NRT M-factor delivery document 19 Jan 2009

Klaus Bramstedt, ife Bremen

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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: 13 Jan 2009–19 Jan 2009
- Prediction: 20 Jan 2009–26 Jan 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 | | | |
|---|---|--|--|--|
| md5-sum 20da602322f0d0b9d41d4ba65c7c9c5e 4619ad71fe1445dce1af4e1c7f2cb284 efc27403c2e3acc7a27c6fdf793338ac 080a55bf42aa5b824e3a1b25a62b5c5c ce7307d8547648b6c93a4158ed08efa8 93ec05da8292920a0e3448cd4b4d6e38 67f1e2822d0f8d2809bc5b42a848693b 84cc2fdaa0d0f134f6831ce923ed93bf c72e713279be4816f58d4fff10f75a3d d8f3568986a4030254286ba244b69351 db6938acf22b1749682102369332d21c | m-factor auxiliary file SCI_MF1_AXNIFE20090123_095557_20090113_183649_20090115_183649 SCI_MF1_AXNIFE20090123_095557_20090114_194548_20090116_194548 SCI_MF1_AXNIFE20090123_095557_20090115_191411_20090117_191411 SCI_MF1_AXNIFE20090123_095557_20090116_184234_20090118_184234 SCI_MF1_AXNIFE20090123_095557_20090117_181057_20090119_181057 SCI_MF1_AXNIFE20090123_095557_20090118_191956_20090120_1919566 SCI_MF1_AXNIFE20090123_095557_20090119_184819_20090121_184819 SCI_MF1_AXNIFE20090123_095557_20090120_181642_20090122_181642 SCI_MF1_AXNIFE20090123_095557_20090120_181642_20090122_181642 SCI_MF1_AXNIFE20090123_095557_20090121_192541_20090124_185404 SCI_MF1_AXNIFE20090123_095557_20090123_182227_20090124_185404 | | | |
| 80d4e7c963977deb116aa8f3a067cfd5 2423bde9264dd72629741692e9b4baaa 616dc07495d830ef4e595544bcadb1b6 | SCI_MF1_AXNIFE20090123_095557_20090125_182227_20090125_182227 SCI_MF1_AXNIFE20090123_095557_20090124_193126_20090126_193126 SCI_MF1_AXNIFE20090123_095557_20090125_185949_20090127_185949 SCI_MF1_AXNIFE20090123_095557_20090126_182812_20090223_182812 | | | |

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

| validity identifier | M_CAL | M_DL | M_DN |
|---------------------------------|-------|---------|---------|
| 20090113_183649_20090115_183649 | meas. | meas. | meas. |
| 20090114_194548_20090116_194548 | meas. | meas. | interp. |
| 20090115_191411_20090117_191411 | meas. | meas. | interp. |
| 20090116_184234_20090118_184234 | meas. | interp. | interp. |
| 20090117_181057_20090119_181057 | meas. | meas. | meas. |
| 20090118_191956_20090120_191956 | meas. | meas. | pred. |
| 20090119_184819_20090121_184819 | meas. | meas. | pred. |
| 20090120_181642_20090122_181642 | pred. | pred. | pred. |
| 20090121_192541_20090123_192541 | pred. | pred. | pred. |
| 20090122_185404_20090124_185404 | pred. | pred. | pred. |
| 20090123_182227_20090125_182227 | pred. | pred. | pred. |
| 20090124_193126_20090126_193126 | pred. | pred. | pred. |
| 20090125_185949_20090127_185949 | pred. | pred. | pred. |
| 20090126_182812_20090223_182812 | 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 range | 197 784 | $\begin{array}{c} 1140 \\ 1859 \end{array}$ | $2131 \\ 2943$ | $3117 \\ 3925$ | $\begin{array}{c} 4151 \\ 4863 \end{array}$ | $5226 \\ 5914$ | $6154 \\ 7157$ | 7178 8181 |

| | | | Table 4: | Content c | heck resu | lts. | | |
|----------------|---------------------------------|-----------|----------|------------|-----------|-----------|--------|--------|
| | max. ratio (ch. $6/7$: median) | | | mean ratio | | | | |
| | $M_{-}CAL$ | $M_{-}DL$ | M_DN | $M_{-}CAL$ | $M_{-}DL$ | $M_{-}DN$ | limit | status |
| 1 | 1.0220 | 1.0446 | 1.0103 | 1.0065 | 1.0134 | 1.0020 | 1.0400 | Not OK |
| 2 | 1.0095 | 1.0191 | 1.0060 | 1.0035 | 1.0058 | 1.0022 | 1.0200 | OK |
| 3 | 1.0030 | 1.0053 | 1.0048 | 1.0004 | 1.0008 | 0.9985 | 1.0100 | OK |
| 4 | 1.0006 | 1.0009 | 1.0030 | 1.0002 | 1.0001 | 0.9982 | 1.0100 | OK |
| 5 | 1.0016 | 1.0016 | 1.0028 | 1.0006 | 1.0003 | 0.9987 | 1.0120 | OK |
| 6 | 1.0205 | 1.0207 | 1.0149 | 0.9971 | 0.9965 | 1.0000 | 1.0100 | Not OK |
| $\overline{7}$ | 1.0010 | 1.0005 | 1.0056 | _ | _ | _ | 1.0070 | Not OK |
| 8 | 1.0388 | 1.0402 | 1.1020 | _ | _ | _ | 1.0120 | Not OK |

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}}$$
 with $M_{ratio,i} < l$ and $\frac{1}{M_{ratio,i}} < l$ (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 12 Jan 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20090123_095416_20090112_190826_20090114_190826 .

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

- 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 (13 Jan 2009– 26 Jan 2009) to the corresponding m-factor of the previous delivery day (12 Jan 2009). The grey boxes visualize the maximum ratio allowed.