J/ApJ/823/95 CANDELS GOODS-S sources Chandra counterparts (Cappelluti+, 2016)

Chandra counterparts of CANDELS GOODS-S sources.
Cappelluti N., Comastri A., Fontana A., Zamorani G., Amorin R.,
Castellano M., Merlin E., Santini P., Elbaz D., Schreiber C., Shu X.,
Wang T., Dunlop J.S., Bourne N., Bruce V.A., Buitrago F., Michalowski M.J.,
Derriere S., Ferguson H.C., Faber S.M., Vito F.
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quasars: supermassive black holes

Abstract:
Improving the capabilities of detecting faint X-ray sources is fundamental to increase the statistics on faint high-z AGN and star-forming galaxies. We performed a simultaneous Maximum Likelihood PSF fit in the [0.5-2]keV and [2-7]keV energy bands of the 4Ms Chandra Deep Field South (CDFS) data at the position of the 34930 CANDELS H-band selected galaxies. For each detected source we provide X-ray photometry and optical counterpart validation. We validated this technique by means of a raytracing simulation. We detected a total of 698 X-ray point-sources with a likelihood L>4.98 (i.e.> 2.7σ). We show that the prior knowledge of a deep sample of Optical-NIR galaxies leads to a significant increase of the detection of faint (i.e. ~10^{-17}cgs in the [0.5-2]keV band) sources with respect to "blind" X-ray detections. By including previous catalogs, this work increases the total number of X-ray sources detected in the 4Ms CDFS, CANDELS area to 793, which represents the largest sample of extremely faint X-ray sources assembled to date. Our results suggest that a large fraction of the optical counterparts of our X-ray sources determined by likelihood ratio actually coincides with the priors used for the source detection. Most of th e new detected sources are likely star-forming galaxies or faint absorbed AGN. We identified a few sources sources with putative photometric redshift z>4. Despite the low number statistics, this sample significantly increases the number of X-ray selected candidate high-z AGN.

Description:
The 4Ms CDFS consists of 23 observations described in Table 1 of Luo et al. (2008, Cat. J/ApJS/179/19) plus other 31 pointings described in X11 for a total exposure of ~4Ms. For the purpose of this paper we employed only observations taken with a focal temperature of ≤-120°C since at higher T the background cannot be modeled with our technique.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
catalog.dat	461	698	List of detected Chandra counterparts
catalog.fits	2880	57	Fits version fot eh catalog

See also:
J/ApJS/179/19 : CDFS survey: 2 Ms source catalogs (Luo+, 2008)
J/ApJS/195/10 : The CDF-S survey: 4Ms source catalogs (Xue+, 2011)
J/ApJ/801/97 : GOODS-S+UDS stellar mass catalogs from CANDELS (Santini+, 2015)

Byte-by-byte Description of file: catalog.dat

Bytes	Format	Units	Label	Explanations
1- 3	I3	---	NID	? ID of the X-ray source (NID)
5- 9	I5	---	PID	? CANDELS ID of the optical source used as prior for the X-ray source detection (PRIOR_ID)
11	I1	---	f_PID	? Flag to determine the reliability of the association with a prior (FLAG_PRIOR)
13- 17	I5	---	BID	? CANDELS ID of the primary optical counterpart of the X-ray source from LR (BEST_ID)
19- 24	I6	---	SID	? CANDELS ID of the second best optical counterpart of the X-ray source from LR (SECOND)
26- 27	I2	---	Qual	? Quality of the identification flag (FLAG)
29- 38	F10.6	deg	RAdeg	Best fit right ascension of the X-ray centroid (J2000) (RA_X)
40- 49	F10.6	deg	DEdeg	Best fit declination of the X-ray centroid (J2000) (DEC_X)
51- 58	F8.6	arcsec	e_Pos	Error on the X-ray centroid position (RADEC_ERR)
60- 68	F9.7	---	Sep	Distance from the best optical counterpart (SEP)

70- 81	E12.6	ct	ctF	Counts in [0.5-7] keV band (SCTS_FULL)
83- 91	F9.5	ct	e_ctF	1 sigma [0.5-7] keV counts error ($SCTS_{ERR}FULL$)
93-104	E12.6	ct	ctS	Counts in [0.5-2] keV band (SCTS_SOFT)
106-115	F10.6	ct	e_ctS	1 sigma [0.5-2] keV counts error ($SCTS_{ERR}SOFT$)
117-128	E12.6	ct	ctH	Counts in [2-7] keV band (SCTS_HARD)
130-139	F10.6	ct	e_ctH	1 sigma [2-7] keV counts error ($SCTS_{ERR}HARD$)
141-152	E12.6	---	LF	-ln(p) determined in the [0.5-7] keV band (L_FULL)
154-165	E12.6	---	LS	-ln(p) determined in the [0.5-2] keV band (L_SOFT)
167-178	E12.6	---	LH	-ln(p) determined in the [2-7] keV band (L_HARD)
180-191	E12.6	s	ExpmapF	?=- Exposure time in full band (Not used) ($EXP_{MAP}FULL$)
193-204	E12.6	s	ExpmapS	Exposure time in soft band ($EXP_{MAP}SOFT$)
206-217	E12.6	s	ExpmapH	Exposure time in hard band ($EXP_{MAP}HARD$)
219-230	E12.6	10-19W/m2	FluxF	Flux in [0.5-10] keV band (FLUX_FULL)
232-243	E12.6	10-19W/m2	e_FluxF	1sigma [0.5-10] keV flux error ($FLUX_{ERR}FULL$)
245-256	E12.6	10-19W/m2	FluxS	Flux in [0.5-2] keV band (FLUX_SOFT)
258-269	E12.6	10-19W/m2	e_FluxS	1sigma [0.5-20] keV flux error ($FLUX_{ERR}SOFT$)
271-282	E12.6	10-19W/m2	FluxH	Flux in [2-10] keV band (FLUX_HARD)
284-295	E12.6	10-19W/m2	e_FluxH	1 sigma [2-10] keV flux error ($FLUX_{ERR}HARD$)
297-308	E12.6	ct/s	CRF	Count-rate in [0.5-7] keV band (RATE_FULL)
310-321	E12.6	ct/s	e_CRF	1 sigma [0.5-7] keV count rate error ($RATE_{ERR}FULL$)
323-334	E12.6	ct/s	CRS	Count-rate in [0.5-2] keV band (RATE_SOFT)
336-347	E12.6	ct/s	e_CRS	1 sigma [0.5-2] keV count rate error ($RATE_{ERR}SOFT$)
349-360	E12.6	ct/s	CRH	Count-rate in [2-7] keV band (RATE_HARD)
362-373	E12.6	ct/s	e_CRH	1 sigma [2-7] keV count rate error ($RATE_{ERR}HARD$)
375-383	F9.6	---	HR1	Hardness ratio (HR1)
385-392	F8.6	---	e_HR1	Hardness ratio error (HR1_ERR)
394-401	F8.6	arcmin	Offaxis	Off Axis Angle (offax)
403-412	F10.6	---	RAodeg	Best fit right ascension of the best CANDELS counterpart (J2000) (RA_OPT)
414-423	F10.6	---	DEodeg	Best fit declination of the best CANDELS counterpart (J2000) (DEC_OPT)
425-430	F6.3	---	F160Wmag	F160W AB magnitude (mag(f160w))
432-440	F9.6	---	zsp	Spectroscopic redshift from Santini et al., 2015, Cat. J/ApJ/801/97 (Spec_z)
442-446	F5.3	---	zph	Photometric redshift from Santini et al., 2015, Cat. J/ApJ/801/97 (Photo_z)
448-455	F8.4	---	zph2	Photometric redshift from Hsu et al., 2014ApJ...796...60H ($Photo_zh$)
458-461	I4	---	Xue11	?=-99 Source ID in Xuz et al., 2011, Cat. J/ApJS/195/10 (XID_Xue11)

Acknowledgements:
Nico Cappelluti, n.cappelluti(at)yale.edu

(End) Patricia Vannier [CDS] 17-Apr-2016

*The document above follows the rules of the Standard Description for Astronomical Catalogues; from this documentation it is possible to generate **f77** program to load files into arrays or line by line*