NRT M-factor delivery document 24 Jan 2011

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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 07.01.

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: 18 Jan 2011–24 Jan 2011
- Prediction: 25 Jan 2011– 31 Jan 2011

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 48f8007c4aca78d13f0817f13d23a7c3 4eed47e86ac8610c1cdec792b4a9faa3 4881a72ad99d776b0a999e555351f6c2 a6974a150a058a2b85c24e803b2d74d1 6cc0706b82b254219fc1427317f1e8bc 19c143aff41f16715ff5595f378d18e0 d8218446d4b880f3b7549db9a83f2133 b136b99f357ad1732b14711be7d273c8 65ba91c97479291e3276c14e886549df fde65d8ea42cc89ecbad3639ae551f00 c97a3c46d78b3b2d802cebdf1b5c51e8 | m-factor auxiliary file SCI_MF1_AXNIFE20110125_044314_20110118_192534_20110120_192534 SCI_MF1_AXNIFE20110125_044314_20110119_184848_20110121_184848 SCI_MF1_AXNIFE20110125_044314_20110121_191531_20110123_191531 SCI_MF1_AXNIFE20110125_044314_20110122_183846_20110124_183846 SCI_MF1_AXNIFE20110125_044314_20110123_194214_20110125_194214 SCI_MF1_AXNIFE20110125_044314_20110124_190529_20110126_190529 SCI_MF1_AXNIFE20110125_044314_20110125_182843_20110127_182843 SCI_MF1_AXNIFE20110125_044314_20110126_193212_20110128_193212 SCI_MF1_AXNIFE20110125_044314_20110126_193212_20110128_193212 SCI_MF1_AXNIFE20110125_044314_20110126_193212_20110128_193212 SCI_MF1_AXNIFE20110125_044314_20110127_185526_20110129_185526 SCI_MF1_AXNIFE20110125_044314_20110128_181841_20110130_181841 | | | |
| fa64de2d2207aab525336fed85f8fe89 b14b783ae9fdda6df0437fbf96e4857f 8c2929deb2d0a862e33b5fa79a2b105d | SCI_MF1_AXNIFE20110125_044314_20110129_192209_20110131_192209 SCI_MF1_AXNIFE20110125_044314_20110130_184524_20110201_184524 SCI_MF1_AXNIFE20110125_044314_20110131_194852_20110228_194852 | | | |

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

| validity identifier | M_CAL | M_DL | M_DN |
|---------------------------------|-------|-------|---------|
| 20110118_192534_20110120_192534 | meas. | meas. | meas. |
| 20110119_184848_20110121_184848 | meas. | meas. | interp. |
| 20110120_181203_20110122_181203 | meas. | meas. | interp. |
| 20110121_191531_20110123_191531 | meas. | meas. | interp. |
| 20110122_183846_20110124_183846 | meas. | meas. | meas. |
| 20110123_194214_20110125_194214 | meas. | meas. | pred. |
| 20110124_190529_20110126_190529 | meas. | meas. | pred. |
| 20110125_182843_20110127_182843 | pred. | pred. | pred. |
| 20110126_193212_20110128_193212 | pred. | pred. | pred. |
| 20110127_185526_20110129_185526 | pred. | pred. | pred. |
| 20110128_181841_20110130_181841 | pred. | pred. | pred. |
| 20110129_192209_20110131_192209 | pred. | pred. | pred. |
| 20110130_184524_20110201_184524 | pred. | pred. | pred. |
| 20110131_194852_20110228_194852 | 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 | 1.0119 | 1.0176 | 1.0045 | 1.0013 | 1.0061 | 0.9989 | 1.0400 | OK | | |
| 2 | 1.0024 | 1.0073 | 1.0013 | 1.0011 | 1.0029 | 1.0001 | 1.0200 | OK | | |
| 3 | 1.0010 | 1.0019 | 1.0016 | 1.0000 | 1.0005 | 0.9999 | 1.0100 | OK | | |
| 4 | 1.0016 | 1.0010 | 1.0014 | 0.9999 | 1.0003 | 1.0003 | 1.0100 | OK | | |
| 5 | 1.0011 | 1.0018 | 1.0012 | 1.0003 | 1.0003 | 1.0001 | 1.0120 | OK | | |
| 6 | 1.0012 | 1.0015 | 1.0010 | 1.0003 | 0.9996 | 0.9995 | 1.0100 | OK | | |
| 7 | 1.0010 | 1.0006 | 1.0005 | _ | _ | _ | 1.0070 | OK | | |
| 8 | 1.0034 | 1.0037 | 1.0033 | _ | _ | _ | 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 17 Jan 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110118_044254_20110117_182205_20110119_182205 .

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 (18 Jan 2011– 31 Jan 2011) to the corresponding m-factor of the previous delivery day (17 Jan 2011). The grey boxes visualize the maximum ratio allowed.