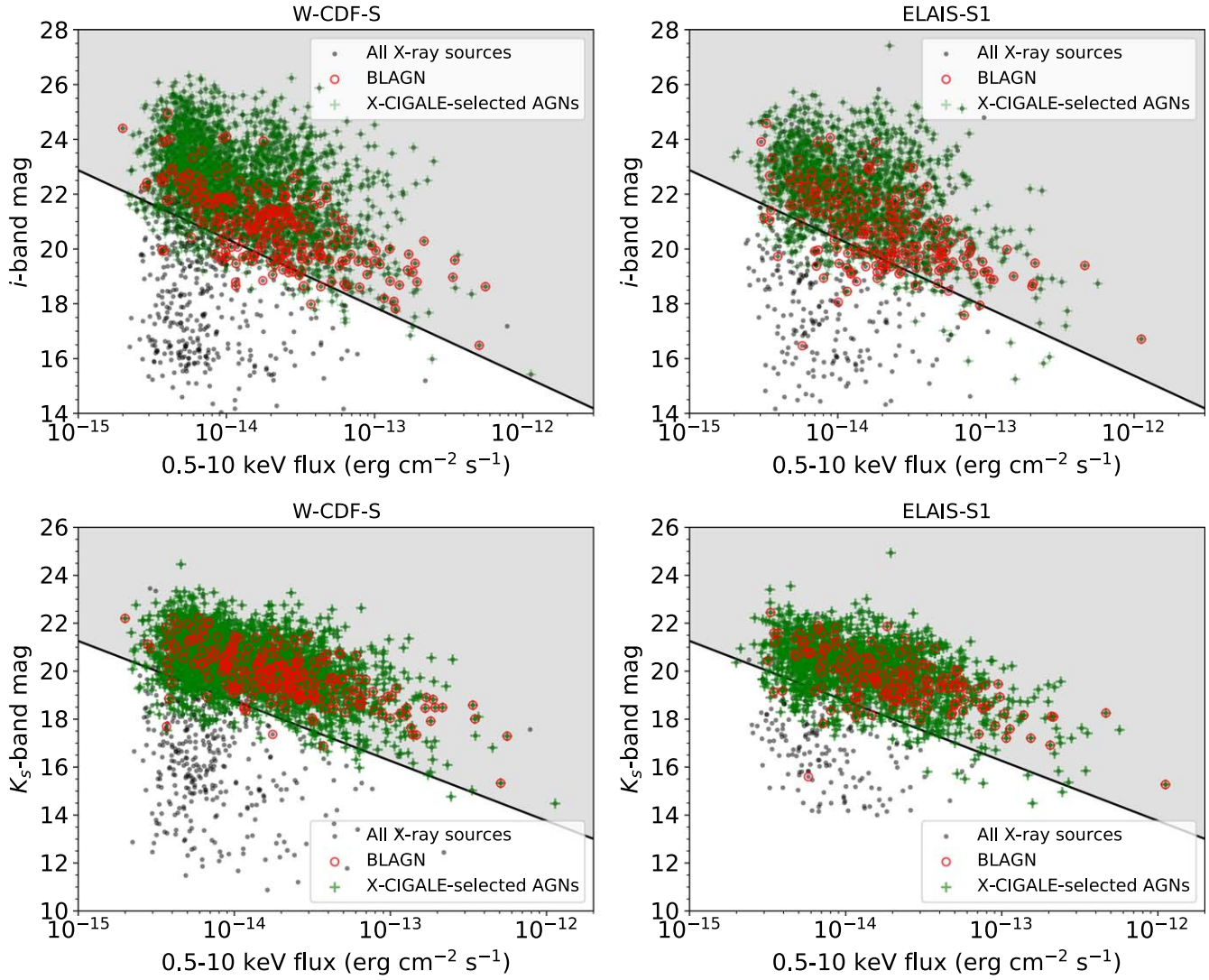

Figure 28. Left/right: HSC (or DES) i-band/VIDEO K_s-band magnitude vs. X-ray flux in the full band for all the X-ray sources detected in the i/K_s band (black circles), i/K_s-band-detected BL AGNs (red circles), and i/K_s-band-detected X-ray sources that are classified as AGNs from X-CIGALE SED fitting (green plus signs) in W-CDF-S (top panels) and ELAIS-S1 (bottom panels). The shaded region marks the "AGN region" defined by the $\log_{10} f_x/f_i > -1$ or $\log_{10} f_x/f_{K_s} > -1.2$ threshold (represented by the black solid line).

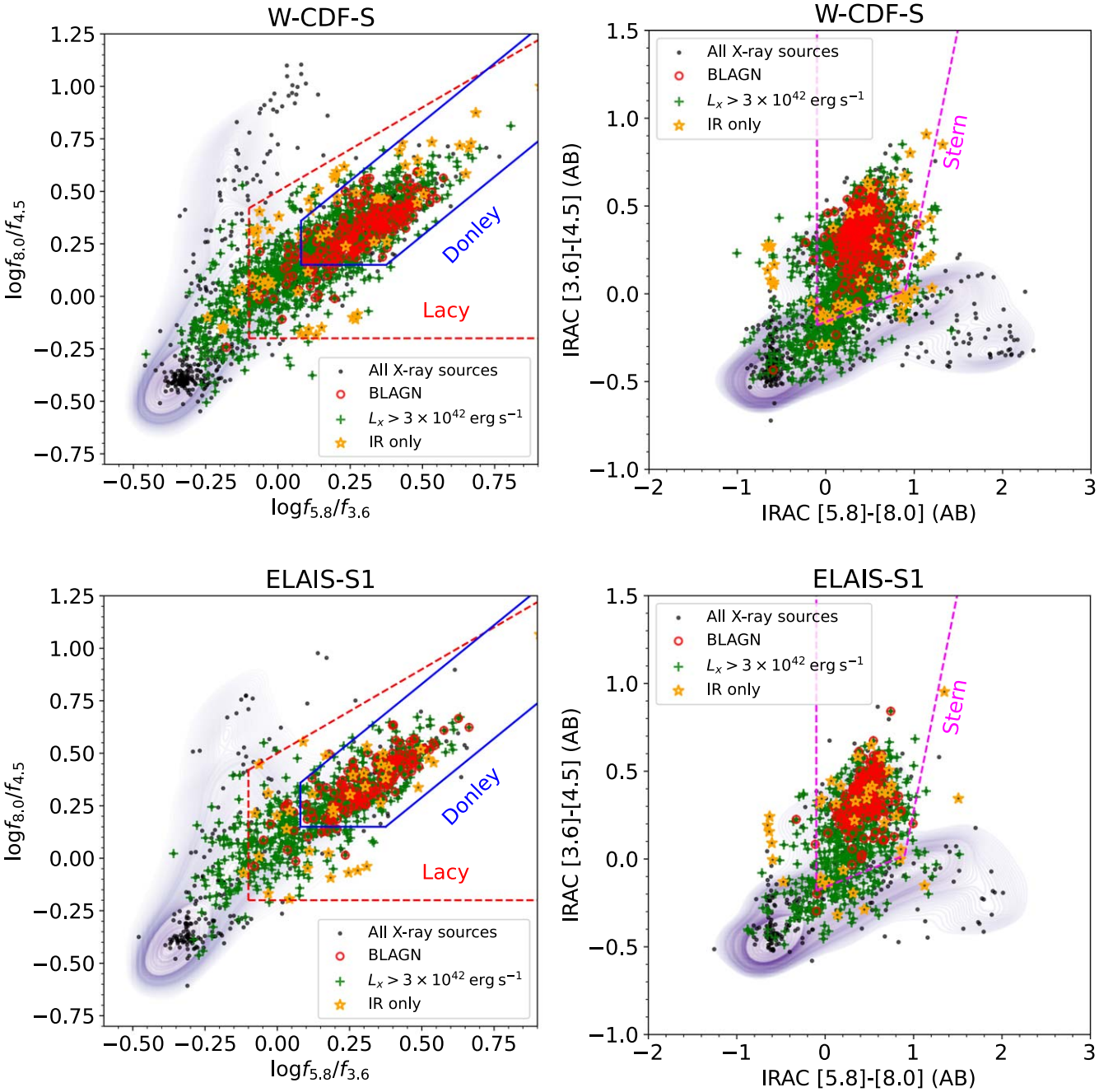

Figure 29. Left panels: the distribution of $\log f_{5.8}/f_{3.6}$ vs. $\log f_{8.0}/f_{4.5}$ for X-ray sources that are detected in four IRAC bands (black circles), with the 2D kernel density plot of all SWIRE sources detected in four IRAC bands in the background in W-CDF-S (top) and ELAIS-S1 (bottom). Among these X-ray sources, BL AGNs are marked by the red circles, AGNs identified with high L_X values are marked by green plus signs, and X-ray sources that are only identified as AGN via MIR colors are marked by orange stars. The blue lines denote the Donley wedge (Donley et al. 2012); the red dashed lines denote the Lacy wedge (Lacy et al. 2004). Right panels: the distribution of IRAC [5.8] − [8.0] vs. [3.6] − [4.5] (AB) for all X-ray sources that are detected in four IRAC bands (black circles), with the 2D kernel density plot of all SWIRE sources detected in four IRAC bands in the background in W-CDF-S (top) and ELAIS-S1 (bottom). Symbols represent the same objects as in the left panel. The magenta dashed lines denote the Stern wedge (Stern et al. 2005).

Appendix A
Main X-Ray Source Catalog Description

The descriptions of the columns included in our main X-ray source catalogs in W-CDF-S and ELAIS-S1 (see Tables 6 and 7) are presented below in a format similar to that of Chen et al. (2018). Throughout the table, null values are set to −99. All celestial coordinates are given in equinox J2000.

Table 6: X-ray *source catalog in* W-CDF-S

X-ray properties

Columns (1)–(110) list the X-ray properties of our sources. Columns for the soft/hard/full-band results are marked with the "SB_"/"HB_"/"FB_" prefix.

1. Column (1), `XID`: the source ID of each X-ray source.
2. Columns (2)–(3), `RA, DEC`: R.A. and decl. (in degrees) of the X-ray source. Based on availability, we use the

Table 6
The Main X-Ray Source Catalog in W-CDF-S with a Selection of Columns

XID (1)	R.A. (2)	Decl. (3)	XPOSERR (4)	FB_EXP (19)	FB_BKG (31)	FB_SCTS (43)	0p5_10_FLUX (104)	SPECZ (189)	AGN_FLAG (206)
WCDFS0000	52.152070	−28.698755	0.14	90110.6	3.78	8505.6	1.13635	0.10870	1
WCDFS0001	52.168228	−28.669922	0.29	118105.5	4.87	1948.1	0.05208	0.77247	1
WCDFS0002	52.130722	−28.880466	0.30	64600.6	3.95	1917.3	0.11816	1.04995	1
WCDFS0003	52.136161	−28.733398	0.33	100678.1	4.05	1555.2	0.04719	−99	1
WCDFS0004	51.876881	−28.512461	0.34	99457.5	3.23	1430.5	0.05912	0.38893	1

(This table is available in its entirety in machine-readable form.)

Table 7
The Main X-Ray Source Catalog in ELAIS-S1 with a Selection of Columns

XID (1)	R.A. (2)	Decl. (3)	XPOSERR (4)	FB_EXP (19)	FB_BKG (31)	FB_SCTS (43)	0p5_10_FLUX (104)	SPECZ (180)	AGN_FLAG (197)
ES0000	8.747565	−44.824939	0.13	42850.9	1.96	5539.8	0.56817	−99.0	1
ES0001	8.726280	−44.771419	0.16	52141.0	2.00	3727.6	0.32483	0.40723	1
ES0002	9.324548	−44.503995	0.21	118323.1	5.71	2356.2	0.11067	1.32429	1
ES0003	9.087287	−44.144419	0.23	58336.4	2.29	2011.9	0.23091	0.20828	1
ES0004	8.787302	−44.310709	0.25	70255.8	1.81	1770.0	0.13339	0.34187	1

(This table is available in its entirety in machine-readable form.)

positions from, in priority order, the full band, soft band, and hard band as the primary position. Band-specific positions are listed in Columns (8)–(13).

3. Column (4), XPOSERR: X-ray positional uncertainty (σ_x) in arcseconds (reported with the same priority order as that of positions).
4. Columns (5)–(6), R68, R99: 68% and 99.73% X-ray positional uncertainties in arcseconds based on the Rayleigh distribution (see Section 3.4).
5. Column (7), EMLERR: Positional uncertainties calculated by EMLDETECT, $\sigma_{\rm eml}$, in arcseconds (with the same priority order as that of positions).
6. Columns (8)–(13), SB_RA, SB_DEC, HB_RA, HB_DEC, FB_RA, FB_DEC: R.A. and decl. (in degrees) of the source in the soft, hard, and full bands, respectively.
7. Columns (14)–(16), SB_DET_ML, HB_DET_ML, FB_DET_ML: the EMLDETECT source detection likelihood in each band.
8. Columns (17)–(19), SB_EXP, HB_EXP, FB_EXP: total (PN + MOS1 + MOS2) exposure time in seconds in each band.
9. Columns (20)–(28), SB_EXPPN, SB_EXPM1, SB_EXPM2, HB_EXPPN, HB_EXPM1, HB_EXPM2, FB_EXPPN, FB_EXPM1, FB_EXPM2: PN, MOS1, and MOS2 exposure times in seconds in each band.
10. Columns (29)–(31), SB_BKG, HB_BKG, FB_BKG: total background-map values (PN + MOS1 + MOS2) in counts per pixel in each band.
11. Columns (32)–(40), SB_BKGPN, SB_BKGM1, SB_BKGM2, HB_BKGPN, HB_BKGM1, HB_BKGM2, FB_BKGPN, FB_BKGM1, FB_BKGM2: PN, MOS1, and MOS2 background-map values in counts per pixel in each band.
12. Columns (41)–(43), SB_SCTS, HB_SCTS, FB_SCTS: total (PN + MOS1 + MOS2) net counts in each band.
13. Columns (44)–(52), SB_SCTSPN, SB_SCTSM1, SB_SCTSM2, HB_SCTSPN, HB_SCTSM1, HB_SCTSM2, FB_SCTSPN, FB_SCTSM1, FB_SCTSM2: PN, MOS1, and MOS2 net counts in each band.
14. Columns (53)–(64), SB_SCTS_ERR, HB_SCTS_ERR, FB_SCTS_ERR, SB_SCTSPN_ERR, SB_SCTSM1_ERR, SB_SCTSM2_ERR, HB_SCTSPN_ERR, HB_SCTSM1_ERR, HB_SCTSM2_ERR, FB_SCTSPN_ERR, FB_SCTSM1_ERR, FB_SCTSM2_ERR: uncertainties of total, PN, MOS1, and MOS2 net counts in each band reported in EMLDETECT.
15. Columns (65)–(76), SB_RATE, HB_RATE, FB_RATE, SB_RATEPN, SB_RATEM1, SB_RATEM2, HB_RATEPN, HB_RATEM1, HB_RATEM2, FB_RATEPN, FB_RATEM1, FB_RATEM2: total, PN, MOS1, and MOS2 net count rates in each band, in counts s^{-1}.
16. Columns (77)–(88), SB_RATE_ERR, HB_RATE_ERR, FB_RATE_ERR, SB_RATEPN_ERR, SB_RATEM1_ERR, SB_RATEM2_ERR, HB_RATEPN_ERR, HB_RATEM1_ERR, HB_RATEM2_ERR, FB_RATEPN_ERR, FB_RATEM1_ERR, FB_RATEM2_ERR: uncertainties of total, PN, MOS1, and MOS2 net count rates in each band, in counts s^{-1}.
17. Columns (89)–(96), BR, BR_ERR, BRPN, BRPN_ERR, BRM1, BRM1_ERR, BRM2, BRM2_ERR: total hard-to-soft-band ratio and its uncertainty, and the hard-to-soft-band ratio and its uncertainty for each EPIC detector.
18. Columns (97)–(98), HR, HR_ERR: hardness ratio and its uncertainty.
19. Column (99), GAMMA: the effective power-law photon index, $\Gamma_{\rm eff}$, derived for each source based on the hard-to-soft-band ratio.
20. Columns (100)–(105), 0p5_2_FLUX, 0p5_2_FLUX_ERR, 2_10_FLUX, 2_10_FLUX_ERR, 0p5_10_FLUX, 0p5_10_FLUX_ERR: observed flux and flux uncertainty in the 0.5–2 keV, 2–10 keV, and 0.5–10 keV bands, in 10^{-12} erg cm^{-2} s^{-1}, after correcting for Galactic absorption. The