NRT M-factor delivery document 14 Apr 2008

Klaus Bramstedt, ife Bremen

14 Apr 2008

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: 08 Apr 2008– 14 Apr 2008
- Prediction: 15 Apr 2008– 21 Apr 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
c629560ae54d50140c77de64941db269	SCI_MF1_AXNIFE20080414_223136_20080408_183650_20080410_183650
e6616efcadbfa6dcfaf532e1bd876e26	SCI_MF1_AXNIFE20080414_223136_20080409_194549_20080411_194549
62bd758da10f8ff2a8087f0487232fc0	SCI_MF1_AXNIFE20080414_223136_20080410_191412_20080412_191412
fe1d63613a1de49af5d4c016a8853c1b	SCI_MF1_AXNIFE20080414_223136_20080411_184235_20080413_184235
52d2b6f0d104b245f1e64dc1e87667c9	SCI_MF1_AXNIFE20080414_223136_20080412_181058_20080414_181058
9c237d33a29b723aee5f2b8188dd772e	SCI_MF1_AXNIFE20080414_223136_20080413_191957_20080415_191957
25ddc03022cd3a849f548365b9c4eb15	SCI_MF1_AXNIFE20080414_223136_20080414_184820_20080416_184820
b4afd0d96788573ac92337f22bbfc577	SCI_MF1_AXNIFE20080414_223136_20080415_181643_20080417_181643
420f8c3bbda513cf6ba1b446345ad414	SCI_MF1_AXNIFE20080414_223136_20080416_192541_20080418_192541
1d205772ba10423f591aae83b7fedebb	SCI_MF1_AXNIFE20080414_223136_20080417_185404_20080419_185404
bd988adc37ea3ec29bc3d638f964e1f1	SCI_MF1_AXNIFE20080414_223136_20080418_182227_20080420_182227
c70af01ab0543372bbfcdc921ccc5233	SCI_MF1_AXNIFE20080414_223136_20080419_193126_20080421_193126
5823a8c04016d6fe0ac4f79eb8eeccfc	SCI_MF1_AXNIFE20080414_223136_20080420_185949_20080422_185949
4bca376232358dd80345f7870b9cc493	SCI_MF1_AXNIFE20080414_223136_20080421_182812_20080519_182812

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

validity identifier	M_CAL	M_DL	M_DN
20080408_183650_20080410_183650	meas.	meas.	interp.
20080409_194549_20080411_194549	meas.	meas.	meas.
20080410_191412_20080412_191412	meas.	meas.	interp.
20080411_184235_20080413_184235	meas.	meas.	interp.
20080412_181058_20080414_181058	meas.	meas.	interp.
20080413_191957_20080415_191957	meas.	meas.	meas.
20080414_184820_20080416_184820	pred.	pred.	pred.
20080415_181643_20080417_181643	pred.	pred.	pred.
20080416_192541_20080418_192541	pred.	pred.	pred.
20080417_185404_20080419_185404	pred.	pred.	pred.
20080418_182227_20080420_182227	pred.	pred.	pred.
20080419_193126_20080421_193126	pred.	pred.	pred.
20080420_185949_20080422_185949	pred.	pred.	pred.
20080421_182812_20080519_182812	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. SCIAMACHY 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	197	1140	2131	3117	4151	5226	6154	7178
range	784	1859	2943	3925	4863	5914	7157	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	1.0033	1.0096	1.0206	1.0001	1.0024	1.0073	1.0400	OK
2	1.0011	1.0034	1.0074	1.0002	1.0008	1.0028	1.0200	OK
3	1.0007	1.0017	1.0035	1.0002	1.0003	1.0006	1.0100	OK
4	1.0017	1.0013	1.0018	1.0003	1.0003	1.0002	1.0100	OK
5	1.0056	1.0038	1.0046	1.0017	1.0010	1.0012	1.0120	OK
6	1.0022	1.0020	1.0010	1.0007	0.9990	0.9996	1.0100	OK
7	0.9999	0.9984	0.9986	–	–	–	1.0070	OK
8	0.9990	0.9975	0.9974	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \qquad \text{with} \quad M_{ratio,i} < l \qquad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

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 07 Apr 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080410_080825_20080407_190827_20080409_190827` .

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

[1] 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

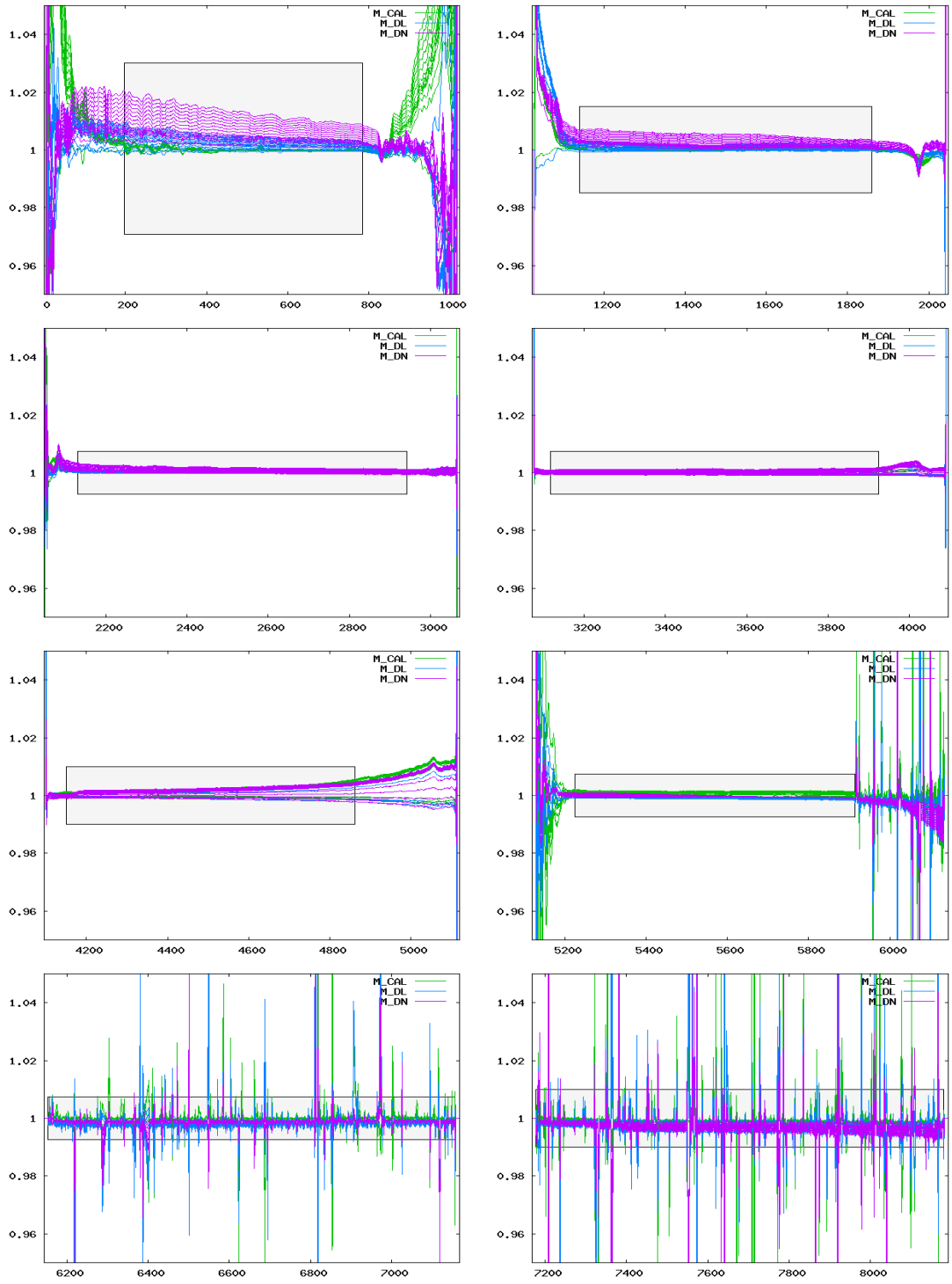

Figure 1: Ratio of delivered m-factors (08 Apr 2008– 21 Apr 2008) to the corresponding m-factor of the previous delivery day (07 Apr 2008). The grey boxes visualize the maximum ratio allowed.