NRT M-factor delivery document 09 Mar 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: 03 Mar 2009–09 Mar 2009
- Prediction: 10 Mar 2009–16 Mar 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.

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

validity identifier	M_CAL	M_DL	M_DN
20090303_193711_20090305_193711	meas.	meas.	meas.
20090304_190534_20090306_190534	interp.	meas.	interp.
20090305_183357_20090307_183357	meas.	meas.	interp.
20090306_194256_20090308_194256	meas.	meas.	interp.
20090307_191118_20090309_191118	meas.	meas.	meas.
20090308_183941_20090310_183941	meas.	meas.	pred.
20090309_194840_20090311_194840	pred.	pred.	pred.
20090310_191703_20090312_191703	pred.	pred.	pred.
20090311_184526_20090313_184526	pred.	pred.	pred.
20090312_181349_20090314_181349	pred.	pred.	pred.
20090313_192248_20090315_192248	pred.	pred.	pred.
20090314_185111_20090316_185111	pred.	pred.	pred.
20090315_181934_20090317_181934	pred.	pred.	pred.
20090316_192833_20090413_192833	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. rat	io (ch. 6/	7: median)	mean ratio				
	$M_{-}CAL$	M_DL	M_DN	$M_{-}CAL$	$M_{-}DL$	$M_{-}DN$	limit	status
1	1.0212	1.0277	1.0352	1.0004	1.0025	1.0102	1.0400	OK
2	1.0041	1.0068	1.0107	1.0011	1.0019	1.0041	1.0200	OK
3	1.0043	1.0043	1.0054	1.0004	1.0005	1.0015	1.0100	OK
4	1.0013	1.0014	1.0024	1.0008	1.0002	1.0010	1.0100	OK
5	1.0033	1.0036	1.0019	1.0009	0.9985	1.0000	1.0120	OK
6	1.0039	1.0031	1.0013	1.0019	0.9979	0.9999	1.0100	OK
$\overline{7}$	1.0030	1.0012	1.0009	_	_	_	1.0070	OK
8	1.0219	1.0214	1.0122	_	_	_	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 02 Mar 2009, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20090303_132815_20090302_182812_20090304_182812 .

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 (03 Mar 2009–16 Mar 2009) to the corresponding m-factor of the previous delivery day (02 Mar 2009). The grey boxes visualize the maximum ratio allowed.