# NRT M-factor delivery document 23 Nov 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: 17 Nov 2009– 23 Nov 2009
- Prediction: 24 Nov 2009– 30 Nov 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 |
|---|---|
| ec250ce93b43515099ea490eb3214b5e | SCI_MF1_AXNIFE20091202_110215_20091117_185656_20091119_185656 |
| afaa641c23fd0d6eec6f4b79c504991b | SCI_MF1_AXNIFE20091202_110215_20091118_182519_20091120_182519 |
| b9fc2d72ef5ae6b4b5a8e7812268458a | SCI_MF1_AXNIFE20091202_110215_20091119_193418_20091121_193418 |
| 60f134d765d5edb513603578752c4a69 | SCI_MF1_AXNIFE20091202_110215_20091120_190241_20091122_190241 |
| b493b7ba9171f403f042981aab5fe840 | SCI_MF1_AXNIFE20091202_110215_20091121_183104_20091123_183104 |
| 469a7547117d263bc974835a879212d7 | SCI_MF1_AXNIFE20091202_110215_20091122_194003_20091124_194003 |
| 946da316c7da11298f970bfe9271cc35 | SCI_MF1_AXNIFE20091202_110215_20091123_190826_20091125_190826 |
| 9591e13fcfd1c52a26af3014c637191c | SCI_MF1_AXNIFE20091202_110215_20091124_183648_20091126_183648 |
| a697899a1e00d82355f699bf612594c4 | SCI_MF1_AXNIFE20091202_110215_20091125_194547_20091127_194547 |
| f18721ea06cde080bee6655fb0515a6c | SCI_MF1_AXNIFE20091202_110215_20091126_191410_20091128_191410 |
| d95a69f4036e47661d9d8f57d4c58647 | SCI_MF1_AXNIFE20091202_110215_20091127_184233_20091129_184233 |
| 04a7328baf51fab1e4cb4f659cb743c1 | SCI_MF1_AXNIFE20091202_110215_20091128_181056_20091130_181056 |
| 537eb97f11492f2af5ffd31e271c04f2 | SCI_MF1_AXNIFE20091202_110215_20091129_191955_20091201_191955 |
| e8f06a691c3a0ba4d396b035ddcd5423 | SCI_MF1_AXNIFE20091202_110215_20091130_184818_20091228_184818 |

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

| validity identifier | M_CAL | M_DL | M_DN |
|---|---|---|---|
| 20091117_185656_20091119_185656 | pred. | pred. | pred. |
| 20091118_182519_20091120_182519 | pred. | pred. | pred. |
| 20091119_193418_20091121_193418 | pred. | pred. | pred. |
| 20091120_190241_20091122_190241 | pred. | pred. | pred. |
| 20091121_183104_20091123_183104 | pred. | pred. | pred. |
| 20091122_194003_20091124_194003 | pred. | pred. | pred. |
| 20091123_190826_20091125_190826 | pred. | pred. | pred. |
| 20091124_183648_20091126_183648 | pred. | pred. | pred. |
| 20091125_194547_20091127_194547 | pred. | pred. | pred. |
| 20091126_191410_20091128_191410 | pred. | pred. | pred. |
| 20091127_184233_20091129_184233 | pred. | pred. | pred. |
| 20091128_181056_20091130_181056 | pred. | pred. | pred. |
| 20091129_191955_20091201_191955 | pred. | pred. | pred. |
| 20091130_184818_20091228_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 | 1.0135 | 1.0140 | 1.0144 | 1.0013 | 1.0057 | 1.0045 | 1.0400 | OK |
| 2 | 1.0028 | 1.0077 | 1.0061 | 1.0011 | 1.0027 | 1.0021 | 1.0200 | OK |
| 3 | 1.0006 | 1.0018 | 1.0010 | 1.0002 | 1.0003 | 1.0001 | 1.0100 | OK |
| 4 | 1.0008 | 1.0003 | 1.0004 | 1.0002 | 1.0001 | 1.0001 | 1.0100 | OK |
| 5 | 1.0011 | 1.0007 | 1.0010 | 1.0003 | 1.0002 | 1.0003 | 1.0120 | OK |
| 6 | 1.0020 | 1.0019 | 1.0019 | 1.0005 | 1.0009 | 1.0009 | 1.0100 | OK |
| 7 | 1.0008 | 1.0019 | 1.0017 | – | – | – | 1.0070 | OK |
| 8 | 1.0000 | 1.0011 | 1.0009 | – | – | – | 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 16 Nov 2009, therefore $M_{t_0}$ is taken from the m–factor file `SCI_MF1_AXNIFE20091116_225256_20091116_192833_20091118_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

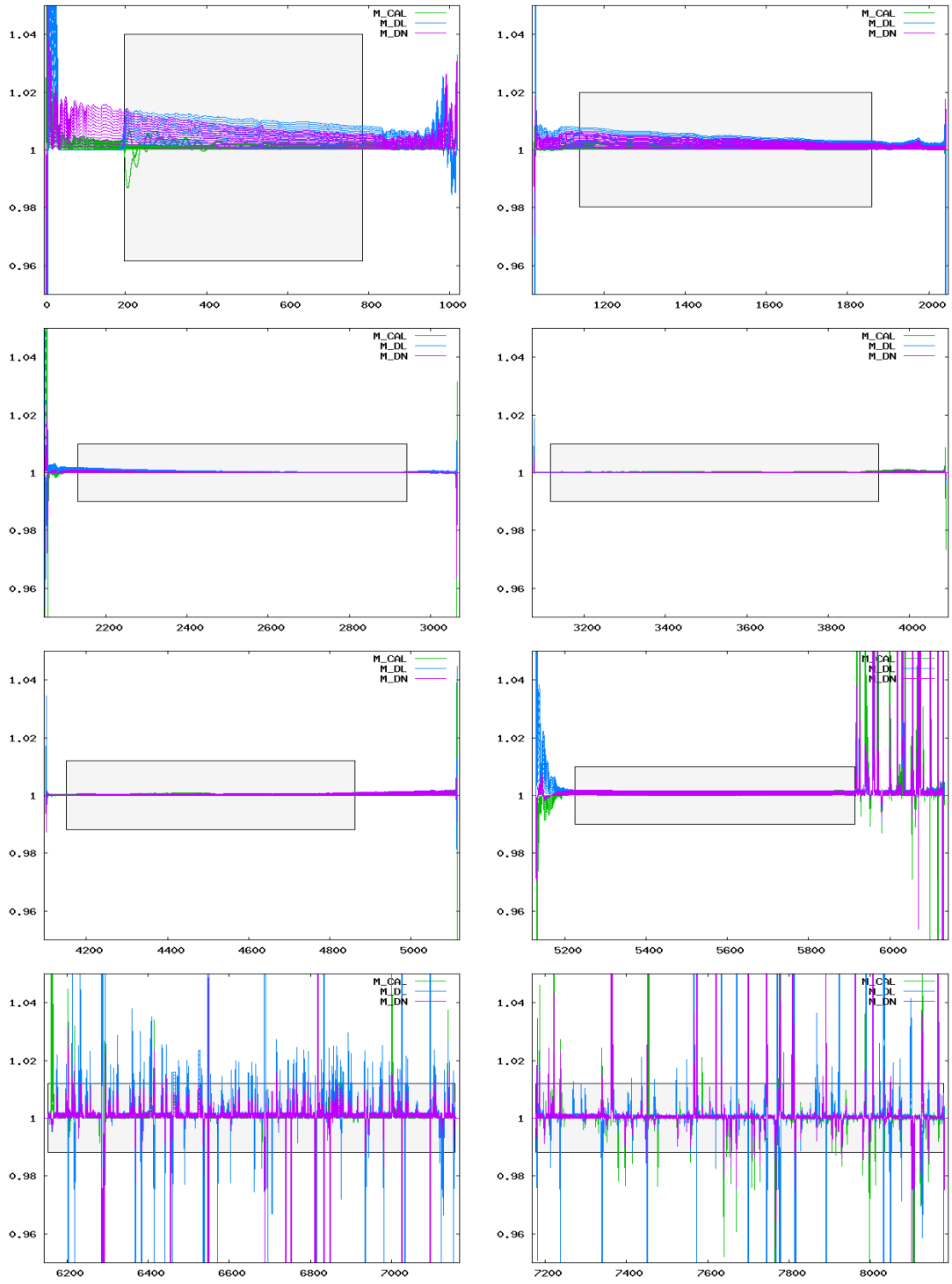


Figure 1: Ratio of delivered m-factors (17 Nov 2009– 30 Nov 2009) to the corresponding m-factor of the previous delivery day (16 Nov 2009). The grey boxes visualize the maximum ratio allowed.