



Table S1. Landsat dataset

Date	Scene ID	Resolution, m	Cloud, %	Daytime air, °C
16/04/2023	LANDSAT/LC08/C02/T1_L2/LC08_177025_20230416	30	8.65	14
17/05/2023	LANDSAT/LC09/C02/T1_L2/LC09_178025_20230517	30	8.13	25
02/06/2023	LANDSAT/LC09/C02/T1_L2/LC09_178025_20230602	30	0.1	25
20/07/2023	LANDSAT/LC09/C02/T1_L2/LC09_178025_20230720	30	2.54	27.8
06/08/2023	LANDSAT/LC08/C02/T1_L2/LC08_177025_20230806	30	0	35.4
14/09/2023	LANDSAT/LC08/C02/T1_L2/LC08_178025_20230914	30	8.23	23.3
07/04/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200407	30	0.02	13.6
23/04/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200423	30	0.08	16
07/05/2022	LANDSAT/LC09/C02/T1_L2/LC09_177025_20220507	30	5.48	25
10/06/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200610	30	0.12	31.9
26/06/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200626	30	1.2	29.4
12/07/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200712	30	0	30.8
03/07/2020	LANDSAT/LC08/C02/T1_L2/LC08_178025_20200703	30	0.46	32.4
04/08/2020	LANDSAT/LC08/C02/T1_L2/LC08_178025_20200804	30	0.8	27.7
14/09/2020	LANDSAT/LC08/C02/T1_L2/LC08_177025_20200914	30	0.12	23.5
21/09/2020	LANDSAT/LC08/C02/T1_L2/LC08_178025_20200921	30	0.01	19.9
09/04/2018	LANDSAT/LC08/C02/T1_L2/LC08_178025_20180409	30	1.65	11.8
04/05/2018	LANDSAT/LC08/C02/T1_L2/LC08_177025_20180504	30	0.01	30.5
11/05/2018	LANDSAT/LC08/C02/T1_L2/LC08_178025_20180511	30	0.03	18.1
27/05/2018	LANDSAT/LC08/C02/T1_L2/LC08_178025_20180527	30	0.02	22.2
21/06/2018	LANDSAT/LC08/C02/T1_L2/LC08_177025_20180621	30	0.01	29.7
30/07/2018	LANDSAT/LC08/C02/T1_L2/LC08_178025_20180730	30	2.97	33.5
24/08/2018	LANDSAT/LC08/C02/T1_L2/LC08_177025_20180824	30	0.01	27.3
22/09/2017	LANDSAT/LC08/C02/T1_L2/LC08_177025_20170922	30	0.01	27.6
10/04/2015	LANDSAT/LC08/C02/T1_L2/LC08_177025_20150410	30	0.11	22
16/05/2014	LANDSAT/LC08/C02/T1_L2/LC08_178025_20140516	30	9.53	29.6
04/06/2015	LANDSAT/LC08/C02/T1_L2/LC08_178025_20150604	30	0.18	29
13/06/2015	LANDSAT/LC08/C02/T1_L2/LC08_177025_20150613	30	0.06	28.3
12/07/2014	LANDSAT/LC08/C02/T1_L2/LC08_177025_20140712	30	5.63	31.2
04/08/2014	LANDSAT/LC08/C02/T1_L2/LC08_178025_20140804	30	6.43	30.9
13/08/2014	LANDSAT/LC08/C02/T1_L2/LC08_177025_20140813	30	0.54	33
20/08/2014	LANDSAT/LC08/C02/T1_L2/LC08_178025_20140820	30	1.6	29
17/09/2015	LANDSAT/LC08/C02/T1_L2/LC08_177025_20150917	30	0.02	26
24/09/2015	LANDSAT/LC08/C02/T1_L2/LC08_178025_20150924	30	0.03	30
22/04/2011	LANDSAT/LT05/C02/T1_L2/LT05_178025_20110422	30	0	16.1
02/06/2011	LANDSAT/LT05/C02/T1_L2/LT05_177025_20110602	30	0	27.9
18/06/2011	LANDSAT/LT05/C02/T1_L2/LT05_177025_20110618	30	4	29.2
20/07/2011	LANDSAT/LT05/C02/T1_L2/LT05_177025_20110720	30	4	32.8

27/07/2011	LANDSAT/LT05/C02/T1_L2/LT05_177025_20110720	30	0	35.7
28/08/2011	LANDSAT/LT05/C02/T1_L2/LT05_178025_20110828	30	0	29.2
08/10/2011	LANDSAT/LT05/C02/T1_L2/LT05_177025_20111008	30	0	24.5
23/05/1999	LANDSAT/LT05/C02/T1_L2/LT05_178025_19990523	30	6	21.5
24/06/1999	LANDSAT/LT05/C02/T1_L2/LT05_178025_19990624	30	0	31.2
26/07/1999	LANDSAT/LT05/C02/T1_L2/LT05_178025_19990726	30	0	29.4
11/08/1999	LANDSAT/LT05/C02/T1_L2/LT05_178025_19990811	30	11	33.7
05/09/1999	LANDSAT/LT05/C02/T1_L2/LT05_177025_19990905	30	0	25.5
17/05/1997	LANDSAT/LT05/C02/T1_L2/LT05_178025_19970517	30	1	23
14/06/1998	LANDSAT/LT05/C02/T1_L2/LT05_177025_19980614	30	0	39.8
16/07/1998	LANDSAT/LT05/C02/T1_L2/LT05_177025_19980716	30	2	31.8
23/07/1998	LANDSAT/LT05/C02/T1_L2/LT05_178025_19980723	30	0	30.4
01/08/1998	LANDSAT/LT05/C02/T1_L2/LT05_177025_19980801	30	1	35.8
09/09/1998	LANDSAT/LT05/C02/T1_L2/LT05_178025_19980909	30	1	20.4
07/05/1996	LANDSAT/LT05/C02/T1_L2/LT05_177025_19960507	30	1	25.2
30/05/1996	LANDSAT/LT05/C02/T1_L2/LT05_178025_19960530	30	5	26.6
24/06/1996	LANDSAT/LT05/C02/T1_L2/LT05_177025_19960624	30	0	30.4
10/07/1996	LANDSAT/LT05/C02/T1_L2/LT05_177025_19960710	30	0	35
02/08/1996	LANDSAT/LT05/C02/T1_L2/LT05_178025_19960802	30	1	28.6
11/08/1996	LANDSAT/LT05/C02/T1_L2/LT05_178025_19960811	30	6	21.9
06/09/1997	LANDSAT/LT05/C02/T1_L2/LT05_178025_19970906	30	0	17.4
15/07/1995	LANDSAT/LT05/C02/T1_L2/LT05_178025_19950715	30	0	29
25/08/1995	LANDSAT/LT05/C02/T1_L2/LT05_177025_19950825	30	3	28.4
17/04/1992	LANDSAT/LT05/C02/T1_L2/LT05_178025_19920417	30	1	19.5
03/05/1992	LANDSAT/LT05/C02/T1_L2/LT05_178025_19920503	30	2	21.5
16/08/1992	LANDSAT/LT05/C02/T1_L2/LT05_177025_19920816	30	0	31.6
01/09/1992	LANDSAT/LT05/C02/T1_L2/LT05_177025_19920901	30	0	26.1
15/04/1991	LANDSAT/LT05/C02/T1_L2/LT05_178025_19910415	30	0	18.1
18/06/1991	LANDSAT/LT05/C02/T1_L2/LT05_178025_19910618	30	0	31
01/10/1991	LANDSAT/LT05/C02/T1_L2/LT05_177025_19911001	30	0	25.9
05/04/1990	LANDSAT/LT05/C02/T1_L2/LT05_177025_19900405	30	0	21
01/07/1990	LANDSAT/LT05/C02/T1_L2/LT05_178025_19900701	30	1	27.3
14/07/1989	LANDSAT/LT05/C02/T1_L2/LT05_178025_19890714	30	0	30
10/04/1986	LANDSAT/LT05/C02/T1_L2/LT05_177025_19860410	30	0	23.3
26/04/1986	LANDSAT/LT05/C02/T1_L2/LT05_177025_19860426	30	0	13.7
28/05/1986	LANDSAT/LT05/C02/T1_L2/LT05_177025_19860528	30	5	27.3
13/06/1986	LANDSAT/LT05/C02/T1_L2/LT05_177025_19860613	30	1	29.3
06/07/1986	LANDSAT/LT05/C02/T1_L2/LT05_178025_19860706	30	0	29.4
07/08/1986	LANDSAT/LT05/C02/T1_L2/LT05_178025_19860807	30	4	29.5
09/05/1985	LANDSAT/LT05/C02/T1_L2/LT05_177025_19850509	30	1	29.6
16/07/1984	LANDSAT/LT05/C02/T1_L2/LT05_178025_19840716	30	8	30.7

Table S2. Statistical analysis of LSTs and LULC class using KDE and its metrics (July 1984–2023).

year	class	mode	median	IQR	min	max	outliers	spread	skewness	MM
2023	water	[30.1, 36.59]	35.38	4.92	27.49	46.67	52	16.51	0.1	2
2023	dense veg	[30.88, 32.71, 37.59, 52.85]	34.65	6.69	26.88	54.59	354	20.92	0.61	4
2023	urban	[38.8]	39.3	4.39	27.42	56.28	4194	17.68	0.18	1
2023	bare land	[37.97, 51.49, 54.24]	37.23	4.85	27.96	56.87	123	16.73	0.4	3
2023	sparse veg	[34.23, 37.73, 51.49, 52.97, 54.36]	36.77	4.7	27.55	56.44	616	16.71	0.55	5
2020	water	[30.74, 34.4, 40.9]	39.73	5.06	29.79	52.34	37	17.72	-0.28	3
2020	dense veg	[34.61, 39.87, 53.71]	37.88	6.16	29.85	56.84	220	17.83	0.63	3
2020	urban	[41.85, 56.25]	42.46	3.74	29.78	58.9	6850	15.62	-0.09	2
2020	bare land	[33.14, 41.11, 49.25, 53.37, 55.66]	40.35	3.15	32.31	56.14	100	10.23	0.5	5
2020	sparse veg	[30.71, 41.23]	40.69	3.99	29.81	57.11	961	15.49	0.05	2
2018	water	[30.0, 33.96, 40.29, 49.07, 53.77, 55.36]	40.24	5.51	29.2	56.54	491	21.97	0.29	6
2018	dense veg	[33.2, 35.69]	37.39	6.36	29.11	56.16	172	19.49	0.61	2
2018	urban	[42.27]	42.32	3.8	29.03	58.69	5496	14.97	-0.14	1
2018	bare land	[29.63, 32.48, 43.17, 52.79]	43.39	3.71	28.87	54.07	133	14.23	-0.55	4
2018	sparse veg	[29.59, 40.5]	40.68	4.31	29.05	56.09	994	16.13	0.03	2
2014	water	[29.15, 35.04, 36.58, 39.51]	38.23	4.61	27.81	50.03	138	17.01	-0.31	4
2014	dense veg	[29.65, 35.31, 39.41]	38.01	5.53	28.11	55.99	457	16.13	0.73	3
2014	urban	[31.39, 41.87, 56.89]	42.09	3.9	27.8	57.7	4561	15.24	-0.07	3
2014	bare land	[28.22, 30.89, 41.4, 51.69]	40.6	4.07	27.83	57.55	359	14.55	-0.1	4
2014	sparse veg	[30.09, 40.29, 54.59]	39.23	4.52	27.98	56.84	505	14.74	0.32	3
2011	water	[29.34, 37.12]	35.99	3.99	27.8	47.33	109	14.71	0.01	2
2011	dense veg	[32.99]	35.3	4.86	27.8	55.83	1039	15.94	1.08	1
2011	urban	[38.5, 57.29]	39.2	4.13	27.79	58.17	3947	15.97	0.34	2
2011	bare land	[28.2, 37.87, 50.95, 54.01]	37.55	4.06	27.79	56.96	293	16.73	0.45	4
2011	sparse veg	[37.78, 50.71, 52.6, 54.75]	37.08	3.8	27.8	57.75	1284	14.27	0.74	4
2006	water	[25.39, 29.88, 35.91]	35.01	5.57	24.37	51.11	87	19.54	-0.17	3
2006	dense veg	[29.46, 35.66]	32.89	6.9	24.98	54.22	404	21.1	0.69	2
2006	urban	[36.66, 56.29, 57.48]	37.34	4.38	24.37	57.55	5212	18.36	0.19	3
2006	bare land	[36.16, 51.39]	36.44	4.25	24.93	54.6	832	19.95	0.43	2
2006	sparse veg	[35.93, 52.17, 55.83, 57.07, 58.95]	35.58	4.52	24.93	59.16	1529	17.88	0.43	5
1999	water	[28.24, 33.51, 38.63, 54.14]	38.67	5.38	27.54	54.3	159	19.77	-0.26	4
1999	dense veg	[33.01, 38.04]	37.31	5.58	27.54	56.44	649	18.51	0.5	2
1999	urban	[38.56, 53.06]	39.63	4.3	27.54	56.44	3275	16.69	0.3	2
1999	bare land	[28.53, 38.94, 50.82]	39.66	4.51	27.54	57.66	630	17.85	-0.12	3
1999	sparse veg	[38.52, 52.1, 54.23]	38.92	4.01	27.55	56.71	682	15.76	0.04	3
1996	water	[28.5, 30.54, 35.19, 39.02]	38.61	4.16	27.07	48.31	568	17.3	-0.53	4
1996	dense veg	[29.43, 35.91, 39.04]	38.12	4.48	27.07	56.52	1320	16.01	0.81	3
1996	urban	[29.63, 39.52, 53.68]	40.99	4.5	27.07	59.05	2637	16.3	0.33	3
1996	bare land	[27.98, 39.39, 52.39, 56.08, 57.51]	39.86	4.11	27.07	59.45	446	17.28	-0.25	5
1996	sparse veg	[39.2, 52.54, 54.28, 57.04]	39.35	3.16	27.07	58.06	3839	13.21	0.38	4
1990	water	[25.71, 29.51, 34.01]	33.07	5.15	24.9	45.54	16	17.07	0.13	3
1990	dense veg	[29.03, 34.51]	31.8	5.76	25.3	54.91	867	17.84	1.11	2

[illegible]

1999	5	29.37	4.97	28.78	4.42	32.05	3.53	35.18	4.39	31.56	4.01
1999	6	35.34	4.33	36.33	4.15	39.96	3.4	40.58	3.37	38.78	3.43
1999	7	36.33	4.05	36.49	4.15	39.95	3.48	40.27	4.26	38.84	3.28
1999	8	35.05	3.91	35.17	3.25	37.98	2.9	39.46	3.33	36.83	2.99
1999	9	28.49	3.76	27.41	2.9	29.39	2.58	32.1	4.06	29.84	3.36
1998	4										
1998	5	27.06	4.44	27.72	4.25	31.96	3.25	32.76	3.65	30.91	3.42
1998	6	39.29	4.49	39.07	4.09	42.42	3.39	44.56	3.83	41.15	3.34
1998	7	34.27	3.83	34.73	4.27	38.25	3.57	37.42	3.43	36.88	3.22
1998	8	39.32	3.45	38.7	3.74	41.84	3.52	41.61	3.41	40.13	2.98
1998	9	26.13	4.68	24.76	3.16	25.62	2.67	26.06	3.06	25.97	3.07
1996	4										
1996	5	35.57	4.4	33.45	4.21	37.34	3.57	38.29	4.07	36.25	3.68
1996	6	36.37	3.7	35.48	4.15	38.88	3.55	37.7	3.45	37.39	3.29
1996	7	38.21	3.3	37.99	3.59	41.08	3.49	39.91	3.58	39.34	2.98
1996	8	30.29	3.15	28.76	3.35	31.59	2.93	31.69	3.15	30.89	2.64
1996	9	21.66	2.89	19.81	3.02	22.03	2.38	23.08	2.91	21.86	2.23

Figure S4. SUHI maps for July over the years.



