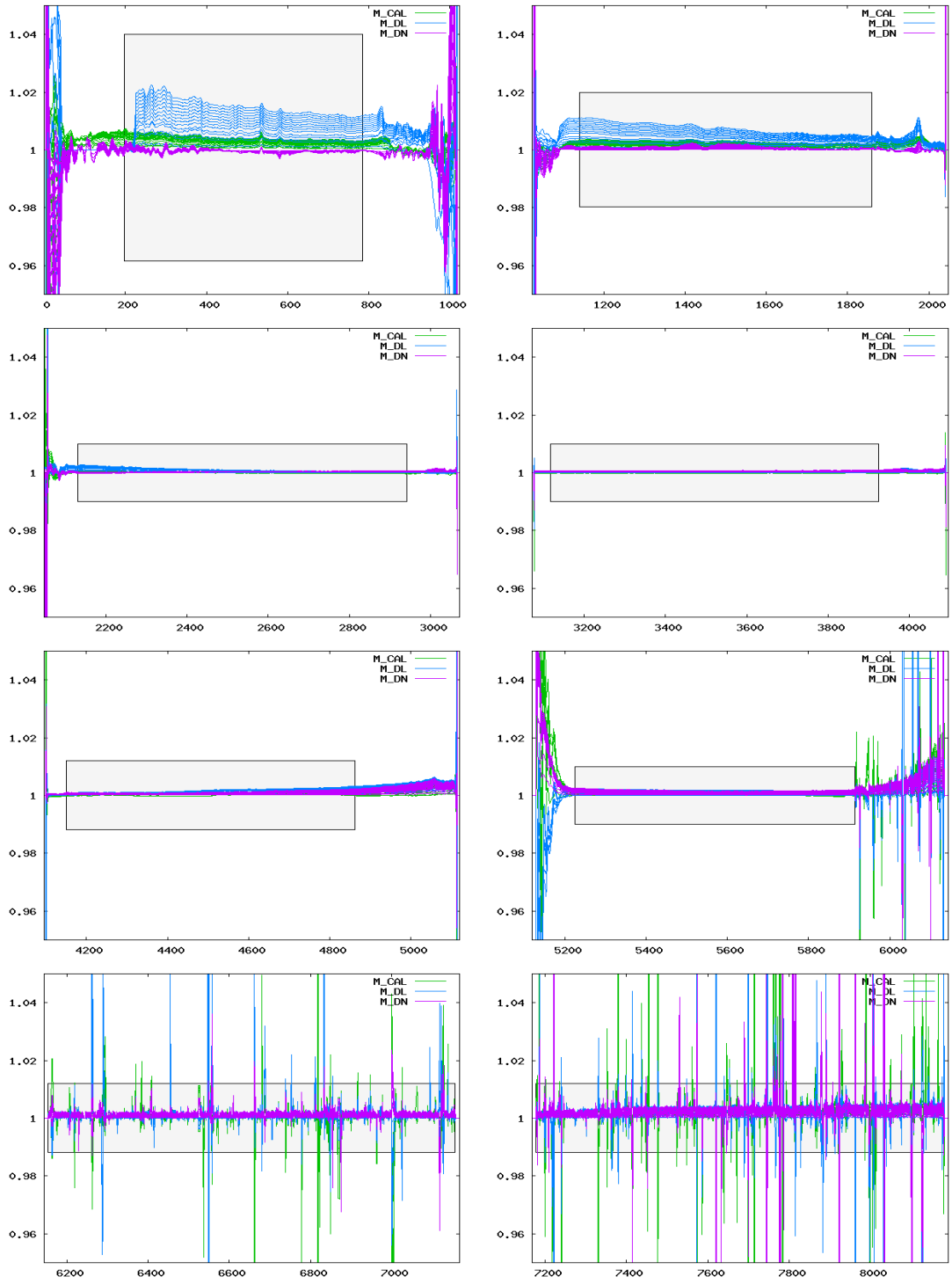

Figure 1: Ratio of delivered m-factors (22 Dec 2009– 04 Jan 2010) to the corresponding m-factor of the previous delivery day (21 Dec 2009). The grey boxes visualize the maximum ratio allowed.