

The CCF concept, cifbuild and calview

Carlos Gabriel & the
SAS & PPS Maintenance and Development Team

The XMM-Newton CCF and `cifbuild`



- The calibration of XMM-Newton instruments is partially independent from the development of its data analysis software, SAS
- XMM-Newton calibration data is contained in Current Calibration File (CCF)
 - CCF = the collection of **all** the XMM-Newton calibration files ever made public
 - Note: the calibration files are **updated continuously** → **NO CCF version number**
but individual calibration files versions
- Calibration Index File (CIF) necessary for data analysis, pointing to the relevant files, according to:
 - observation date
 - analysis date
- `cifbuild` operates on the calibration directory `$SAS_CCFPATH`
 - `setenv SAS_CCFPATH <ccf_dir>`
- Command: `cifbuild`
 - It produces a FITS file `ccf.cif` in the working directory, using :
 - `$SAS_ODF` for observation Date and
 - `'now'` for analysis date, unless explicitly specified

CIF is a FITS file



- The CIF file is in FITS format (you may use any FITS tool to view or work on it, e.g. fv).
- Once the Calibration Index file has been produced:

```
setenv SAS_CCF ccf.cif
```

File Edit Tools

	TELESCOP 4A	SCOPE 6A	TYPEID 32A	ISSUE I	VALDATE 19A yyyy:dd:mmZhh:mm:ss
40	XMM	EPN	LINCOORD	9	1998-01-01T00:00:00
41	XMM	EPN	MODEPARAM	3	1999-01-01T00:00:00
42	XMM	EPN	PATTERNLIB	1	1998-01-01T00:00:00
43	XMM	EPN	QUANTUMEF	8	2000-01-01T00:00:00
44	XMM	EPN	REDIST	5	1998-01-01T00:00:00
45	XMM	EPN	TIMECORR	4	1998-01-01T00:00:00
46	XMM	OM	ASTROMET	8	1998-01-01T00:00:00
47	XMM	OM	BADPIX	2	1998-01-01T00:00:00
48	XMM	OM	COLORTRANS	5	1998-01-01T00:00:00
49	XMM	OM	DARKFRAME	3	1998-01-01T00:00:00
50	XMM	OM	DIFFUSEGALA	1	1998-01-01T00:00:00
51	XMM	OM	HKPARMINT	3	1999-01-01T00:00:00
52	XMM	OM	LARGESCALESENS	2	1998-01-01T00:00:00
53	XMM	OM	LINCOORD	1	1998-01-01T00:00:00
54	XMM	OM	PHOTONAT	3	1998-01-01T00:00:00
55	XMM	OM	PIXTPIXSENS	3	1998-01-01T00:00:00
56	XMM	OM	PSFLDRB	4	1998-01-01T00:00:00
57	XMM	OM	QUICKMAG	2	1998-01-01T00:00:00
58	XMM	OM	ZODIACAL	1	1998-01-01T00:00:00
59	XMM	RGS1	ADUCONV	5	2000-02-06T16:49:60
60	XMM	RGS1	BACKGROUND	1	1998-01-01T00:00:00
61	XMM	RGS1	BADPIX	5	2000-02-06T16:49:60
62	XMM	RGS1	CALSOURCEDATA	1	1998-01-01T00:00:00
63	XMM	RGS1	CLOCKPATTERNS	1	1998-01-01T00:00:00
64	XMM	RGS1	CROSSPSF	2	2000-01-01T00:00:00
65	XMM	RGS1	CTI	2	2000-02-06T16:49:60
66	XMM	RGS1	DARKFRAME	4	1998-01-01T00:00:00
67	XMM	RGS1	HKPARMINT	6	1999-01-01T00:00:00
68	XMM	RGS1	LINCOORD	7	1998-01-01T00:00:00
69	XMM	RGS1	LINESPREADFUNC	3	1999-01-01T00:00:00

cifbuild uses single CCF keywords:

- VALDATE as start of calibration validity period
- EVALDATE as end of validity period
- DATE as analysis validity period

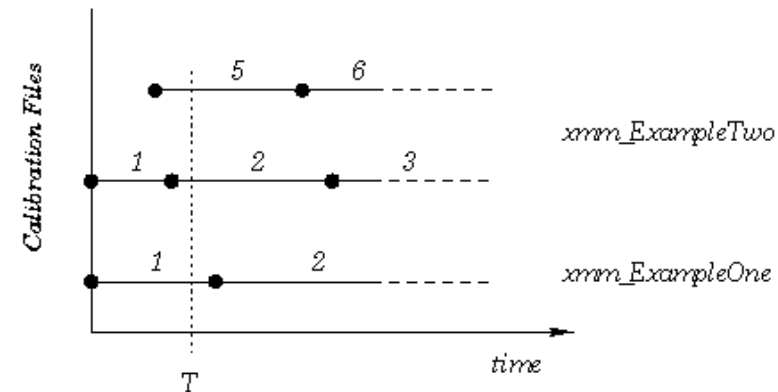


Figure 2: Current calibration file with two files: update. At the time T the current calibration file consists of *xmm_ExampleOne_0001.ccf* and *xmm_ExampleTwo_0005.ccf*

Rule: out of all the CCF calibration files take the highest issue with VALDATE lower AND EVALDATE higher than observation date AND DATE lower than analysis date.

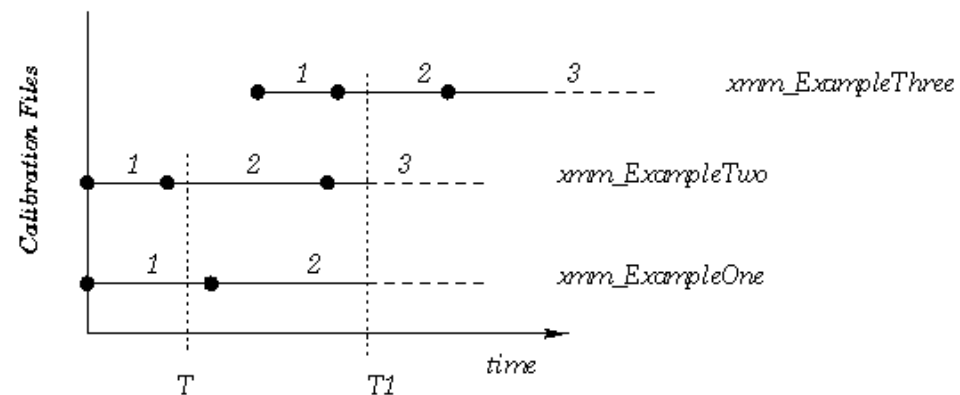


Figure 3: Current calibration file with three files. At the time $T1$ the current calibration file consists of *xmm_ExampleOne_0002.ccf* and *xmm_ExampleTwo_0009.ccf* and *xmm_ExampleThree_0002.ccf*

- On the XMM-Newton calibration web pages [http://xmm2.esac.esa.int/external/xmm_sw_cal/calib/cifbuild.shtml]:
 - ✓ updated cif can be generated on-line and compared to the provided one
 - ✓ required (missing) CCF constituents can also be downloaded
 - ✓ Local CCF library can be mirrored from XMM web site.
 - Via the **rsync** or **mirror** commands (see doc web pages)

Using cifbuild

With the following form you can interact with the SAS task **cifbuild**. Only two parameters of that task are of relevance here: the **observation date** and the **analysis date**. Both have the following format: `yyyy-mm-ddThh:mm:ss`. The string `now` is also a valid date.

The observation date is available in several places, one of these is in the ODF constituent `xxxx_0000000000_scx000000SUX.ASC`. For example:

```
OBSERVATION
0092970701 / Observation/Slew Identifier
0269 / Revolution number
2001-05-29T17:16:58 / Scheduled Start Time <-- Use this date
2001-05-29T20:47:05 / Scheduled Stop Time
```

The analysis date will in general be `now`, but can also be any other date. You should read the [documentation of the task cifbuild](#) for more details.

Observation date: [yyyy-mm-ddThh:mm:ss]
Analysis date: [yyyy-mm-ddThh:mm:ss]

Note: do not enter an analysis date earlier than 2000-12-01, as the calibration database is known **not to be complete** before then. This condition is not yet checked for in the form.

Options

- Allow me to download the CIF
This will create a CIF based on the two dates above. You'll be allowed to **ftp** the resulting CIF to your machine.
- Prepare a script to ftp all the CCF constituents
This will generate a (Unix/Linux) **shell script** with which you can download via **ftp** all the CCF constituents in the CIF. You must **copy the script** from the browser into a file, edit the **password** field, make that file **executable**, and run it in the directory where you want to download the CCF constituents.
- Compare with my CIF
My CIF is: No file chosen
This will compare a CIF you upload with the CIF generated above. You'll then be able to download the CCF constituents that are not in your CIF, but only if you have also selected one of the download options above.
- Allow me to download the individual CCF constituents
This will generate a list of **ftp links** to the individual CCF constituents.

The CCF release notes



- CCF release note shall be consulted, at least periodically.
 - ✓ Subscribing to the CCF mailing list is also useful, to get the RNs and CCFs only when there is something new:

http://xmm2.esac.esa.int/external/xmm_sw_cal/calib/rel_notes/index.shtml

XMM-Newton Current Calibration File Release Notes

The table lists the CCF release notes. The last four columns indicate to which component the CCFs described in this release note are relevant. Additionally, look at:

- [Release Notes listed per CCF](#)
- [List of Calibration Files](#)
- [Calibration documentation](#) (technical notes)

Reference	Title	Date	XRT	EPIC	RGS	OM
XMM-CCF-REL-286	Astrometry: time dependent boresight	24-May-2012		X		
XMM-CCF-REL-285	EPIC-pn HW Closed Outset Maps for Timing and Burst Modes	23-May-2012		X		
XMM-CCF-REL-283	EPIC-pn spatial CTI correction	24-May-2012		X		
XMM-CCF-REL-281	Support to the X-ray Loading correction in EPIC-pn Fast Modes	12-Apr-2012		X		
XMM-CCF-REL-280	2-D PSF parameterization	28-Mar-2012		X		
XMM-CCF-REL-279	Update of EPIC MOS gain	16-Feb-2012		X		
XMM-CCF-REL-278	Update of EPIC MOS CTI	16-Feb-2012		X		
XMM-CCF-REL-277	2-D PSF spoke parameterization	01-Dec-2011		X		
XMM-CCF-REL-276	EPIC-pn Bad Pixels	16-Sep-2011		X		
XMM-CCF-REL-275	Modification of the RGS line-spread function	17-Dec-2011			X	
XMM-CCF-REL-274	OM Photometry	24-May-2011				X
XMM-CCF-REL-273	EPIC MOS response	24-Mar-2011		X		
XMM-CCF-REL-272	EPIC MOS response	31-Jan-2011		X		
XMM-CCF-REL-271	EPIC-pn Long-Term CTI	21-Dec-2010		X		
XMM-CCF-REL-270	EPIC MOS Fixed Offset Tables	11-Sep-2010		X		
XMM-CCF-REL-269	CCF implementation of RGS-pn rectification	16-Dec-2010			X	
XMM-CCF-REL-267	EPIC MOS response	29-Jul-2010		X		
XMM-CCF-REL-266	Refinement of pn redistribution	17-Jun-2010		X		
XMM-CCF-REL-265	RAVY-dependent calibration of the PATTERN fraction in EPIC-pn Timing Mode	17-Jun-2010		X		
XMM-CCF-REL-264	2-D PSF Gaussian parameterization	06-May-2010		X		
XMM-CCF-REL-263	2-D PSF parameterization	07-May-2010		X		
XMM-CCF-REL-262	The RGS effective area incorporating exponential contamination and a mechanism for rectification	20-Apr-2010			X	
XMM-CCF-REL-261	RGS Background Spectra Templates in Wavelength space	16-Apr-2010			X	
XMM-CCF-REL-260	EPIC MOS Quantum Efficiency	15-Jan-2010		X		
XMM-CCF-REL-259	Spectral quality-related CCF XMM-SPECQUAL	13-Apr-2010		X	X	
XMM-CCF-REL-258	Update of EPIC MOS gain	07-Oct-2009		X		
XMM-CCF-REL-257	Update of EPIC MOS CTI	16-Sep-2009		X		

Keeping everything: Diogenes syndrom?



Wikipedia: Diogenes syndrome, also known as **senile squalor syndrome**, is a disorder characterized by extreme [self-neglect](#), domestic squalor, social withdrawal, [apathy](#), [compulsive hoarding of rubbish](#), and [lack of shame](#)

- **All** the calibration files are **kept** in the **CCF repository** only to be able to **reproduce** calibration conditions met in the past (SAS can reduce data as it would have been done with the calibration knowledge of years ago).
- Many CCF files have been superseded by more accurate calibration and will never be used by a normal observer (eg. using the default "analysisdate=now").
- We have produced a reduced repository for all those observers, who do not want to mirror the entire repository but only the **relevant part** for an up-to-date data reduction.
- All the calibration files from before January 2004, which have been **superseded**, are not present in this repository. A new reduced version (taking January 2008 as new date) is under preparation
- The repository has as of today a volume of ~ 2.8 GB, while the reduced repository is about 1.7 GB

All the important bits for you together



- CCF Library: All CCF ever made public
 - ftp: <ftp://xmm.esac.esa.int/pub/ccf/constituents>
 - rsync: `rsync -a xmm.esac.esa.int::XMM_CCF`
- Reduced CCF Library: (former - superseded after 1/2004)
 - ftp: ftp://xmm.esac.esa.int/pub/ccf/red_constituents
 - rsync: `rsync -a xmm.esac.esa.int::XMM_RED_CCF`
- CCF on the net:
 - http://xmm2/esac/esa/int/external/xmm_sw_cal/calib/cifbuild/
- CCF Release Notes: justifying calibration files releases
 - http://xmm2/esac/esa/int/external/xmm_sw_cal/calib/rel_notes/
- CCF Web page: main CCF page
 - http://xmm2/esac/esa/int/external/xmm_sw_cal/calib/ccf.shtml

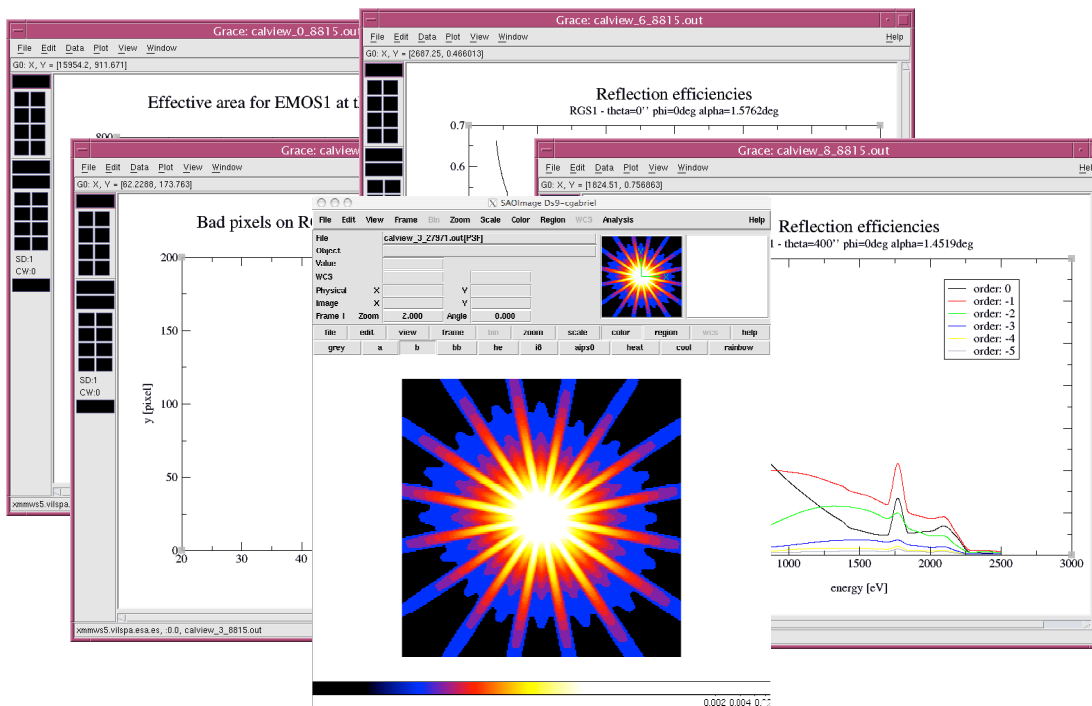
calview: plotting CCF data and more



XMM-Newton Calibration DB: Calibration Access Layer CAL
(calibration algorithms & access functions) + CCF

calview: SAS task to access the calibration data

- using `$SAS_CCF` to define which calibration files should be using
- using `$SAS_CCFPATH` to locate the files



CalView

File CCF View Style Help

Calibration State Editor

Instrument	EMOS1
CCD	1
Node	PRIMARY
Filter	Medium
Mode	PrimeFullWindow
CCD Temperature (K)	99
Camera Temperature (K)	99
On-Chip Binning	0
Date	1999-12-10T14:32:00
Accuracy Level	LOW
Randomization	yes

Calibration Viewer State Editor

Energy (eV)	99
Theta (arcsec)	0
Phi (deg)	0
Order	0

CCF Access Log

```
/sas/CCFdir/RGS1_LINCOORD_0007.CCF  
/sas/CCFdir/RGS1_LINESPREADFUNC_0003.CCF  
/sas/CCFdir/RGS1_QUANTUMEF_0006.CCF  
/sas/CCFdir/XMM_MISCDATA_0013.CCF
```