NRT M-factor delivery document
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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: 06 May 2008– 12 May 2008
- Prediction: 13 May 2008– 19 May 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
dd3edc0887173864779cb9f7f00a250a	SCI_MF1_AXNIFE20080512_215706_20080506_185657_20080508_185657
edf35d0df67d063025d61dd55ecbf769	SCI_MF1_AXNIFE20080512_215706_20080507_182520_20080509_182520
fb27aefb322f3b496cc89d1bbcbbb81f	SCI_MF1_AXNIFE20080512_215706_20080508_193419_20080510_193419
59b94bf685dc2d5ca5502a9512b4bb73	SCI_MF1_AXNIFE20080512_215706_20080509_190242_20080511_190242
75fb814f7bd493fe37e53631574ebb69	SCI_MF1_AXNIFE20080512_215706_20080510_183105_20080512_183105
dc4088eadf4dd4090df103be36de292b	SCI_MF1_AXNIFE20080512_215706_20080511_194004_20080513_194004
f581acfc24ee491294dfdadf93c9faf2	SCI_MF1_AXNIFE20080512_215706_20080512_190827_20080514_190827
76629d0ae2c25ceb99a5487eef7c6be5	SCI_MF1_AXNIFE20080512_215706_20080513_183650_20080515_183650
137849e999383e76b25dc418ee9c2fb7	SCI_MF1_AXNIFE20080512_215706_20080514_194549_20080516_194549
4d33211ca8d0e27bc4986a5f2b86b08e	SCI_MF1_AXNIFE20080512_215706_20080515_191412_20080517_191412
1e99888a2fb69eaedde28f591b9035a3	SCI_MF1_AXNIFE20080512_215706_20080516_184235_20080518_184235
5a17f0b956a899724c228f31dcbcc5bd	SCI_MF1_AXNIFE20080512_215706_20080517_181058_20080519_181058
d4aa66de037af9b1b48557792d8b2d01	SCI_MF1_AXNIFE20080512_215706_20080518_191956_20080520_191956
9dbfba5a6ee557dd3f129b90c23b330a	SCI_MF1_AXNIFE20080512_215706_20080519_184819_20080616_184819

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

validity identifier	M_CAL	M_DL	M_DN
20080506_185657_20080508_185657	meas.	meas.	interp.
20080507_182520_20080509_182520	meas.	meas.	interp.
20080508_193419_20080510_193419	meas.	meas.	meas.
20080509_190242_20080511_190242	pred.	meas.	pred.
20080510_183105_20080512_183105	pred.	pred.	pred.
20080511_194004_20080513_194004	pred.	pred.	pred.
20080512_190827_20080514_190827	pred.	pred.	pred.
20080513_183650_20080515_183650	pred.	pred.	pred.
20080514_194549_20080516_194549	pred.	pred.	pred.
20080515_191412_20080517_191412	pred.	pred.	pred.
20080516_184235_20080518_184235	pred.	pred.	pred.
20080517_181058_20080519_181058	pred.	pred.	pred.
20080518_191956_20080520_191956	pred.	pred.	pred.
20080519_184819_20080616_184819	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	1.0012	1.0073	1.0178	1.0001	1.0024	1.0063	1.0400	OK
2	1.0014	1.0029	1.0072	1.0004	1.0009	1.0027	1.0200	OK
3	1.0011	1.0017	1.0034	1.0003	1.0003	1.0011	1.0100	OK
4	1.0007	1.0004	1.0012	1.0001	1.0000	1.0006	1.0100	OK
5	1.0022	1.0036	1.0016	0.9994	0.9988	0.9999	1.0120	OK
6	1.0018	1.0014	1.0012	1.0005	0.9997	1.0002	1.0100	OK
7	0.9991	0.9984	0.9989	–	–	–	1.0070	OK
8	0.9986	0.9979	0.9983	–	–	–	1.0120	OK

certain limit l:

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

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 05 May 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080505_215812_20080505_192834_20080507_192834` .

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

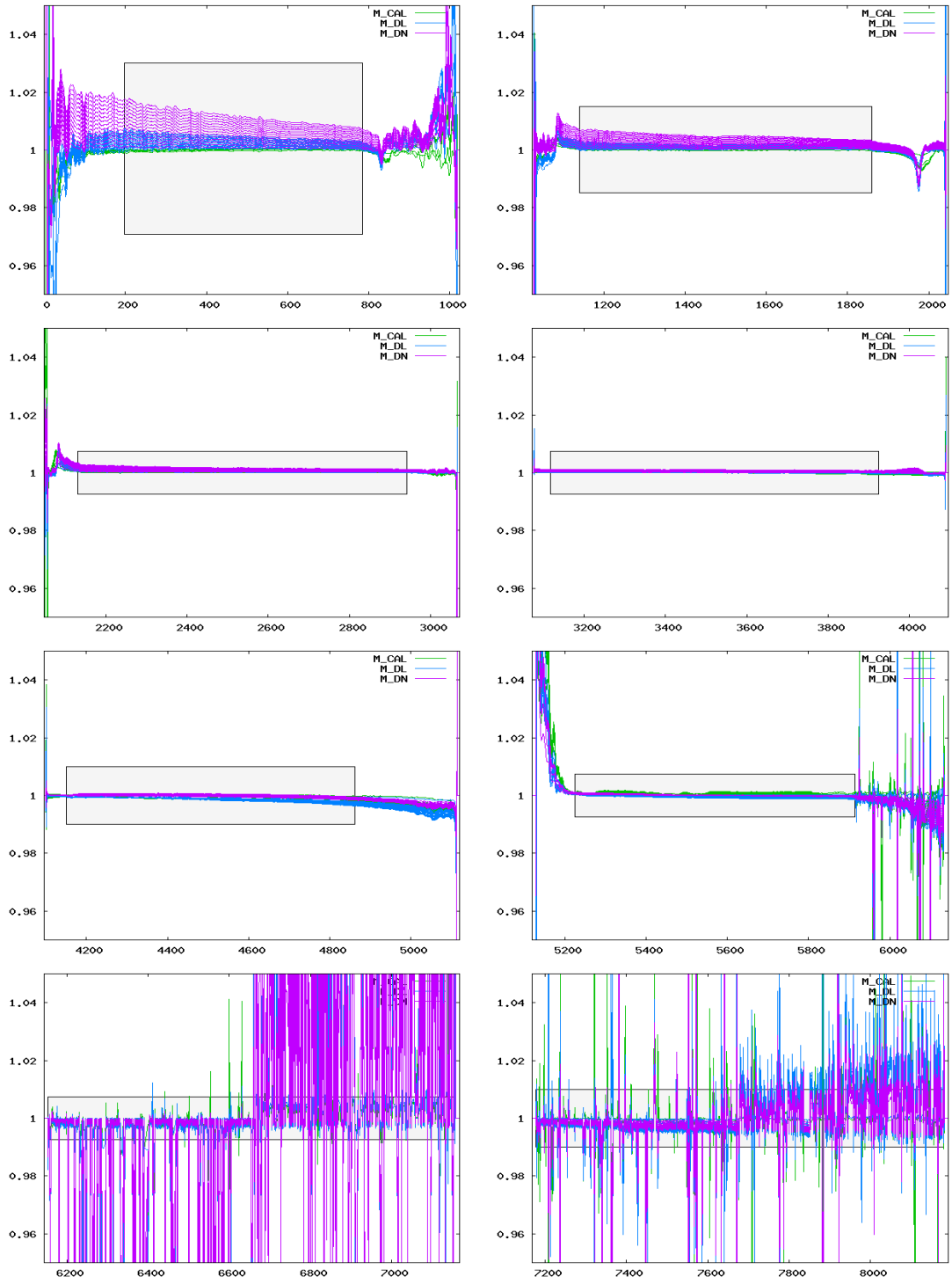

Figure 1: Ratio of delivered m-factors (06 May 2008– 19 May 2008) to the corresponding m-factor of the previous delivery day (05 May 2008). The grey boxes visualize the maximum ratio allowed.