NRT M-factor delivery document 05 Dec 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: 29 Nov 2011–05 Dec 2011
- Prediction: 06 Dec 2011–12 Dec 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
20111129_183332_20111201_183332	meas.	meas.	meas.
20111130_193700_20111202_193700	meas.	meas.	interp.
20111201_190015_20111203_190015	meas.	meas.	interp.
20111202_182329_20111204_182329	meas.	meas.	interp.
20111203_192658_20111205_192658	meas.	meas.	meas.
20111204_185012_20111206_185012	meas.	meas.	pred.
20111205_181327_20111207_181327	meas.	meas.	pred.
20111206_191655_20111208_191655	pred.	pred.	pred.
20111207_184010_20111209_184010	pred.	pred.	pred.
20111208_180324_20111210_180324	pred.	pred.	pred.
20111209_190653_20111211_190653	pred.	pred.	pred.
20111210_183007_20111212_183007	pred.	pred.	pred.
20111211_193336_20111213_193336	pred.	pred.	pred.
20111212_185650_20120109_185650	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	1.0187	1.1883	1.1782	0.9954	0.9443	0.9573	1.1900	OK
2	1.0028	1.0633	1.0458	0.9995	0.9814	0.9864	1.0700	OK
3	1.0015	1.0181	1.0135	0.9999	0.9963	0.9958	1.0200	OK
4	1.0008	1.0027	1.0050	0.9999	0.9991	0.9971	1.0100	OK
5	1.0008	1.0017	1.0037	1.0001	1.0002	0.9983	1.0120	OK
6	1.0012	1.0026	1.0012	1.0004	1.0013	1.0001	1.0100	OK
$\overline{7}$	1.0010	1.0020	1.0013	_	_	_	1.0070	OK
8	1.0034	1.0045	1.0024	_	—	_	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 28 Nov 2011, therefore M_{t_0} is taken from the m-factor file SCI_MF1_AXNIFE20111129_081258_20111128_191017_20111130_191017 .

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 (29 Nov 2011– 12 Dec 2011) to the corresponding m-factor of the previous delivery day (28 Nov 2011). The grey boxes visualize the maximum ratio allowed.