NRT M-factor delivery document 08 Dec 2008

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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: 02 Dec 2008–08 Dec 2008
- Prediction: 09 Dec 2008-15 Dec 2008

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 f777dbb688d970bc76b24b01d52300aa cb07d55d93e6e3c6463498a65c9ceb92 ea4a11b84ceef1df717516faad05bb6a 1a414bf4f698ba4ea9136799556daa41 ef14524d077ae08a055f76f012fa127b ddb2370d03683417fa1b811ce6faa782 8d9547a47cf6ee9c83d39b2ee7d80190 10a7672c6b8678a4f70eafabc688933e c04e0e186358d3344ef61ba9ceb16bfa d4d1bae456b4592a16c1ea69c866b319 c8f9b2352c2d0db6c08327d8acb9522b | m-factor auxiliary file SCI_MF1_AXNIFE20081217_081120_20081202_185656_20081204_185656 SCI_MF1_AXNIFE20081217_081120_20081203_182519_20081205_182519 SCI_MF1_AXNIFE20081217_081120_20081204_193418_20081206_193418 SCI_MF1_AXNIFE20081217_081120_20081205_190241_20081207_190241 SCI_MF1_AXNIFE20081217_081120_20081207_194003_20081209_194003 SCI_MF1_AXNIFE20081217_081120_20081209_183649_20081210_190826 SCI_MF1_AXNIFE20081217_081120_20081209_183649_20081211_183649 SCI_MF1_AXNIFE20081217_081120_20081210_194548_20081212_194548 SCI_MF1_AXNIFE20081217_081120_20081211_191411_20081213_191411 SCI_MF1_AXNIFE20081217_081120_20081211_184234_20081214_184234 | | | |
| 623ce72452b2da52fdc0c7af09626edc 29d68803ead1d51213d46a5a30b702ff f0eecdf61e858c0f41d8d08c84e59256 | SCI_MF1_AXNIFE20081217_081120_20081213_181057_20081215_181057 SCI_MF1_AXNIFE20081217_081120_20081214_191956_20081216_191956 SCI_MF1_AXNIFE20081217_081120_20081215_184819_20090112_184819 | | | |

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

| validity identifier | M_CAL | M_DL | M_DN |
|---------------------------------|-------|-------|---------|
| 20081202_185656_20081204_185656 | meas. | meas. | meas. |
| 20081203_182519_20081205_182519 | meas. | meas. | interp. |
| 20081204_193418_20081206_193418 | meas. | meas. | interp. |
| 20081205_190241_20081207_190241 | meas. | meas. | interp. |
| 20081206_183104_20081208_183104 | meas. | meas. | meas. |
| 20081207_194003_20081209_194003 | meas. | meas. | pred. |
| 20081208_190826_20081210_190826 | meas. | meas. | pred. |
| 20081209_183649_20081211_183649 | pred. | pred. | pred. |
| 20081210_194548_20081212_194548 | pred. | pred. | pred. |
| 20081211_191411_20081213_191411 | pred. | pred. | pred. |
| 20081212_184234_20081214_184234 | pred. | pred. | pred. |
| 20081213_181057_20081215_181057 | pred. | pred. | pred. |
| 20081214_191956_20081216_191956 | pred. | pred. | pred. |
| 20081215_184819_20090112_184819 | 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 check results. | | | | | | | | |
|----------------|---------------------------------|-----------|--------|------------|-----------|--------|--------|--------|--|
| | max. ratio (ch. $6/7$: median) | | | | mean rat | | | | |
| | $M_{-}CAL$ | $M_{-}DL$ | M_DN | $M_{-}CAL$ | $M_{-}DL$ | M_DN | limit | status | |
| 1 | 1.0106 | 1.0174 | 1.0047 | 1.0010 | 1.0052 | 0.9985 | 1.0400 | OK | |
| 2 | 1.0022 | 1.0061 | 1.0016 | 1.0008 | 1.0020 | 0.9993 | 1.0200 | OK | |
| 3 | 1.0004 | 1.0012 | 1.0023 | 0.9999 | 1.0001 | 0.9981 | 1.0100 | OK | |
| 4 | 1.0005 | 1.0004 | 1.0025 | 0.9999 | 1.0000 | 0.9978 | 1.0100 | OK | |
| 5 | 1.0006 | 1.0019 | 1.0021 | 1.0000 | 1.0004 | 0.9983 | 1.0120 | OK | |
| 6 | 1.0018 | 1.0018 | 1.0015 | 0.9995 | 1.0000 | 0.9996 | 1.0100 | OK | |
| $\overline{7}$ | 0.9992 | 0.9996 | 0.9976 | _ | _ | _ | 1.0070 | OK | |
| 8 | 1.0000 | 1.0006 | 1.0004 | _ | — | _ | 1.0120 | 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 01 Dec 2008, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20081216_152312_20081201_192833_20081203_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

- 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 (02 Dec 2008–15 Dec 2008) to the corresponding m-factor of the previous delivery day (01 Dec 2008). The grey boxes visualize the maximum ratio allowed.