
The 3XMM catalogue

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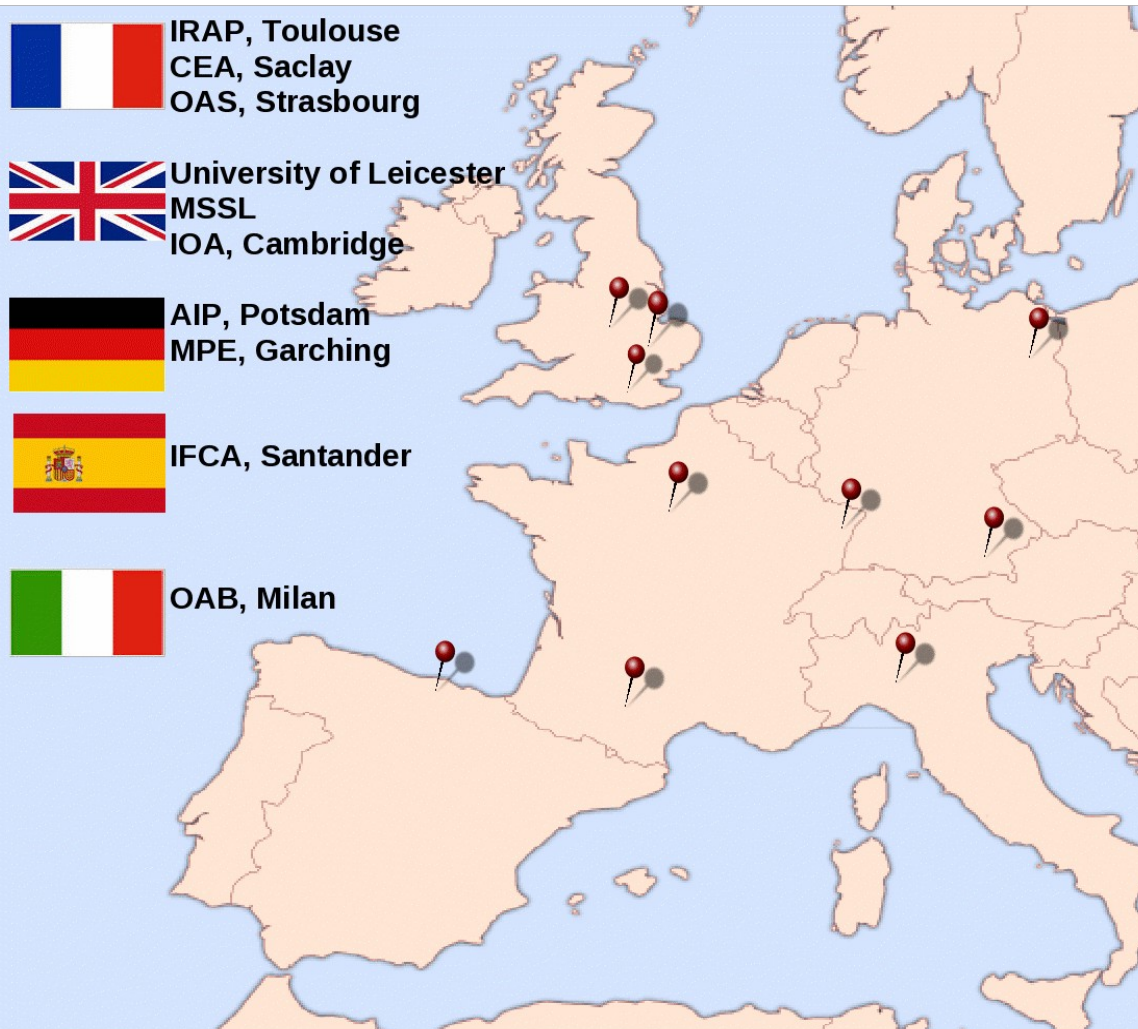


and for the XMM-Newton Survey Science Centre (SSC)



XMM-Newton Survey Science Centre (SSC)

The XMM-Newton Survey Science Centre was selected by ESA to ensure that the scientific community can exploit XMM-Newton data



Responsibilities :

Development of science analysis software (SAS)

Pipeline processing of all XMM-Newton observations.

Follow-up/identification of the XMM-Newton serendipitous sky - the XID Programme

Compilation of the Serendipitous Source Catalogue.



3XMM-DR7



3 February 2000 – 15 December 2016 – made public 1st June 2017 !

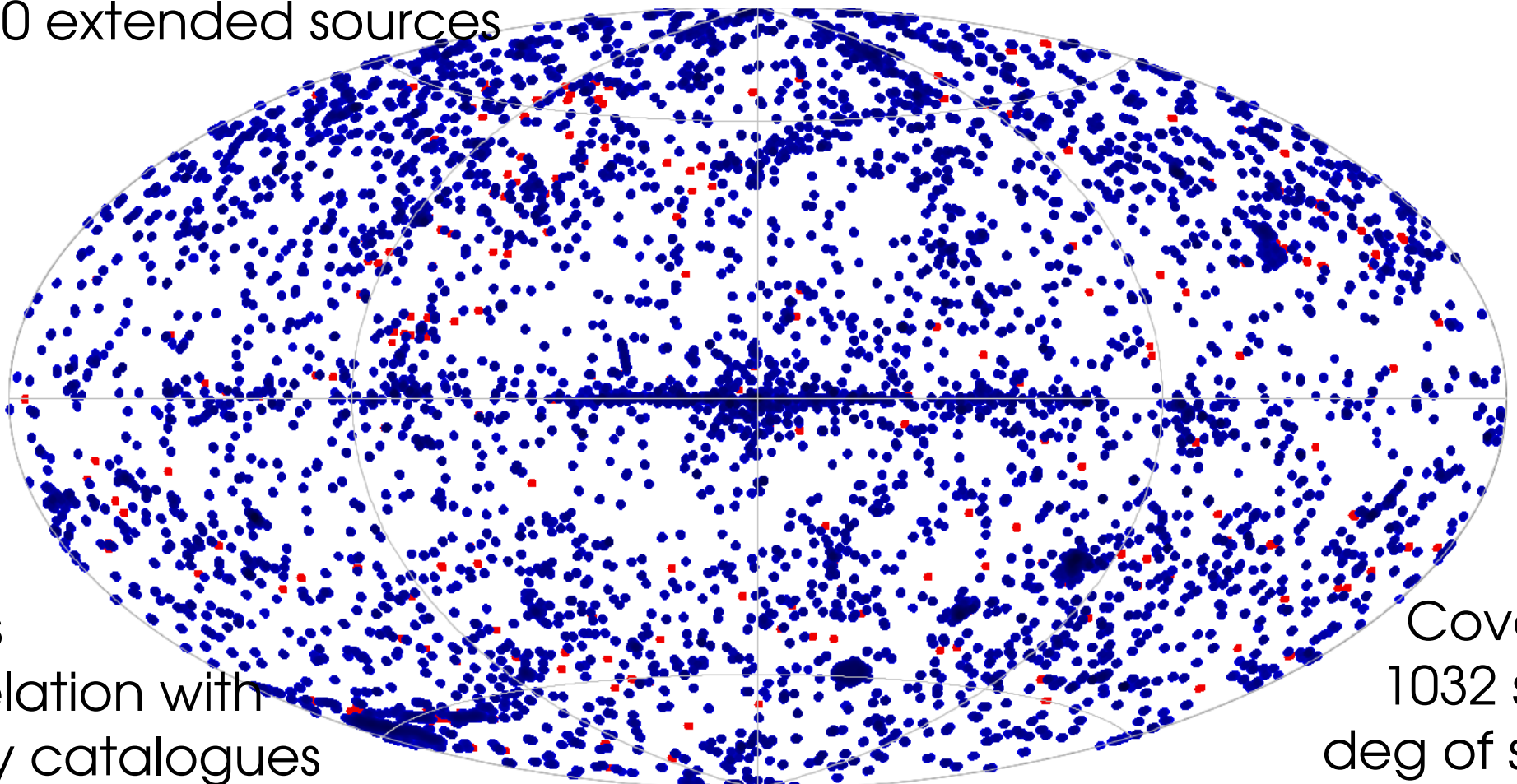
727790 detections, some sources up to 59 times

499266 unique sources

162045 sources with spectra and lightcurves

11220 extended sources

Rosen, Webb
et al. (2016)



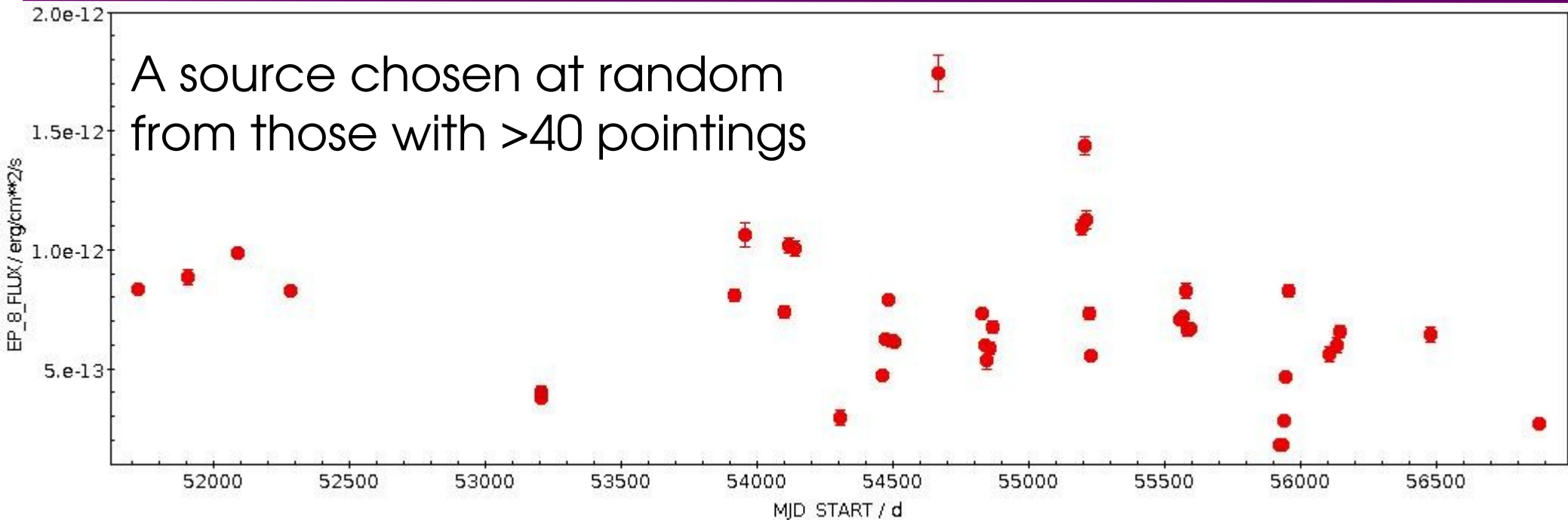
Cross
correlation with
many catalogues

Covers
1032 sq.
deg of sky



Natalie Webb

The X-ray Universe 2017, Rome, Italy



In 3XMM-DR7, the median flux :

$\sim 1.9 \times 10^{-14}$ erg cm $^{-2}$ s $^{-1}$ (0.2 - 12.0 keV)

$\sim 23\%$ sources fluxes $< 1 \times 10^{-14}$ erg cm $^{-2}$ s $^{-1}$ (0.2 - 12.0 keV)

$\sim 6 \times 10^{-15}$ erg cm $^{-2}$ s $^{-1}$ (0.2 - 2.0 keV)

$\sim 8 \times 10^{-15}$ erg cm $^{-2}$ s $^{-1}$ (2.0 - 12.0 keV)

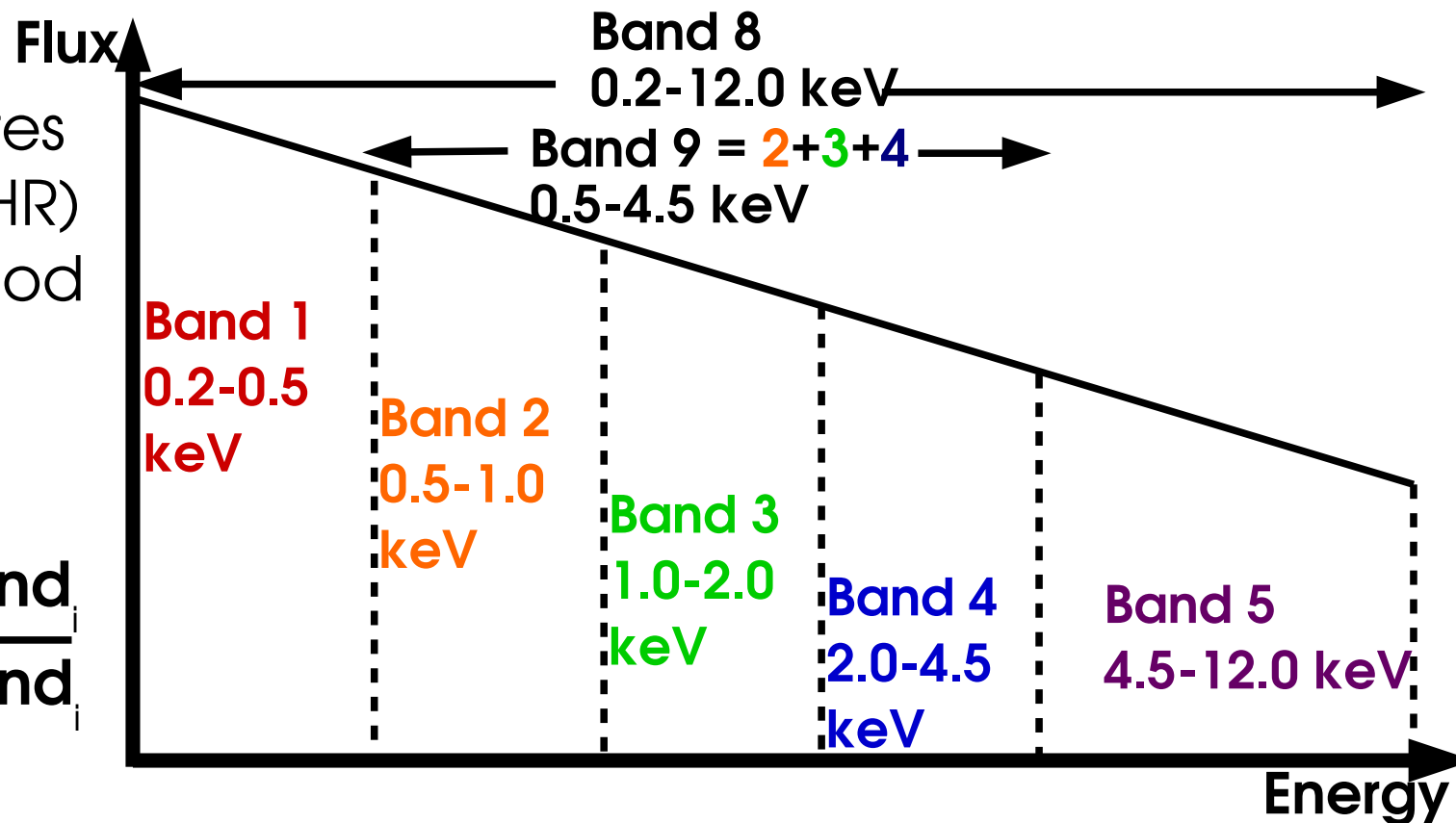
5631 sources variable ($\chi^2 < 1 \times 10^{-5}$)

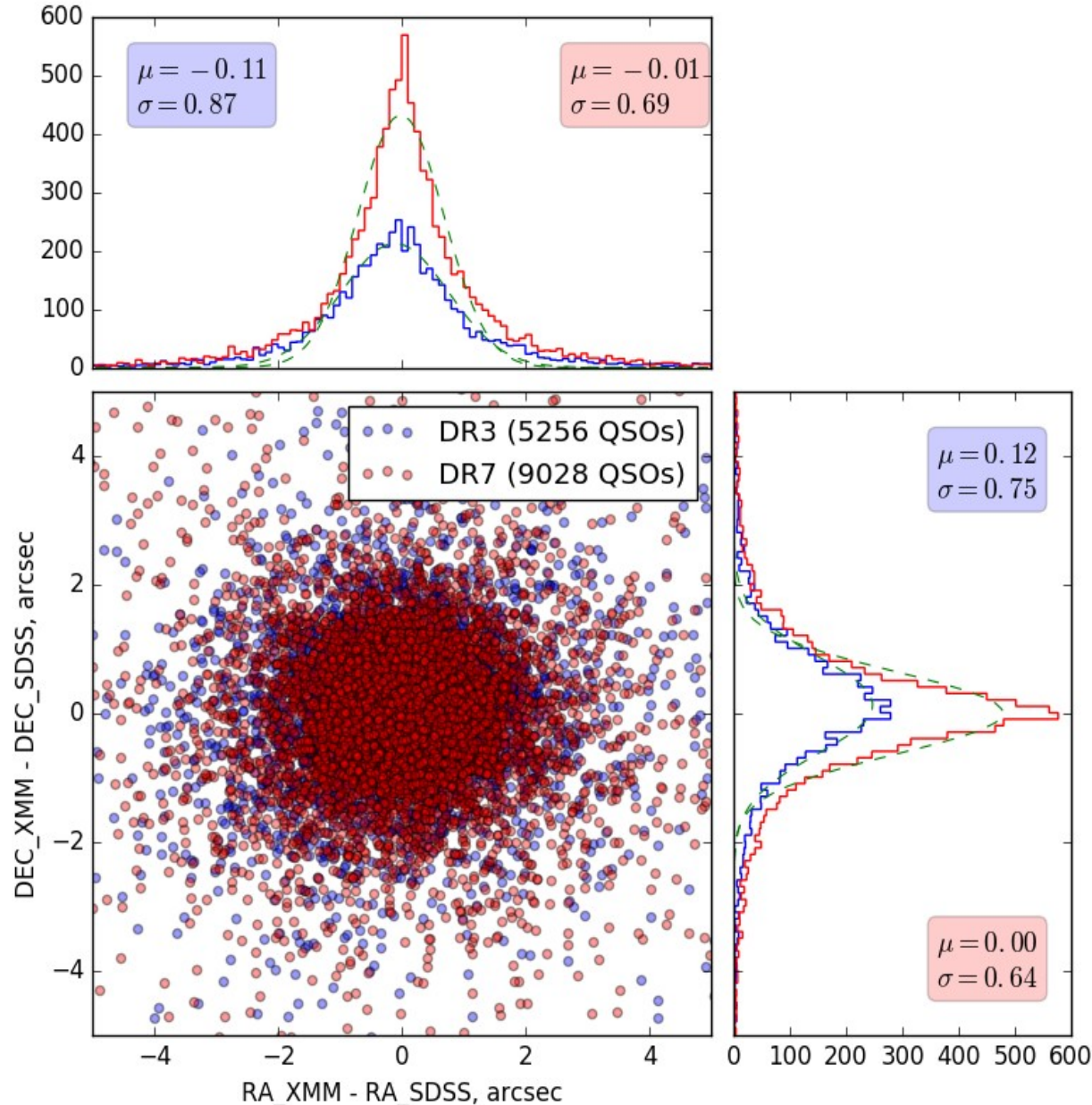


332 columns of information including :

- Identifiers/coordinates
- Observation date/time and observing mode
- Exposure
- /background info
- Extent
- Counts/fluxes/rates
- Hardness ratios (HR)
- Maximum likelihood
- Quality flags
- Variability

$$HR_i = \frac{\text{Band}_{i+1} - \text{Band}_i}{\text{Band}_{i+1} + \text{Band}_i}$$



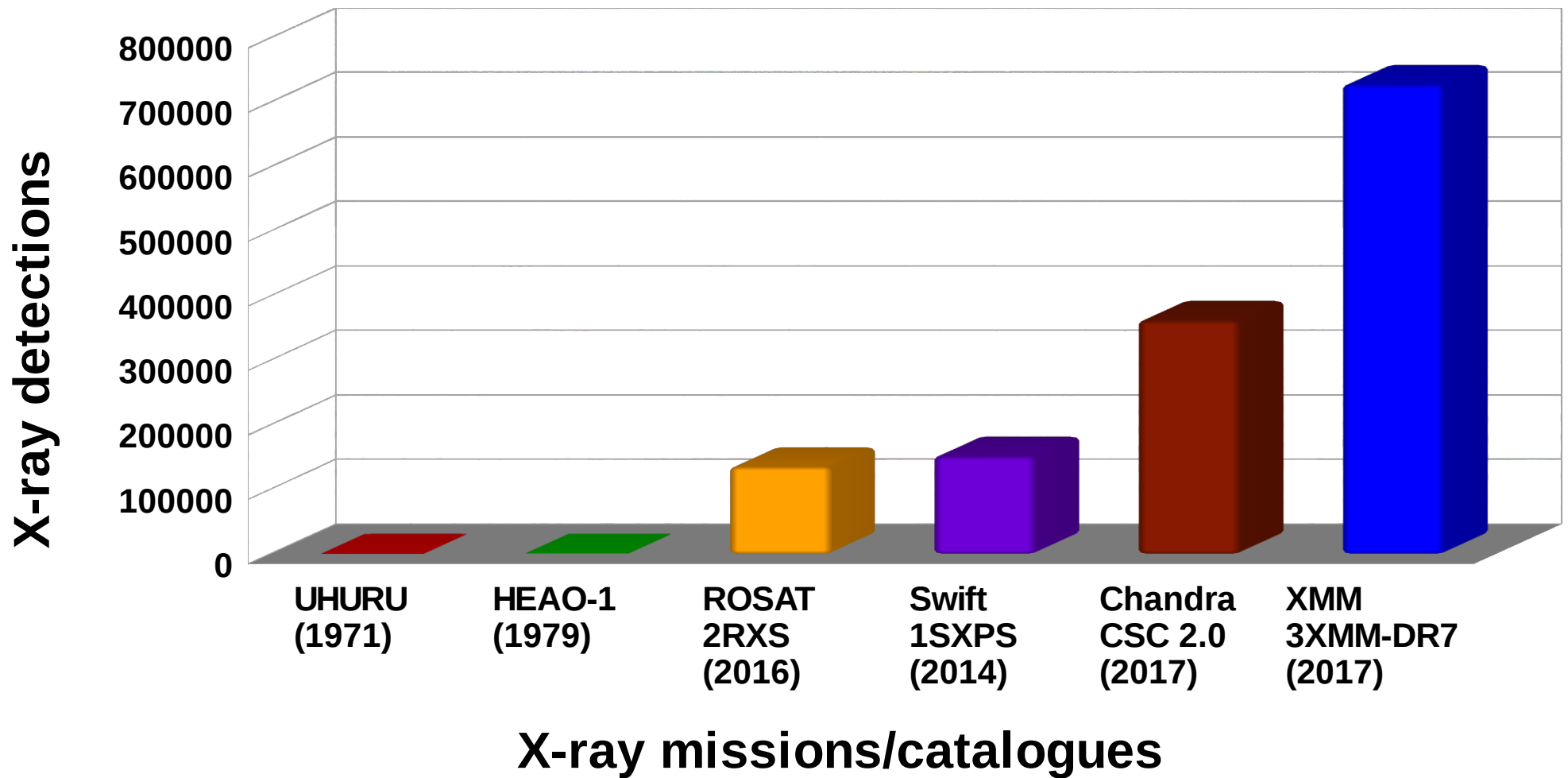


Astrometry

- Cross-match with latest version of SDSS quasars catalogue
- Comparison between 2XMM-DR3 and 3XMM-DR7

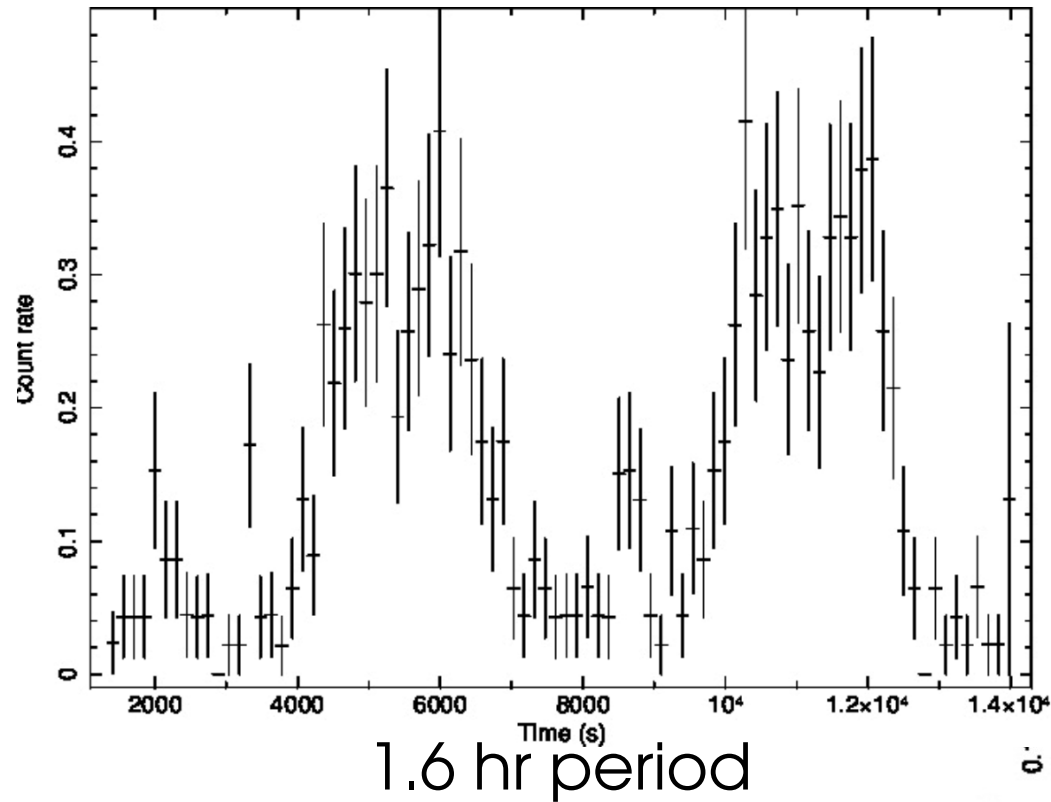


3XMM-DR7 – relative size



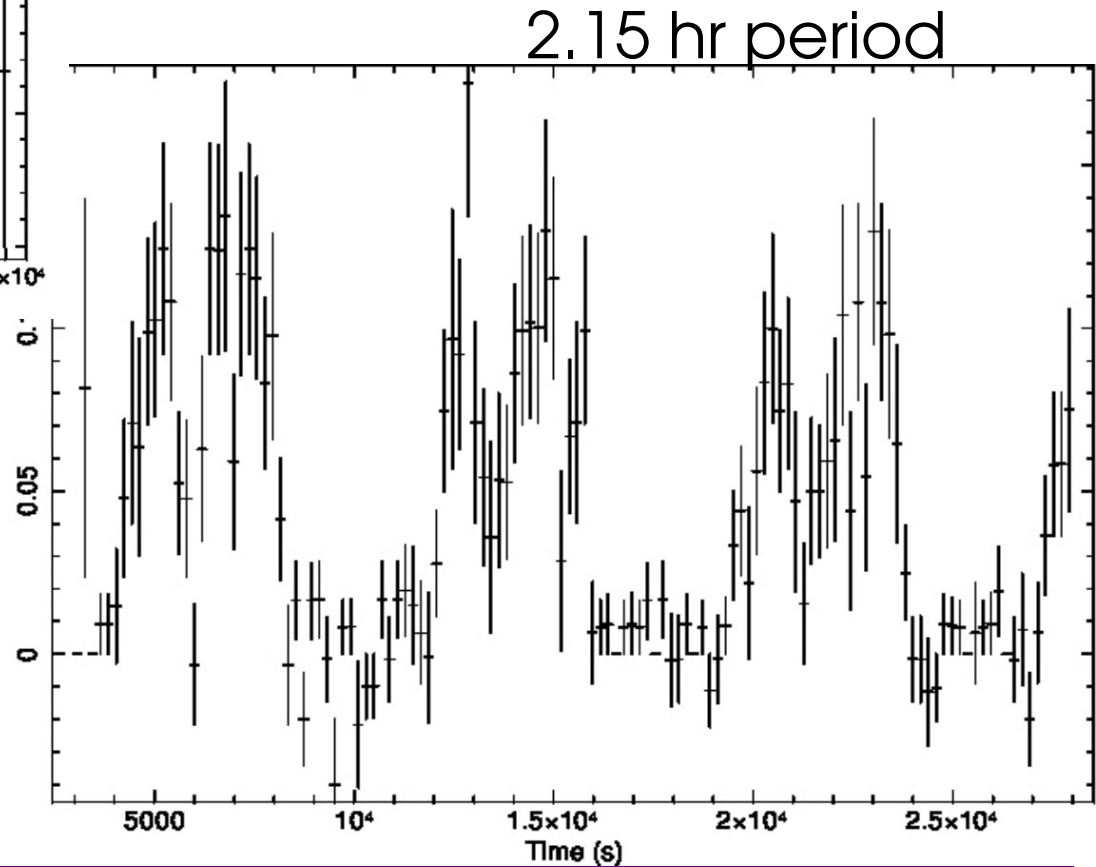
The catalogue is excellent for :

- Quick access to data products (fluxes, spectra, images, etc)
- Finding new objects
- Population studies
- Cross correlation for multi-wavelength studies

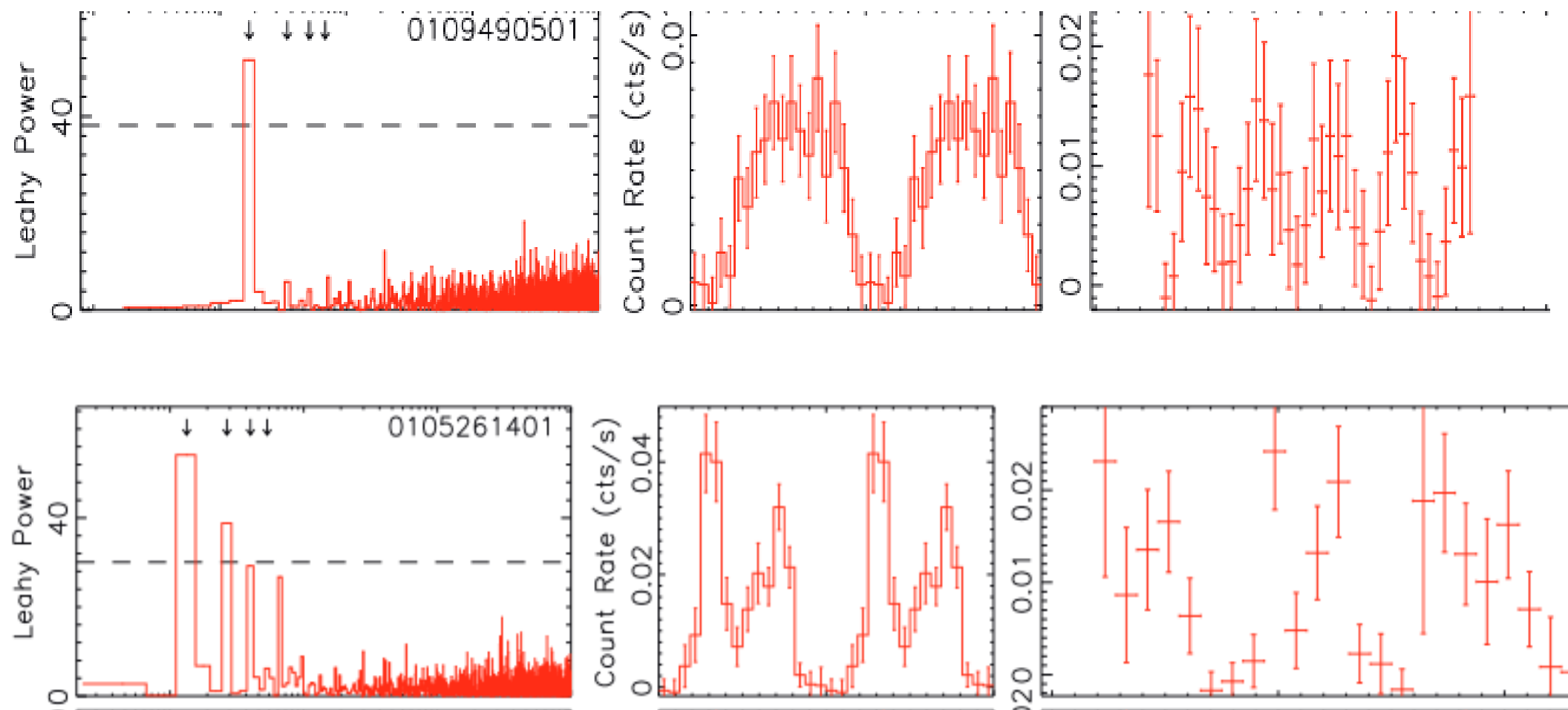


2 magnetic cataclysmic variables (CVs)

(Webb et al., submitted)



Accreting compact objects

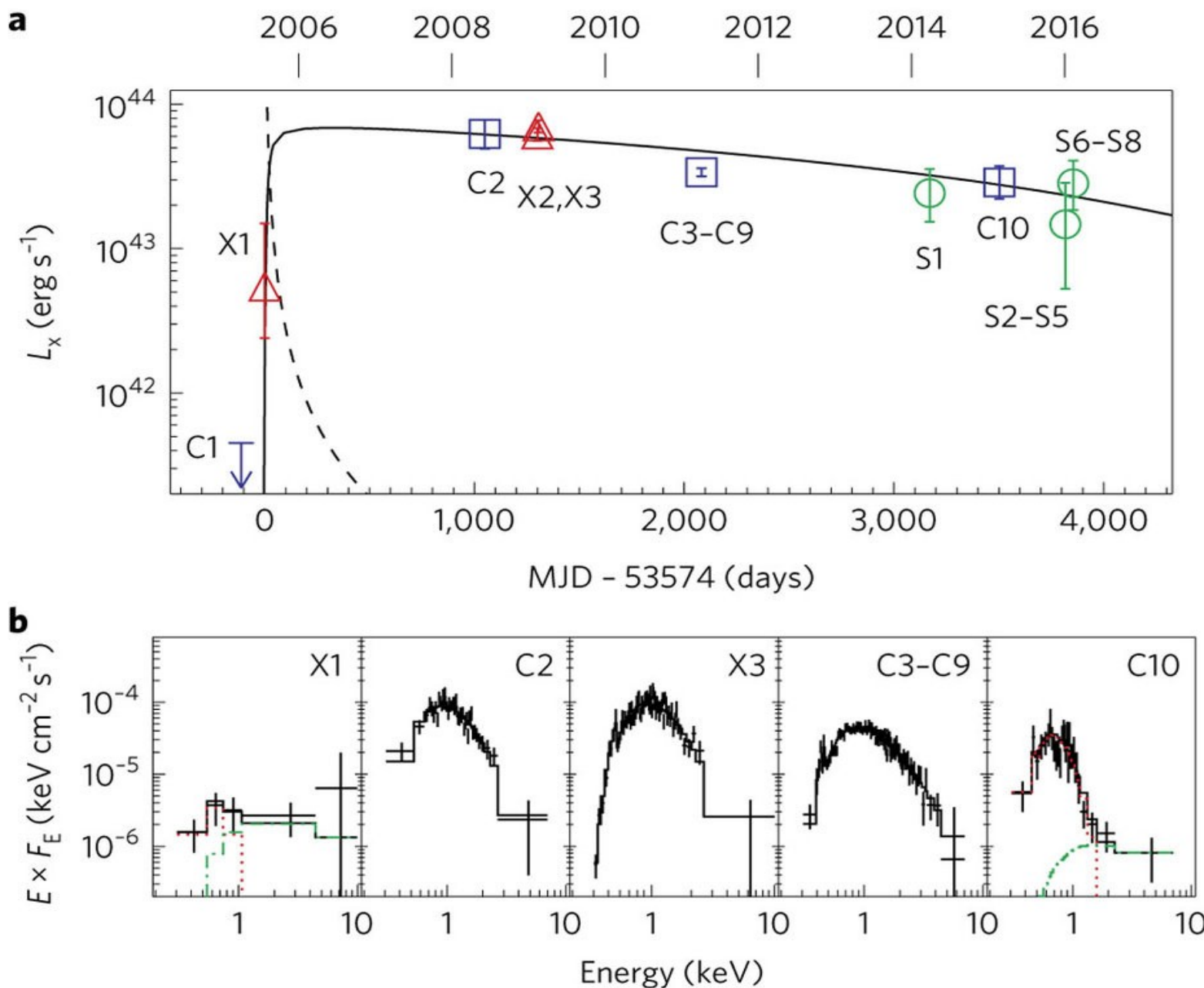


2 more magnetic CVs

(Lin, Webb & Barret, 2014)



Extreme tidal disruption event



Lin et al.
(2017)

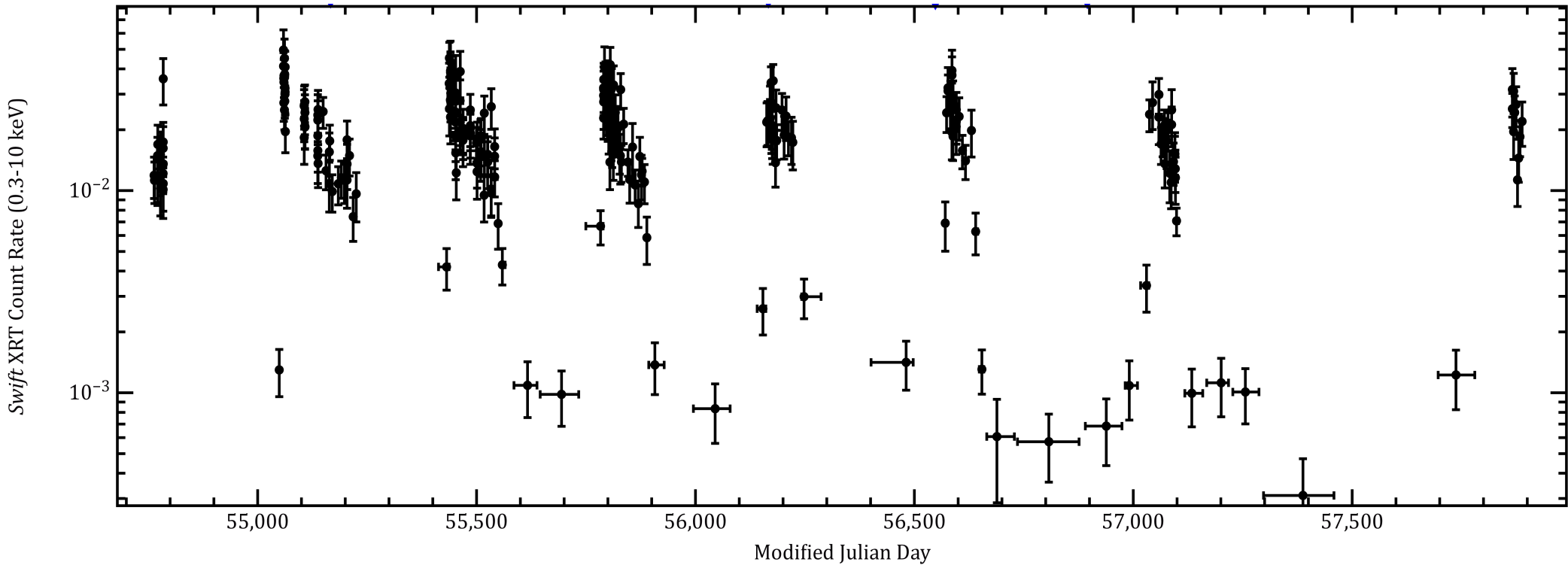
See also
poster by
Sébastien
Soler
J20
for
other
examples

HLX-1

ID	Observatory	Date	Spectral model	χ^2/dof	Luminosity
R1	Rosat	1990 Jul 11-1991 Aug 13*	-	-	<11
R2	Rosat	1992 Jun 20-1993 Jul 10	-	-	<0.9
X1	XMM-Newton	2004 Sep 23	$\Gamma=3.4\pm 0.3$ -----	113.4/108	$11\pm_{4.0}^{0.1}$

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HLX-1

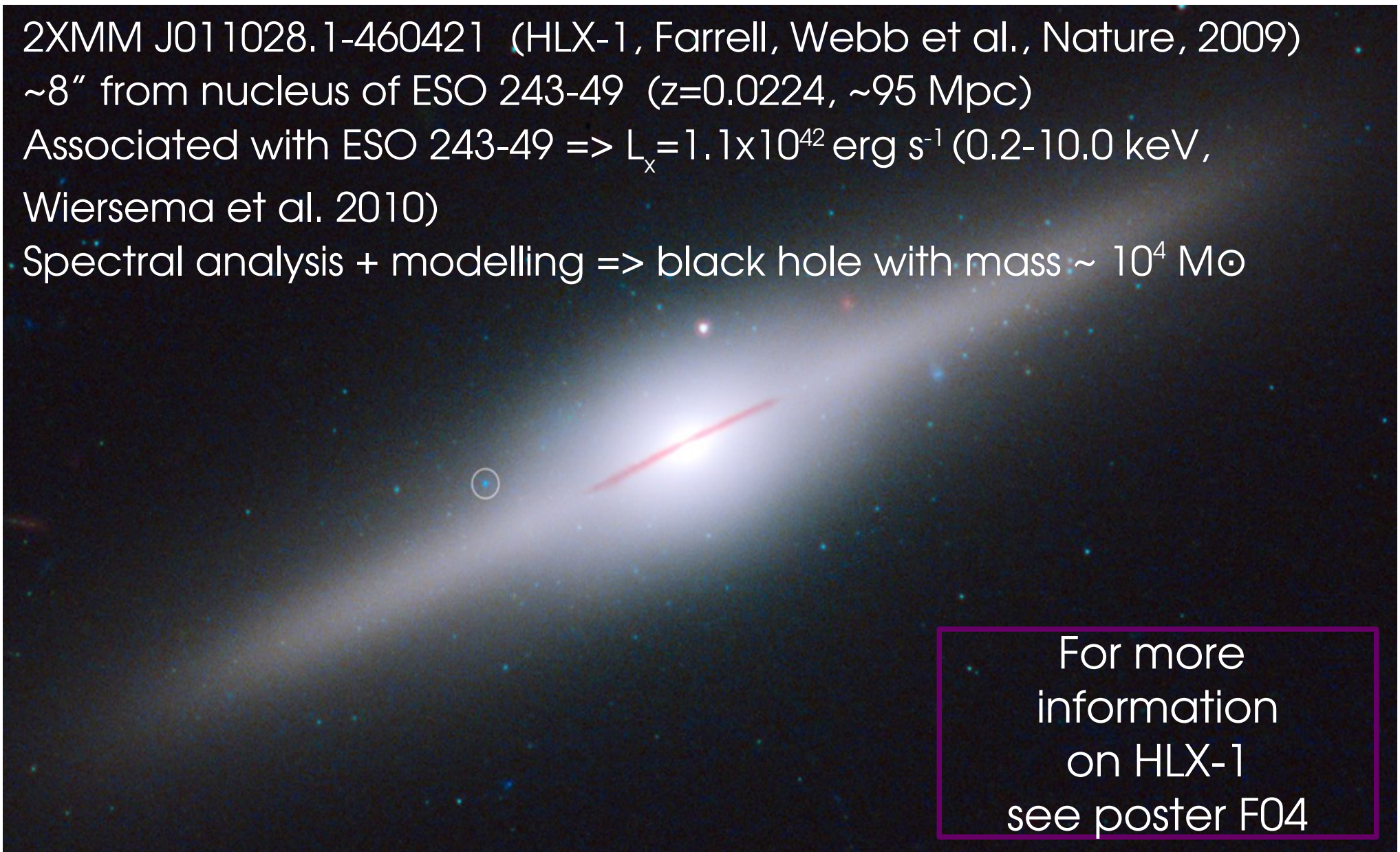
2XMM J011028.1-460421 (HLX-1, Farrell, Webb et al., Nature, 2009)

~8" from nucleus of ESO 243-49 ($z=0.0224$, ~95 Mpc)

Associated with ESO 243-49 $\Rightarrow L_x = 1.1 \times 10^{42} \text{ erg s}^{-1}$ (0.2-10.0 keV,

Wiersema et al. 2010)

Spectral analysis + modelling \Rightarrow black hole with mass $\sim 10^4 M_\odot$



For more
information
on HLX-1
see poster F04

Stacked catalogue

New stacked source detection tasks in SAS to

- provide a standardised source-detection method for overlapping observations
- more convenient handling of multiple pointings for the users
- optimize stacked source parameters
- basis of a “stacked catalogue” of repeatedly observed sources

Images stacked with *emldetect*

Source detection using *edetect_stack*

<u>#OBS</u>	<u>#grps</u>
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2	204
---	-----

3	40
---	----

4	10
---	----

5-8	4-6
-----	-----

9,10,12	1 each
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Proto-catalogue:

736 observations,

278 stacks,

≥ 25,500 detections

SUSS 3.0

Field of view coincides with 3XMM FOV

6,880,116 detections

4,751,899 unique sources

867,022 have multiple entries

Visible (U, B and V) and UV (UVW1, UVM2 and UVW2)

Detections down to AB magnitude: FWHM (")

UVW2~ 23.0 1.98

UVM2~ 24.1 1.8

UVW1~ 24.8 2.0

U ~ 25.2 1.55

B ~ 24.0 1.39

V ~ 23.4 1.38

(Page et al. 2012)

4XMM

3XMM-DR8 planned for first half of 2018

4XMM anticipated for 2019

- full re-reduction of all data (~10500 obs.) with improved software and improved calibration

to include :

- variability between observations in catalogue
- added variability analysis
- improved source flagging
- sky exposure for population studies

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Summary

Wide range of rare objects found in 3XMM catalogue

New incremental version planned for 2018 (DR8)

New major version, 4XMM-DR9 planned for 2019

Access the catalogue :

XMM-Newton SSC webpages : <http://xmmssc.irap.omp.eu>

But also at :

XSA at ESA's XMM-Newton SOC : <http://xmm.esac.esa.int/xsa/>

XCAT-DB at : <http://xcatdb.unistra.fr/3xmmdr7>

The IRAP catalogue server XSA : <http://xmm-catalog.irap.omp.eu/>

Browse at HEASARC NASA GSFC :

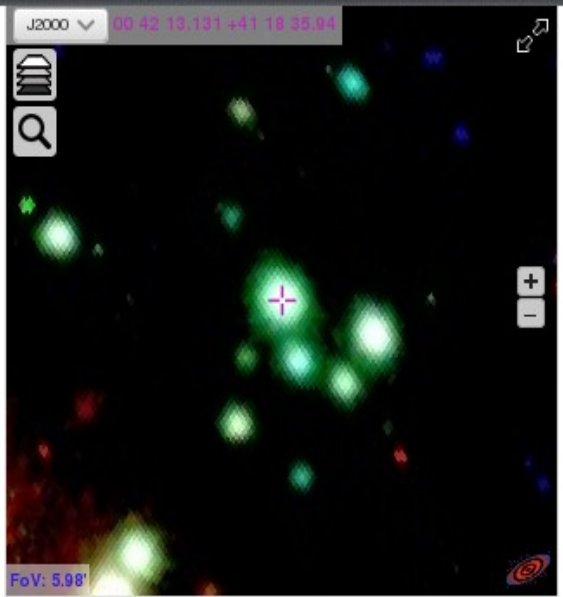
<http://heasarc.gsfc.nasa.gov/db-perl/W3Browse/w3browse.pl>

LEDAS at : <http://www.ledas.ac.uk/>

ESA sky : <http://sky.esa.int/>

Backup slides

Backup slides



sc_ep_1_flux	2.83214e-15 ± 8.93324e-17	sc_ep_2_flux	4.15314e-14 ± 3.17139e-16
mjd_first	51720.4884491	sc_ep_3_flux	1.94199e-13 ± 7.02137e-16
mjd_last	56479.4418866	sc_ep_4_flux	2.50582e-13 ± 1.3788e-15
sc_chi2prob	0.00323261	sc_ep_5_flux	8.57917e-14 ± 2.47017e-15
sc_ra	10.5547131248	sc_ep_8_flux	5.55128e-13 ± 3.0474e-15
sc_dec	41.3099819881	sc_ep_8_fmax	1.74306e-12 ± 7.50653e-14
sc_poserr	0.0484553	sc_ep_8_fmin	1.77926e-13 ± 1.00496e-14
sc_det_ml	47769.8	sc_ep_9_flux	4.01314e-13 ± 1.18207e-15
sc_ext_ml	0.0	sc_extent	0.0
sc_fvar	0.252154 ± 0.0542623	sc_hr1	0.86285 ± 0.00386822
sc_hr2	0.629318 ± 0.00244231	sc_hr3	-0.341634 ± 0.00264739
sc_hr4	-0.808007 ± 0.00395566	sc_sum_flag	1
sc_var_flag	False	confused	False

This source in external databases: [XCatDB](#), [Chandra CSC 20" VO Table](#), [Swift 1SXPS 20"](#), [RCSED](#), [Simbad 2'](#), [VizieR 20"](#), [NED 2'](#)

Detections (observations of this source at different epochs)

detid	revolut	obs_id	src_num	poserr	ep_8_flux	utc_start	exptime	ep_offax	spectrum
101125704010012	0100	0112570401	12	0.329335	8.36703e-13	2000-06-25 11:43:22.000	31232	5.27103	True (Fit spectrum)
101125706010013	0193	0112570601	13	0.327963	8.83526e-13	2000-12-28 00:51:02.000	9849	5.96841	True (Fit spectrum)
101092701010011	0285	0109270101	11	0.223599	9.89186e-13	2001-06-29 06:59:13.000	52508	5.30718	True (Fit spectrum)
101125701010013	0381	0112570101	13	0.33079	8.2724e-13	2002-01-06 18:44:42.000	61198	6.07995	True (Fit spectrum)
102022302010031	0843	0202230201	31	0.266496	4.0448e-13	2004-07-16 16:40:09.000	18335	4.27041	True (Fit spectrum)
102022303010030	0843	0202230301	30	0.276143	4.00074e-13	2004-07-17 12:30:57.000	23196	4.26273	True (Fit spectrum)