NRT M-factor delivery document 03 Oct 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: 27 Sep 2011–03 Oct 2011
- Prediction: 04 Oct 2011–10 Oct 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.

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

validity identifier	M_CAL	M_DL	M_DN
20110927_184356_20110929_184356	meas.	meas.	meas.
20110928_180711_20110930_180711	meas.	meas.	interp.
20110929_191039_20111001_191039	meas.	meas.	interp.
20110930_183354_20111002_183354	meas.	meas.	interp.
20111001_193722_20111003_193722	meas.	meas.	interp.
20111002_190037_20111004_190037	meas.	meas.	meas.
20111003_182351_20111005_182351	meas.	meas.	pred.
20111004_192720_20111006_192720	pred.	pred.	pred.
20111005_185034_20111007_185034	pred.	pred.	pred.
20111006_181349_20111008_181349	pred.	pred.	pred.
20111007_191717_20111009_191717	pred.	pred.	pred.
20111008_184032_20111010_184032	pred.	pred.	pred.
20111009_180346_20111011_180346	pred.	pred.	pred.
20111010_190715_20111107_190715	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 ratio				
	$M_{-}CAL$	$M_{-}DL$	M_DN	$M_{-}CAL$	$M_{-}DL$	M_DN	limit	status
1	1.0049	1.0707	1.0552	0.9977	0.9676	0.9771	1.0800	OK
2	1.0026	1.0363	1.0267	0.9986	0.9861	0.9896	1.0400	OK
3	1.0020	1.0123	1.0076	0.9990	0.9964	0.9971	1.0200	OK
4	1.0012	1.0028	1.0020	0.9992	0.9986	0.9987	1.0100	OK
5	1.0025	1.0022	1.0022	0.9989	0.9989	0.9990	1.0120	OK
6	1.0010	1.0011	1.0012	0.9996	1.0002	0.9996	1.0100	OK
$\overline{7}$	1.0008	1.0007	1.0010	_	_	_	1.0070	OK
8	1.0019	1.0009	1.0018	_	_	_	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{to}}$$
 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 26 Sep 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20110927_070316_20110926_192042_20110928_192042_.

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 (27 Sep 2011– 10 Oct 2011) to the corresponding m-factor of the previous delivery day (26 Sep 2011). The grey boxes visualize the maximum ratio allowed.