J/ApJ/817/172   X-ray Observations of Stripe 82   (LaMassa+, 2016)

The 31 Deg^2 release of the Stripe 82 X-ray survey: the point source catalog.
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    Makler M., Marchesi S., Pecoraro R., Ranalli P., Salvato M., Schawinski K.,
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        X-rays: general

Abstract:
    We release the next installment of the Stripe 82 X-ray survey
    point-source catalog, which currently covers 31.3deg^2 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^{-16}erg/s/cm2, 4.7x10^{-15}erg/s/cm2, and 2.1x10^{-15}erg/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^{-15}erg/s/cm2, 2.9x10^{-14}erg/s/cm2, and 1.7x10^{-14}erg/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)

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  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  ---      RelS      ?=-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
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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

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  Bytes Format Units    Label     Explanations


  1-  4 I4     ---       Seq       Record number assigned to each XMM
                                        source
  6- 15 I10    ---       ObsID     XMM observation identification number
```

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  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)
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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     ---      XMMAO13CP  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 AO13 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 AO13
  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
```

```
   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 Specroscopic 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)
```

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