



Publication Year	2016
Acceptance in OA	2020-05-20T09:42:56Z
Title	VizieR Online Data Catalog: X-ray Observations of Stripe 82 (LaMassa+, 2016)
Authors	Lamassa, S. M., Urry, C. M., Cappelluti, N., Bohringer, H., COMASTRI, Andrea, Glikman, E., Richards, G., Ananna, T., Brusa, M., Cardamone, C., Chon, G., Civano, F., Farrah, D., Gilfanov, M., Green, P., Komossa, S., Lira, P., Makler, M., MARCHESI, STEFANO, Pecoraro, R., Ranalli, P., Salvato, M., Schawinski, K., Stern, D., Treister, E., Viero, M.
Handle	http://hdl.handle.net/20.500.12386/24987
Journal	VizieR Online Data Catalog



J/ApJ/817/172

X-ray Observations of Stripe 82

(LaMassa+, 2016)

The 31 Deg² release of the Stripe 82 X-ray survey: the point source catalog.
LaMassa S.M., Urry C.M., Cappelluti N., Bohringer H., Comastri A.,
Glikman E., Richards G., Ananna T., Brusa M., Cardamone C., Chon G.,
Civano F., Farrah D., Gilfanov M., Green P., Komossa S., Lira P.,
Makler M., Marchesi S., Pecoraro R., Ranalli P., Salvato M., Schawinski K.,
Stern D., Treister E., Viero M.
<Astrophys. J., 817, 172 (2016)>
=[2016ApJ...817..172L](#) (SIMBAD/NED BibCode)

ADC_Keywords: Active gal. nuclei ; X-ray sources

Keywords: catalogs - galaxies: active - quasars: general - surveys -
X-rays: general

Abstract:

We release the next installment of the Stripe 82 X-ray survey point-source catalog, which currently covers 31.3deg² of the Sloan Digital Sky Survey (SDSS) Stripe 82 Legacy field. In total, 6181 unique X-ray sources are significantly detected with XMM-Newton (>5σ) and Chandra (>4.5σ). This catalog release includes data from XMM-Newton cycle AO 13, which approximately doubled the Stripe 82X survey area. The flux limits of the Stripe 82X survey are 8.7x10⁻¹⁶erg/s/cm², 4.7x10⁻¹⁵erg/s/cm², and 2.1x10⁻¹⁵erg/s/cm² in the soft (0.5-2keV), hard (2-10keV), and full bands (0.5-10keV), respectively, with approximate half-area survey flux limits of 5.4x10⁻¹⁵erg/s/cm², 2.9x10⁻¹⁴erg/s/cm², and 1.7x10⁻¹⁴erg/s/cm². We matched the X-ray source lists to available multi-wavelength catalogs, including updated matches to the previous release of the Stripe 82X survey; 88% of the sample is matched to a multi-wavelength counterpart. Due to the wide area of Stripe 82X and rich ancillary multi-wavelength data, including coadded SDSS photometry, mid-infrared WISE coverage, near-infrared coverage from UKIDSS and VISTA Hemisphere Survey, ultraviolet coverage from GALEX, radio coverage from FIRST, and far-infrared coverage from Herschel, as well as existing ~30% optical spectroscopic completeness, we are beginning to uncover rare objects, such as obscured high-luminosity active galactic nuclei at high-redshift. The Stripe 82X point source catalog is a valuable data set for constraining how this population grows and evolves, as well as for studying how they interact with the galaxies in which they live.

Description:

XMM-Newton and Chandra X-ray sources matched to the SDSS, WISE, UKIDSS, VHS, and GALEX catalogs using the maximum likelihood estimator (MLE). X-ray sources are matched to FIRST and Herschel sources using a nearest neighbor matching. Spectroscopic redshifts obtained from dedicated ground-based follow-up are also published in this catalog. The archival Chandra and archival and AO10 XMM-Newton catalogs supersede those from the previous catalog release in 2013.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
xmmao13.dat	1031	2862	XMM AO13 matched catalog
xmmao10.dat	1038	2358	XMM archival and AO10 matched catalog
chandra.dat	1048	1146	chandra matched catalog

See also:

B/chandra	: Chandra Archive Log (CXC, 1999-2014)
IX/45	: Chandra Source Catalog, Release 1.1 (Evans+ 2012)
V/139	: SDSS Photometric Catalog, Release 9 (Adelman-McCarthy+ 2012)
II/314	: UKIDSS-DR8 LAS, GCS and DXS Surveys (Lawrence+ 2012)
II/319	: UKIDSS-DR9 LAS, GCS and DXS Surveys (Lawrence+ 2012)
II/312	: GALEX-DR5 (GR5) sources from AIS and MIS (Bianchi+ 2011)
II/311	: WISE All-Sky Data Release (Cutri+ 2012)
II/328	: AllWISE Data Release (Cutri+ 2013)
VIII/90	: The FIRST Survey Catalog, Version 12Feb16 (Becker+ 2012)
J/AJ/142/3	: 1.4GHz observations of Stripe 82 (Hodge+, 2011)
J/ApJ/769/125	: 1.4GHz radio variability in FIRST + SDSS Stripe 82 (Hodge+, 2013)
J/MNRAS/436/3581	: X-ray observations of Stripe 82 (LaMassa+, 2013)
J/ApJS/210/22	: Herschel Stripe 82 survey (HerS) first catalog (Viero+ 2014)
J/MNRAS/440/476	: Low-redshift QSOs in SDSS Stripe 82 (Falomo+, 2014)
J/MNRAS/441/1802	: Low-redshift QSOs in SDSS Stripe 82 (Karhunen+, 2014)
J/ApJ/799/72	: Binary AGNs from the VLA Stripe 82 survey (Fu+, 2015)

Byte-by-byte Description of file: [xmmao13.dat](#)

Bytes	Format	Units	Label	Explanations
1- 4	I4	---	Seq	Record number assigned to each XMM source
6- 15	I10	---	ObsID	XMM observation identification number
17- 23	F7.3	deg	RAdeg	XMM right ascension (J2000)

25- 30	F6.3	deg	DEdeg	XMM declination (J2000)
32- 35	F4.1	arcsec	e_Pos	XMM positional error
37- 41	F5.1	arcsec	DistNN	Distance to nearest XMM source
43	I1	---	ExtFlag	Flag to indicate if source is extended (1)
45- 54	A10	---	InXMM	Flag to indicate if source is found in previous XMM observations (2)
56- 77	A22	---	InChandra	Flag to indicate if source is found in Chandra (chandra.dat) catalog (2)
79- 85	F7.2	10-17W/m2	FSoft	Soft (0.5-2keV) flux
87- 93	F7.2	10-17W/m2	e_FSoft	Error on the soft flux
95-101	F7.2	ct	CtSoft	Net counts detected in soft band
103-109	F7.2	---	SoftDetml	Soft band detection significance, det_ml = -ln(P_random) (3)
111-117	F7.2	10-17W/m2	FHard	Hard (2-10keV) flux
119-125	F7.2	10-17W/m2	e_FHard	Error on the hard flux
127-133	F7.2	ct	CtHard	Net counts detected in hard band
135-141	F7.2	---	HardDetml	Hard band detection significance, det_ml = -ln(P_random) (3)
143-149	F7.2	10-17W/m2	FFull	Full (2-10keV) flux
151-157	F7.2	10-17W/m2	e_FFull	Error on the full flux
159-165	F7.2	ct	CtFull	Net counts detected in full band
167-173	F7.2	---	FullDetml	Full band detection significance, det_ml = -ln(P_random) (3)
175-181	F7.2	[10-7W]	logLSoft	Soft (0.5-2keV) X-ray luminosity
183-189	F7.2	[10-7W]	logLHard	Hard (2-10keV) X-ray luminosity
191-197	F7.2	[10-7W]	logLFull	Full (0.5-10keV) X-ray luminosity
199-201	A3	---	ReJS	Set to 'yes' if SDSS counterpart failed photometry quality control checks
203-221	A19	---	SDSS	SDSS ObjID
223-230	F8.3	deg	RASdeg	?=-999 SDSS right ascension (J2000)
232-239	F8.3	deg	DESdeg	?=-999 SDSS declination (J2000)
241-247	F7.2	---	ReIS	?=-999 MLE reliability of SDSS match to X-ray source
249-255	F7.2	arcsec	rS	?=-999 Distance between X-ray and SDSS sources
257-259	A3	---	CoaddS	Set to 'yes' if counterpart is from SDSS coadded catalog
261-267	F7.2	mag	umag	?=-999 SDSS u magnitude
269-275	F7.2	mag	e_umag	?=-999 SDSS u magnitude error
277-283	F7.2	mag	gmag	?=-999 SDSS g magnitude
285-291	F7.2	mag	e_gmag	?=-999 SDSS g magnitude error
293-299	F7.2	mag	rmag	?=-999 SDSS r magnitude
301-307	F7.2	mag	e_rmag	?=-999 SDSS r magnitude error
309-315	F7.2	mag	imag	?=-999 SDSS i magnitude
317-323	F7.2	mag	e_imag	?=-999 SDSS i magnitude error
325-331	F7.2	mag	zmag	?=-999 SDSS z magnitude
333-339	F7.2	mag	e_zmag	?=-999 SDSS z magnitude error
341-359	A19	---	SpecID	SDSS SpecObjID
361-366	A6	---	Class	Spectroscopic class
368-375	F8.3	---	zsp	?=-999 Spectroscopic redshift
377-380	I4	---	r_zsp	?=-999 Source of spectroscopic redshift (G1)
382-400	A19	---	WISE	WISE Name
402-408	F7.2	deg	RAWdeg	?=-999 WISE right ascension (J2000)
410-416	F7.2	deg	DEWdeg	?=-999 WISE declination (J2000)
418-424	F7.2	arcsec	e_RAWdeg	?=-999 WISE right ascension error
426-432	F7.2	arcsec	e_DEWdeg	?=-999 WISE declination error
434-442	F9.4	---	RelW	?=-999 MLE reliability of WISE match to X-ray source
444-450	F7.2	arcsec	rW	?=-999 Distance between X-ray and WISE sources
452-458	F7.2	mag	W1mag	?=-999 WISE W1 magnitude (5)
460-466	F7.2	mag	e_W1mag	?=-999 WISE W1 error
468-474	F7.2	---	W1SNR	?=-999 WISE W1 SNR (6)
476-482	F7.2	mag	W2mag	?=-999 WISE W2 magnitude (5)
484-490	F7.2	mag	e_W2mag	?=-999 WISE W2 error
492-498	F7.2	---	W2SNR	?=-999 WISE W2 SNR (6)
500-506	F7.2	mag	W3mag	?=-999 WISE W3 magnitude (5)
508-514	F7.2	mag	e_W3mag	?=-999 WISE W3 error
516-522	F7.2	---	W3SNR	?=-999 WISE W3 SNR (6)
524-530	F7.2	mag	W4mag	?=-999 WISE W4 magnitude (5)
532-538	F7.2	mag	e_W4mag	?=-999 WISE W4 error
540-546	F7.2	---	W4SNR	?=-999 WISE W4 SNR (6)
548-550	A3	---	ExtW	Set to 'yes' if extended WISE source
552-554	A3	---	RejW	Set to 'yes' if WISE counterpart failed photometry quality control checks
556-567	A12	---	UKIDSS	UKIDSS ID
569-576	F8.3	deg	RAUdeg	?=-999 UKIDSS right ascension (J2000)
578-585	F8.3	deg	DEUdeg	?=-999 UKIDSS declination (J2000)
587-594	F8.3	---	RelU	?=-999 MLE reliability of UKIDSS match to X-ray source
596-602	F7.2	arcsec	rU	?=-999 Distance between X-ray and UKIDSS sources
604-610	F7.2	mag	Ymag	?=-999 UKIDSS Y magnitude
612-618	F7.2	mag	e_Ymag	?=-999 UKIDSS Y magnitude error
620-626	F7.2	mag	Jmag	?=-999 UKIDSS J magnitude
628-634	F7.2	mag	e_Jmag	?=-999 UKIDSS J magnitude error
636-642	F7.2	mag	Hmag	?=-999 UKIDSS H magnitude
644-650	F7.2	mag	e_Hmag	?=-999 UKIDSS H magnitude error
652-658	F7.2	mag	Kmag	?=-999 UKIDSS K magnitude
660-666	F7.2	mag	e_Kmag	?=-999 UKIDSS K magnitude error
668-670	A3	---	RejU	Set to 'yes' if UKIDSS counterpart failed photometry quality control checks
672-683	A12	---	VHS	VHS ID
685-692	F8.3	deg	RAVdeg	?=-999 VHS right ascension (J2000)
694-701	F8.3	deg	DEVdeg	?=-999 VHS declination (J2000)
703-710	F8.3	---	RelV	?=-999 MLE reliability of VHS match to X-ray source

712-718	F7.2	arcsec	rV	?=-999 Distance between X-ray and VHS sources
720-726	F7.2	mag	JVmag	?=-999 VHS J magnitude
728-734	F7.2	mag	e_JVmag	?=-999 VHS J magnitude error
736-742	F7.2	mag	HVmag	?=-999 VHS H magnitude
744-750	F7.2	mag	e_HVmag	?=-999 VHS H magnitude error
752-758	F7.2	mag	KVmag	?=-999 VHS K magnitude
760-766	F7.2	mag	e_KVmag	?=-999 VHS K magnitude error
768-770	A3	---	RejV	Set to 'yes' if VHS counterpart failed photometry quality control checks
772-791	A20	---	GALEX	GALEX ObjID
793-800	F8.3	deg	RAGdeg	?=-999 GALEX right ascension (J2000)
802-809	F8.3	deg	DEGdeg	?=-999 GALEX declination (J2000)
811-817	F7.2	arcsec	e_NUVPos	?=-999 GALEX NUV positional error
819-825	F7.2	arcsec	e_FUVPos	?=-999 GALEX FUV positional error
827-833	F7.2	---	RelG	?=-999 MLE reliability of GALEX match to X-ray source
835-841	F7.2	arcsec	rG	?=-999 Distance between X-ray and GALEX sources
843-849	F7.2	mag	NUV	?=-999 GALEX NUV magnitude
851-857	F7.2	mag	e_NUV	?=-999 GALEX NUV magnitude error
859-865	F7.2	mag	FUV	?=-999 GALEX FUV magnitude
867-873	F7.2	mag	e_FUV	?=-999 GALEX FUV magnitude error
875-897	A23	---	FIRST	Name of FIRST counterpart
899-906	F8.3	deg	RAFdeg	?=-999 FIRST right ascension (J2000)
908-915	F8.3	deg	DEFdeg	?=-999 FIRST declination (J2000)
917-923	F7.2	arcsec	rF	?=-999 Distance between X-ray and FIRST sources
925-931	F7.2	mJy	F1.4GHz	?=-999 FIRST 1.4GHz flux density
933-939	F7.2	mJy	e_F1.4GHz	?=-999 FIRST 1.4GHz flux density error
941-947	F7.2	deg	RAHdeg	?=-999 Herschel right ascension (J2000)
949-955	F7.2	deg	DEHdeg	?=-999 Herschel declination (J2000)
957-963	F7.2	arcsec	rH	?=-999 Distance between X-ray and Herschel sources
965-971	F7.2	mJy	F250	?=-999 Herschel 250um flux density
973-979	F7.2	mJy	e_F250	?=-999 Herschel 250um flux density error
981-987	F7.2	mJy	F350	?=-999 Herschel 350um flux density
989-995	F7.2	mJy	e_F350	?=-999 Herschel 350um flux density error
997-1003	F7.2	mJy	F500	?=-999 Herschel 500um flux density
1005-1011	F7.2	mJy	e_F500	?=-999 Herschel 500um flux density error
1013-1020	A8	---	XMMAO10CP	Flag to indicate if counterpart is promoted match (7)
1022-1029	A8	---	ChCP	Flag to indicate if counterpart is promoted match (8)
1031	I1	---	CPCoord	Flag to indicate if multiwavelength coordinates are consistent (9)

Note (1): Flag to indicate if source is extended as follows:

- 0 = point-like in all bands
- 1 = extended in soft (0.5-2keV) band; point-like in other bands
- 2 = extended in full (0.5-10keV) band; point-like in other bands
- 3 = extended in hard (2-10keV) band; point-like in other bands
- 4 = extended in soft and full bands; point-like in hard band
- 5 = extended in soft and hard bands; point-like in full band
- 6 = extended in hard and full bands; point-like in soft band

Note (2): If source is found in archival XMM observations, 'InXMM' is set to 'yes' and record number of XMM source is given. If source is found in archival Chandra observations, 'InChandra' is set to 'yes' and the MSID number(s) of corresponding Chandra source(s) is (are) given.

Note (3): det_ml≥15 in at least one band for source to be included in the catalog, and for luminosities to be reported in the catalog for that band.

Note (5): magnitude from profile-fitting photometry unless the WISE_ext flag is set to 'yes', in which case the magnitudes are associated with elliptical apertures

Note (6): WISE magnitude if upper limit if SNR<2.

Note (7): If non-null, the multi-wavelength counterpart was promoted as a match since the same X-ray source detected in the XMM archival catalog, and matched independently to multi-wavelength catalogs, was found to have a reliable counterpart.

Flag indicates which multi-wavelength counterpart is such a promoted match:

- 1 = SDSS counterpart found but photometry rejected for failing quality control checks
- 2 = SDSS
- 3 = redshift
- 4 = WISE counterpart found but rejected for failing quality control checks
- 5 = WISE
- 6 = UKIDSS
- 7 = VHS
- 8 = GALEX

Note (8): Same as note 7, but for promoted matches found from the archival Chandra catalog.

Note (9): Set to 0 if multi-wavelength counterpart coordinates are consistent within 2" (SDSS, UKIDSS, VHS, FIRST) or 3" (WISE, GALEX, Herschel); otherwise flag is set to 1.

Byte-by-byte Description of file: [xmmao10.dat](#)

Bytes	Format	Units	Label	Explanations
1- 4	I4	---	Seq	Record number assigned to each XMM source
6- 15	I10	---	ObsID	XMM observation identification number

17- 23	F7.3	deg	RAdeg	XMM right ascension (J2000)
25- 30	F6.3	deg	DEdeg	XMM declination (J2000)
32- 35	F4.1	arcsec	e_Pos	XMM positional error
37- 41	F5.1	arcsec	DistNN	Distance to nearest XMM source
43	I1	---	ExtFlag	Flag to indicate if source is extended (1)
45- 54	A10	---	InXMM	Flag to indicate if source is found in previous XMM observations (2)
56- 77	A22	---	InChandra	Flag to indicate if source is found in Chandra (chandra.dat) catalog (2)
79- 81	A3	---	RemLogNS	Flag to indicate if source is removed from LogN-LogS calculation (3)
83- 89	F7.2	10-17W/m2	FSoft	Soft (0.5-2keV) flux
91- 97	F7.2	10-17W/m2	e_FSoft	Error on the soft flux
99-105	F7.2	ct	CtSoft	Net counts detected in soft band
107-114	F8.2	---	SoftDetml	Soft band detection significance, det_ml = -ln(P_random) (4)
116-122	F7.2	10-17W/m2	FHard	Hard (2-10keV) flux
124-130	F7.2	10-17W/m2	e_FHard	Error on the hard flux
132-138	F7.2	ct	CtHard	Net counts detected in hard band
140-147	F8.2	---	HardDetml	Hard band detection significance, det_ml = -ln(P_random) (4)
149-155	F7.2	10-17W/m2	FFull	Full (2-10keV) flux
157-163	F7.2	10-17W/m2	e_FFull	Error on the full flux
165-171	F7.2	ct	CtFull	Net counts detected in full band
173-180	F8.2	---	FullDetml	Full band detection significance, det_ml = -ln(P_random) (4)
182-188	F7.2	[10-7W]	logLSoft	Soft (0.5-2keV) X-ray luminosity
190-196	F7.2	[10-7W]	logLHard	Hard (2-10keV) X-ray luminosity
198-204	F7.2	[10-7W]	logLFull	Full (0.5-10keV) X-ray luminosity
206-208	A3	---	RejS	Set to 'yes' if SDSS counterpart failed photometry quality control checks
210-228	A19	---	SDSS	SDSS ObjID
230-237	F8.3	deg	RASdeg	?=-999 SDSS right ascension (J2000)
239-246	F8.3	deg	DESdeg	?=-999 SDSS declination (J2000)
248-254	F7.2	---	RelS	?=-999 MLE reliability of SDSS match to X-ray source
256-262	F7.2	arcsec	rS	?=-999 Distance between X-ray and SDSS sources
264-266	A3	---	CoaddS	Set to 'yes' if counterpart is from SDSS coadded catalog
268-274	F7.2	mag	umag	?=-999 SDSS u magnitude
276-282	F7.2	mag	e_umag	?=-999 SDSS u magnitude error
284-290	F7.2	mag	gmag	?=-999 SDSS g magnitude
292-298	F7.2	mag	e_gmag	?=-999 SDSS g magnitude error
300-306	F7.2	mag	rmag	?=-999 SDSS r magnitude
308-314	F7.2	mag	e_rmag	?=-999 SDSS r magnitude error
316-322	F7.2	mag	imag	?=-999 SDSS i magnitude
324-330	F7.2	mag	e_imag	?=-999 SDSS i magnitude error
332-338	F7.2	mag	zmag	?=-999 SDSS z magnitude
340-346	F7.2	mag	e_zmag	?=-999 SDSS z magnitude error
348-366	A19	---	SpecID	SDSS SpecObjID
368-373	A6	---	Class	Spectroscopic class
375-382	F8.3	---	zsp	?=-999 Spectroscopic redshift
384-387	I4	---	r_zsp	?=-999 Source of spectroscopic redshift (G1)
389-407	A19	---	WISE	WISE Name
409-415	F7.2	deg	RAWdeg	?=-999 WISE right ascension (J2000)
417-423	F7.2	deg	DEWdeg	?=-999 WISE declination (J2000)
425-431	F7.2	arcsec	e_RAWdeg	?=-999 WISE right ascension error
433-439	F7.2	arcsec	e_DEWdeg	?=-999 WISE declination error
441-449	F9.4	---	RelW	?=-999 MLE reliability of WISE match to X-ray source
451-457	F7.2	arcsec	rW	?=-999 Distance between X-ray and WISE sources
459-465	F7.2	mag	W1mag	?=-999 WISE W1 magnitude (6)
467-473	F7.2	mag	e_W1mag	?=-999 WISE W1 error
475-481	F7.2	---	W1SNR	?=-999 WISE W1 SNR (7)
483-489	F7.2	mag	W2mag	?=-999 WISE W2 magnitude (6)
491-497	F7.2	mag	e_W2mag	?=-999 WISE W2 error
499-505	F7.2	---	W2SNR	?=-999 WISE W2 SNR (7)
507-513	F7.2	mag	W3mag	?=-999 WISE W3 magnitude (6)
515-521	F7.2	mag	e_W3mag	?=-999 WISE W3 error
523-529	F7.2	---	W3SNR	?=-999 WISE W3 SNR (7)
531-537	F7.2	mag	W4mag	?=-999 WISE W4 magnitude (6)
539-545	F7.2	mag	e_W4mag	?=-999 WISE W4 error
547-553	F7.2	---	W4SNR	?=-999 WISE W4 SNR (7)
555-557	A3	---	ExtW	Set to 'yes' if extended WISE source
559-561	A3	---	RejW	Set to 'yes' if WISE counterpart failed photometry quality control checks
563-574	A12	---	UKIDSS	UKIDSS ID
576-583	F8.3	deg	RAUdeg	?=-999 UKIDSS right ascension (J2000)
585-592	F8.3	deg	DEUdeg	?=-999 UKIDSS declination (J2000)
594-601	F8.3	---	RelU	?=-999 MLE reliability of UKIDSS match to X-ray source
603-609	F7.2	arcsec	rU	?=-999 Distance between X-ray and UKIDSS sources
611-617	F7.2	mag	Ymag	?=-999 UKIDSS Y magnitude
619-625	F7.2	mag	e_Ymag	?=-999 UKIDSS Y magnitude error
627-633	F7.2	mag	Jmag	?=-999 UKIDSS J magnitude
635-641	F7.2	mag	e_Jmag	?=-999 UKIDSS J magnitude error
643-649	F7.2	mag	Hmag	?=-999 UKIDSS H magnitude
651-657	F7.2	mag	e_Hmag	?=-999 UKIDSS H magnitude error
659-665	F7.2	mag	Kmag	?=-999 UKIDSS K magnitude
667-673	F7.2	mag	e_Kmag	?=-999 UKIDSS K magnitude error
675-677	A3	---	RejU	Set to 'yes' if UKIDSS counterpart failed photometry quality control checks
679-690	A12	---	VHS	VHS ID
692-699	F8.3	deg	RAVdeg	?=-999 VHS right ascension (J2000)

701-708	F8.3	deg	DEVdeg	?=-999 VHS declination (J2000)
710-717	F8.3	---	RelV	?=-999 MLE reliability of VHS match to X-ray source
719-725	F7.2	arcsec	rV	?=-999 Distance between X-ray and VHS sources
727-733	F7.2	mag	JVmag	?=-999 VHS J magnitude
735-741	F7.2	mag	e_JVmag	?=-999 VHS J magnitude error
743-749	F7.2	mag	HVmag	?=-999 VHS H magnitude
751-757	F7.2	mag	e_HVmag	?=-999 VHS H magnitude error
759-765	F7.2	mag	KVmag	?=-999 VHS K magnitude
767-773	F7.2	mag	e_KVmag	?=-999 VHS K magnitude error
775-777	A3	---	RejV	Set to 'yes' if VHS counterpart failed photometry quality control checks
780-798	A19	---	GALEX	GALEX ObjID
800-807	F8.3	deg	RAGdeg	?=-999 GALEX right ascension (J2000)
809-816	F8.3	deg	DEGdeg	?=-999 GALEX declination (J2000)
818-824	F7.2	arcsec	e_NUVPos	?=-999 GALEX NUV positional error
826-832	F7.2	arcsec	e_FUVPos	?=-999 GALEX FUV positional error
834-840	F7.2	---	RelG	?=-999 MLE reliability of GALEX match to X-ray source
842-848	F7.2	arcsec	rG	?=-999 Distance between X-ray and GALEX sources
850-856	F7.2	mag	NUV	?=-999 GALEX NUV magnitude
858-864	F7.2	mag	e_NUV	?=-999 GALEX NUV magnitude error
866-872	F7.2	mag	FUV	?=-999 GALEX FUV magnitude
874-880	F7.2	mag	e_FUV	?=-999 GALEX FUV magnitude error
882-904	A23	---	FIRST	Name of FIRST counterpart
906-913	F8.3	deg	RAFdeg	?=-999 FIRST right ascension (J2000)
915-922	F8.3	deg	DEFdeg	?=-999 FIRST declination (J2000)
924-930	F7.2	arcsec	rF	?=-999 Distance between X-ray and FIRST sources
932-938	F7.2	mJy	F1.4GHz	?=-999 FIRST 1.4GHz flux density
940-946	F7.2	mJy	e_F1.4GHz	?=-999 FIRST 1.4GHz flux density error
948-954	F7.2	deg	RAHdeg	?=-999 Herschel right ascension (J2000)
956-962	F7.2	deg	DEHdeg	?=-999 Herschel declination (J2000)
964-970	F7.2	arcsec	rH	?=-999 Distance between X-ray and Herschel sources
972-978	F7.2	mJy	F250	?=-999 Herschel 250um flux density
980-986	F7.2	mJy	e_F250	?=-999 Herschel 250um flux density error
988-994	F7.2	mJy	F350	?=-999 Herschel 350um flux density
996-1002	F7.2	mJy	e_F350	?=-999 Herschel 350um flux density error
1004-1010	F7.2	mJy	F500	?=-999 Herschel 500um flux density
1012-1018	F7.2	mJy	e_F500	?=-999 Herschel 500um flux density error
1020-1027	A8	---	ChCP	Flag to indicate if counterpart is promoted match (8)
1029-1036	A8	---	XMMA013CP	Flag to indicate if counterpart is promoted match (9)
1038	I1	---	CPCoord	Flag to indicate if multiwavelength coordinates are consistent (10)

Note (1): Flag to indicate if source is extended as follows:

- 0 = point-like in all bands
- 1 = extended in soft (0.5-2keV) band; point-like in other bands
- 2 = extended in full (0.5-10keV) band; point-like in other bands
- 3 = extended in hard (2-10keV) band; point like in other bands
- 4 = extended in soft and full bands; point-like in hard band
- 5 = extended in soft and hard bands; point-like in full band
- 6 = extended in hard and full bands; point-like in soft band

Note (2): If source is found in archival XMM observations, 'InXMM' is set to 'yes' and record number of XMM source is given. If source is found in archival Chandra observations, 'InChandra' is set to 'yes' and the MSID number(s) of corresponding Chandra source(s) is (are) given.

Note (3): Source is removed from LogN-LogS relationship if it is target of archival observation or if the observation overlaps the A013 coverage area.

Note (4): det_ml≥15 in at least one band for source to be included in the catalog, and for luminosities to be reported in the catalog for that band.

Note (6): magnitude from profile-fitting photometry unless the WISE_ext flag is set to 'yes', in which case the magnitudes are associated with elliptical apertures

Note (7): WISE magnitude is upper limit if SNR<2.

Note (8): If non-null, the multi-wavelength counterpart was promoted as a match since the same X-ray source detected in the Chandra archival catalog, and matched independently to multi-wavelength catalogs, was found to have a reliable counterpart.

Flag indicates which multi-wavelength counterpart is such a promoted match:

- 1 = SDSS counterpart found but photometry rejected for failing quality control checks
- 2 = SDSS
- 3 = redshift
- 4 = WISE counterpart found but rejected for failing quality control checks
- 5 = WISE
- 6 = UKIDSS
- 7 = VHS
- 8 = GALEX

Note (9): Same as note 8, but for promoted matches found from the XMM A013 catalog.

Note (10): Set to 0 if multi-wavelength counterpart coordinates are consistent within 2" (SDSS, UKIDSS, VHS, FIRST) or 3" (WISE, GALEX, Herschel); otherwise flag is set to 1.

Byte-by-byte Description of file: [chandra.dat](#)

Bytes	Format	Units	Label	Explanations
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1-	6	I6	---	MSID	Chandra Source Catalog identification number
8-	17	I10	---	ObsID	Chandra observation identification number
19-	25	F7.3	deg	RAdeg	Chandra right ascension (J2000)
27-	32	F6.3	deg	DEdeg	Chandra declination (J2000)
34-	37	F4.1	arcsec	e_Pos	Chandra positional error
39-	44	F6.1	arcsec	DistNN	Distance to nearest Chandra source
46-	67	A22	---	InAO10	Flag to indicate if source is found in archival/AO10 XMM (xmmao10.dat) catalog (1)
69-	90	A22	---	InAO13	Flag to indicate if source is found in AO13 XMM (xmmao13.dat) catalog (1)
92-	94	A3	ct	RemLogNS	Flag to indicate if source is removed from LogN-LogS calculation (2)
96-102	F7.2	10-17W/m2	FSoft	Soft (0.5-2keV) flux (3)	
104-110	F7.2	10-17W/m2	B_FSoft	?=-999 Higher bound on the soft flux	
112-118	F7.2	10-17W/m2	b_FSoft	?=-999 Lower bound on the soft flux	
120-126	F7.2	ct	CtSoft	Net counts detected in soft band	
128-134	F7.2	10-17W/m2	FHard	Hard (2-10keV) flux (3)	
136-142	F7.2	10-17W/m2	B_FHard	Higher bound on the hard flux	
144-150	F7.2	10-17W/m2	b_FHard	Lower bound on the hard flux	
152-158	F7.2	ct	CtHard	Net counts detected in hard band	
160-166	F7.2	10-17W/m2	FFull	Full (0.5-10keV) flux (3)	
168-174	F7.2	10-17W/m2	B_FFull	Higher bound on the full flux	
176-182	F7.2	10-17W/m2	b_FFull	Lower bound on the full flux	
184-190	F7.2	ct	CtFull	Net counts detected in the full band	
192-198	F7.2	[10-7W]	logLSoft	?=-999 Soft (0.5-2keV) X-ray luminosity	
200-206	F7.2	[10-7W]	logLHard	?=-999 Hard (2-10keV) X-ray luminosity	
208-214	F7.2	[10-7W]	logLFull	?=-999 Full (0.5-10keV) X-ray luminosity	
216-218	A3	---	RejS	Set to 'yes' if SDSS counterpart failed photometry quality control checks	
220-238	A19	---	SDSS	SDSS ObjID	
240-247	F8.3	deg	RASdeg	SDSS right ascension (J2000)	
249-256	F8.3	deg	DESdeg	SDSS declination (J2000)	
258-264	F7.2	---	RelS	?=-999 MLE reliability of SDSS match to X-ray source	
266-272	F7.2	arcsec	rS	?=-999 Distance between X-ray and SDSS sources	
274-276	A3	---	CoaddS	Set to 'yes' if counterpart is from SDSS coadded catalog	
278-284	F7.2	mag	umag	?=-999 SDSS u magnitude	
286-292	F7.2	mag	e_umag	?=-999 SDSS u magnitude error	
294-300	F7.2	mag	gmag	?=-999 SDSS g magnitude	
302-308	F7.2	mag	e_gmag	?=-999 SDSS g magnitude error	
310-316	F7.2	mag	rmag	?=-999 SDSS r magnitude	
318-324	F7.2	mag	e_rmag	?=-999 SDSS r magnitude error	
326-332	F7.2	mag	imag	?=-999 SDSS i magnitude	
334-340	F7.2	mag	e_imag	?=-999 SDSS i magnitude error	
342-348	F7.2	mag	zmag	?=-999 SDSS z magnitude	
350-356	F7.2	mag	e_zmag	?=-999 SDSS z magnitude error	
358-376	A19	---	SpecID	SDSS SpecObjID	
378-383	A6	---	Class	Spectroscopic class	
385-392	F8.3	---	zsp	?=-999 Spectroscopic redshift	
394-397	I4	---	r_zsp	?=-999 Spectroscopic z source (G1)	
399-417	A19	---	WISE	WISE Name	
419-425	F7.2	deg	RAWdeg	?=-999 WISE right ascension (J2000)	
427-433	F7.2	deg	DEWdeg	?=-999 WISE declination (J2000)	
435-441	F7.2	arcsec	e_RAWdeg	?=-999 WISE right ascension error	
443-449	F7.2	arcsec	e_DEWdeg	?=-999 WISE declination error	
451-459	F9.4	---	RelW	?=-999 MLE reliability of WISE match to X-ray source	
461-467	F7.2	arcsec	rW	?=-999 Distance between X-ray and WISE sources	
469-475	F7.2	mag	W1mag	?=-999 WISE W1 magnitude (5)	
477-483	F7.2	mag	e_W1mag	?=-999 WISE W1 error	
485-491	F7.2	---	W1SNR	?=-999 WISE W1 SNR (6)	
493-499	F7.2	mag	W2mag	?=-999 WISE W2 magnitude (5)	
501-507	F7.2	mag	e_W2mag	?=-999 WISE W2 error	
509-515	F7.2	---	W2SNR	?=-999 WISE W2 SNR (6)	
517-523	F7.2	mag	W3mag	?=-999 WISE W3 magnitude (5)	
525-531	F7.2	mag	e_W3mag	?=-999 WISE W3 error	
533-539	F7.2	---	W3SNR	?=-999 WISE W3 SNR (6)	
541-547	F7.2	mag	W4mag	?=-999 WISE W4 magnitude (5)	
549-555	F7.2	mag	e_W4mag	?=-999 WISE W4 error	
557-563	F7.2	---	W4SNR	?=-999 WISE W4 SNR (6)	
565-567	A3	---	ExtW	Set to 'yes' if extended WISE source	
569-571	A3	---	RejW	Set to 'yes' if WISE counterpart failed photometry quality control checks	
573-584	A12	---	UKIDSS	UKIDSS ID	
586-593	F8.3	deg	RAUdeg	?=-999 UKIDSS right ascension (J2000)	
595-602	F8.3	deg	DEUdeg	?=-999 UKIDSS declination (J2000)	
604-611	F8.3	---	RelU	?=-999 MLE reliability of UKIDSS match to X-ray source	
613-619	F7.2	arcsec	rU	?=-999 Distance between X-ray and UKIDSS sources	
621-627	F7.2	mag	Ymag	?=-999 UKIDSS Y magnitude	
629-635	F7.2	mag	e_Ymag	?=-999 UKIDSS Y magnitude error	
637-643	F7.2	mag	Jmag	?=-999 UKIDSS J magnitude	
645-651	F7.2	mag	e_Jmag	?=-999 UKIDSS J magnitude error	
653-659	F7.2	mag	Hmag	?=-999 UKIDSS H magnitude	
661-667	F7.2	mag	e_Hmag	?=-999 UKIDSS H magnitude error	
669-675	F7.2	mag	Kmag	?=-999 UKIDSS K magnitude	
677-683	F7.2	mag	e_Kmag	?=-999 UKIDSS K magnitude error	
685-687	A3	---	RejU	Set to 'yes' if UKIDSS counterpart failed photometry quality control checks	
689-700	A12	---	VHS	VHS ID	
702-709	F8.3	deg	RAVdeg	?=-999 VHS right ascension (J2000)	

711-718	F8.3	deg	DEVdeg	?=-999 VHS declination (J2000)
720-727	F8.3	---	RelV	?=-999 MLE reliability of VHS match to X-ray source
729-735	F7.2	arcsec	rV	?=-999 Distance between X-ray and VHS sources
737-743	F7.2	mag	JVmag	?=-999 VHS J magnitude
745-751	F7.2	mag	e_JVmag	?=-999 VHS J magnitude error
753-759	F7.2	mag	HVmag	?=-999 VHS H magnitude
761-767	F7.2	mag	e_HVmag	?=-999 VHS H magnitude error
769-775	F7.2	mag	KVmag	?=-999 VHS K magnitude
777-783	F7.2	mag	e_KVmag	?=-999 VHS K magnitude error
785-787	A3	---	RejV	Set to 'yes' if VHS counterpart failed photometry quality control checks
790-808	A19	---	GALEX	GALEX ObjID
810-817	F8.3	deg	RAGdeg	?=-999 GALEX right ascension (J2000)
819-826	F8.3	deg	DEGdeg	?=-999 GALEX declination (J2000)
828-834	F7.2	arcsec	e_NUVPos	?=-999 GALEX NUV positional error
836-842	F7.2	arcsec	e_FUVPos	?=-999 GALEX FUV positional error
844-850	F7.2	---	RelG	?=-999 MLE reliability of GALEX match to X-ray source
852-858	F7.2	arcsec	rG	?=-999 Distance between X-ray and GALEX sources
860-866	F7.2	mag	NUV	?=-999 GALEX NUV magnitude
868-874	F7.2	mag	e_NUV	?=-999 GALEX NUV magnitude error
876-882	F7.2	mag	FUV	?=-999 GALEX FUV magnitude
884-890	F7.2	mag	e_FUV	?=-999 GALEX FUV magnitude error
892-914	A23	---	FIRST	Name of FIRST counterpart
916-923	F8.3	deg	RAFdeg	?=-999 FIRST right ascension (J2000)
925-932	F8.3	deg	DEFdeg	?=-999 FIRST declination (J2000)
934-940	F7.2	arcsec	rF	?=-999 Distance between X-ray and FIRST sources
942-948	F7.2	mJy	F1.4GHz	?=-999 FIRST 1.4GHz flux density
950-956	F7.2	mJy	e_F1.4GHz	?=-999 FIRST 1.4GHz flux density error
958-964	F7.2	deg	RAHdeg	?=-999 Herschel right ascension (J2000)
966-972	F7.2	deg	DEHdeg	?=-999 Herschel declination (J2000)
974-980	F7.2	arcsec	rH	?=-999 Distance between X-ray and Herschel sources
982-988	F7.2	mJy	F250	?=-999 Herschel 250um flux density
990-996	F7.2	mJy	e_F250	?=-999 Herschel 250um flux density error
998-1004	F7.2	mJy	F350	?=-999 Herschel 350um flux density
1006-1012	F7.2	mJy	e_F350	?=-999 Herschel 350um flux density error
1014-1020	F7.2	mJy	F500	?=-999 Herschel 500um flux density
1022-1028	F7.2	mJy	e_F500	?=-999 Herschel 500um flux density error
1030-1037	A8	---	XMMAO10CP	Flag to indicate if counterpart is promoted match (7)
1039-1046	A8	---	XMMAO13CP	Flag to indicate if counterpart is promoted match (8)
1048	I1	---	CPCoord	Flag to indicate if multiwavelength coordinates are consistent (9)

Note (1): If source is found in XMM catalogs, this flag is set to 'yes' and the record number of the corresponding XMM source is given.

Note (2): Source is removed from LogN-LogS relationship if it is target of Chandra observation or if the observation overlaps the XMM coverage area.

Note (3): Flux is reported if it is significant at ≥ 4.5 -sigma level. For lower significance flux measurements, check the Chandra Source Catalog.

Note (5): magnitude from profile-fitting photometry unless the WISE_ext flag is set to 'yes', in which case the magnitudes are associated with elliptical apertures.

Note (6): WISE magnitude is upper limit if SNR<2.

Note (7): If non-null, the multi-wavelength counterpart was promoted as a match since the same X-ray source detected in the archival/AO10 XMM catalog, and matched independently to multi-wavelength catalogs, was found to have a reliable counterpart.

Flag indicates which multi-wavelength counterpart is such a promoted match as follows:

- 1 = SDSS counterpart found but photometry rejected for failing quality control checks
- 2 = SDSS
- 3 = redshift
- 4 = WISE counterpart found but rejected for failing quality control checks
- 5 = WISE, 2012, Cutri et al., Cat. [II/311](#)
- 6 = UKIDSS, 2012, Lawrence et al., Cat. [II/314](#)
- 7 = VHS (McMahon et al., [2013Msngr.154...35M](#), VISTA Hemisphere Survey)
- 8 = GALEX, 2011, Bianchi et al, Cat. [II/312](#)

Note (8): Same as note 8, but for promoted matches found from the XMM AO13 catalog.

Note (9): Set to 0 if multi-wavelength counterpart coordinates are consistent within 2" (SDSS, UKIDSS, VHS, FIRST) or 3" (WISE, GALEX, Herschel); otherwise flag is set to 1.

Global notes:

Note (G1): Spectroscopic redshift source as follows:

- 0 = SDSS DR9 (Ahn et al., [2012ApJS..203...21A](#), Cat. [V/139](#))
- 1 = 2SLAQ (Croom et al., 2009, Cat. [J/MNRAS/392/19](#))
- 2 = WiggleZ (Drinkwater et al., 2010, Cat. [J/MNRAS/401/1429](#))
- 3 = DEEP2 (Newman et al., [2013ApJS..208...5N](#))
- 4 = SDSS spectrum re-fit/verified by us
- 5 = SDSS DR10 (Ahn et al., [2014ApJS..211...17A](#))
- 6 = Jiang et al. (2006, Cat. [J/AJ/131/2788](#))
- 7 = WIYN HYDRA follow-up observations from 2012 Dec
- 8 = PRIMUS (Coil et al., [2011ApJ...741...8C](#))
- 9 = VLT ISAAC follow-up observations from 2013 Aug

10 = Keck NIRSPEC follow-up observations from 2013 Sep
11 = SDSS DR12 (Alam et al., [2015ApJS..219...12A](#))
12 = WIYN Hydra follow-up observations from 2013 Aug - Sep
13 = WIYN HYDRA follow-up observations from 2014 Jan
14 = WIYN HYDRA follow-up observations from 2014 Jun
15 = WIYN HYDRA follow-up observations from 2014 Jul
16 = WIYN HYDRA follow-up observations from 2014 Sep
17 = WIYN HYDRA follow-up observations from 2015 Jan
18 = Palomar DoubleSpec observations from 2014 Jul
19 = MMT Hectospec (Ross et al., 2012, Cat. [J/ApJS/199/3](#))
20 = Palomar DoubleSpec observations from 2014 Dec
22 = 6dF (Jones et al., [2004MNRAS.355..747J](#) and [2009MNRAS.399..683J](#),
Cat. [VII/259](#))
23 = VVDS (Le Fevre et al., 2003, Proc. SPIE 4841, 1670 and
[2005A&A...439..845L](#), Cat. [III/250](#); Garilli et al., [2008A&A...486..683G](#);
Le Fevre et al., [2013A&A...559A..14L](#))

Acknowledgements:

Stephanie LaMassa, stephanie.m.lamassa@nasa.gov
NASA Goddard Space Flight Center

(End) S. LaMassa [NASA Goddard Space Flight Center] P. Vannier [CDS] 04-Mar-2016

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