Supplementary Material

Table S1: Descriptive Statistics of LST and UHI Intensity (2000–2024)

City	Mean ± SD (°C)	Median	Min–Max (°C)	Variance	CV (%)
Daytime LST					
Ahmedabad	35.46 ± 0.99	35.44	33.82–37.88	0.99	2.8
Gandhinagar	34.75 ± 1.16	34.71	32.79–37.22	1.35	3.34
Rajkot	36.81 ± 1.74	36.64	34.16–42.12	3.02	4.72
Surat	34.49 ± 0.75	34.34	33.08–35.88	0.57	2.18
Vadodara	35.33 ± 1.15	35.2	33.82–39.05	1.32	3.25
Nighttime LST					
Ahmedabad	23.63 ± 1.08	23.68	22.08–26.78	1.16	4.55
Gandhinagar	23.06 ± 1.18	22.92	20.81–26.63	1.39	5.1
Rajkot	22.58 ± 0.94	22.69	21.04–25.07	0.88	4.16
Surat	24.04 ± 0.87	24.18	22.50–25.74	0.76	3.62
Vadodara	23.61 ± 1.16	23.56	21.50–27.22	1.34	4.91
Daytime UHI (Method 2)					
Ahmedabad	2.92 ± 0.51	2.94	2.01–3.94	0.26	17.31
Gandhinagar	1.11 ± 0.18	1.09	0.77–1.58	0.03	15.88
Rajkot	3.30 ± 0.48	3.42	2.09–4.02	0.23	14.68
Surat	3.80 ± 0.40	3.76	3.20–5.00	0.16	10.45
Vadodara	1.45 ± 0.31	1.42	0.88–2.14	0.09	21.15
Nighttime UHI (Method 2)					
Ahmedabad	2.04 ± 0.16	2.04	1.72–2.40	0.03	7.96
Gandhinagar	1.47 ± 0.19	1.44	1.18–1.99	0.03	12.66
Rajkot	0.62 ± 0.14	0.62	0.41–0.92	0.02	22.05
Surat	2.30 ± 0.23	2.28	1.86–2.66	0.05	9.83
Vadodara	2.25 ± 0.24	2.24	1.88–2.64	0.06	10.48

Table S2. Trend and Change-Point Statistics of LST and UHI Intensity Across Major Cities of Gujarat (2000–2024)

Variable	City	Sen's Slope	95% CI	τ (Z)	R^2	p-value	Adjusted MK p-value	BH-adjusted q-value	Pettitt Year (p)	Trend Classification
Day LST	Ahmedabad	-0.076	-0.125 to -0.029	-0.377 (-2.62)	0.323	0.009	0.0109	0.0182	2011 (0.058)	Significant Decreasing
	Gandhinagar	-0.105	-0.132 to -0.011	-0.413 (-2.87)	0.207	0.004	0.0721	0.0962	2010 (0.100)	Significant Decreasing
	Rajkot	-0.145	-0.233 to -0.079	-0.488 (-3.39)	0.436	0.001	0.0006	0.0024	2007 (0.021)	Moderate Decreasing
	Surat	-0.066	-0.090 to -0.014	-0.357 (-2.48)	0.26	0.013	0.0125	0.0192	2016 (0.224)	Moderate Decreasing
	Vadodara	-0.103	-0.153 to -0.050	-0.524 (-3.64)	0.423	<0.001	0.0030	0.0060	2012 (0.032)	Strong Significant Decreasing
Night LST	Ahmedabad	0.096	0.063 to 0.150	0.504 (3.50)	0.532	<0.001	0.0026	0.0058	2010 (0.003)	Strong Significant Increasing
	Gandhinagar	0.049	0.003 to 0.128	0.227 (1.56)	0.168	0.118	0.1682	0.2103	2009 (0.077)	Weak Increasing
	Rajkot	0.09	0.067 to 0.135	0.624 (4.34)	0.625	<0.001	3.36e-06	3.4e-05	2010 (0.003)	Very Strong Increasing
	Surat	0.108	0.083 to 0.129	0.760 (5.30)	0.799	<0.001	4.02e-07	8.0e-06	2013 (0.001)	Strong Significant Increasing
	Vadodara	0.106	0.061 to 0.158	0.569 (3.95)	0.485	<0.001	6.51e-05	0.000396	2010 (0.016)	Significant Increasing
Day UHI (M2)	Ahmedabad	-0.048	-0.069 to -0.027	-0.504 (-3.50)	0.488	<0.001	0.0007	0.0024	2011 (0.014)	Significant Decreasing
	Gandhinagar	0.013	0.006 to 0.023	0.447 (3.08)	0.37	0.002	0.0022	0.0055	2014 (0.007)	Moderate Increasing
	Rajkot	-0.022	-0.050 to 0.003	-0.250 (-1.73)	0.125	0.084	0.0585	0.0836	2010 (0.027)	Weak Decreasing
	Surat	-0.03	-0.053 to -0.018	-0.488 (-3.39)	0.44	<0.001	0.0010	0.0028	2015 (0.029)	Significant Decreasing
	Vadodara	-0.03	-0.043 to -0.019	-0.544 (-3.76)	0.557	<0.001	7.91e-05	0.000396	2012 (0.007)	Strong Significant Decreasing
Night UHI (M2)	Ahmedabad	0.002	-0.008 to 0.011	0.071 (0.47)	0.002	0.64	0.6913	0.6913	2009 (0.947)	Stable
	Gandhinagar	-0.003	-0.010 to 0.011	-0.077 (-0.51)	0.002	0.607	0.5912	0.6223	2003 (0.979)	Stable
	Rajkot	-0.006	-0.012 to 0.004	-0.199 (-1.35)	0.051	0.176	0.3624	0.4026	2007 (0.311)	Weak Decreasing
	Surat	0.006	-0.008 to 0.018	0.134 (0.91)	0.028	0.362	0.2525	0.2970	2008 (0.420)	Weak Increasing
	Vadodara	0.012	0.002 to 0.027	0.306 (2.10)	0.208	0.036	0.0095	0.0173	2011 (0.032)	Moderate Increasing

Note: *Pettitt change-point years are reported for all time series. Statistical significance of the detected change points is indicated by the corresponding p-values.*

Table S3. Pairwise Pearson correlation matrix for the urban–rural contrast predictors.

Predictor	ΔNDVI	ΔNDBI	ΔAOD	ΔAlbedo
ΔNDVI	1.000	-0.699	-0.486	-0.157
ΔNDBI	-0.699	1.000	0.493	0.457
ΔAOD	-0.486	0.493	1.000	0.392
ΔAlbedo	-0.157	0.457	0.392	1.000

Note. Pearson's r was calculated using pairwise-complete observations. Pairs not involving ΔAlbedo use N = 125; correlations involving ΔAlbedo use N = 118 because seven ΔAlbedo values are missing. Values are pooled across five cities and 2000–2024.

Table S4. Variance inflation factors (VIF) for the urban–rural contrast predictors.

Predictor	VIF	Number of complete records
ΔNDVI	11.29	118
ΔNDBI	4.48	118
ΔAOD	3.15	118
ΔAlbedo	7.13	118

Note. VIF was calculated from the four predictors using the 118 complete predictor records (listwise deletion for this diagnostic only). VIF is reported as an exploratory measure of linear predictor redundancy; it is not a direct diagnostic of Random Forest validity. The pooled values may reflect both between-city differences and temporal variation.

Table S5. City-wise lag-1 autocorrelation after linear detrending

City	Series	N non-missing	Consecutive-year pairs	Lag-1 r	p (BH-adjusted)
Ahmedabad	Daytime SUHI	25	24	-0.145	0.924
Ahmedabad	Nighttime SUHI	25	24	-0.046	0.952
Ahmedabad	ΔNDVI	25	24	0.013	0.952
Ahmedabad	ΔNDBI	25	24	0.044	0.952
Ahmedabad	ΔAOD	25	24	0.410	0.467
Ahmedabad	ΔAlbedo	23	21	0.099	0.924
Gandhinagar	Daytime SUHI	25	24	0.014	0.952
Gandhinagar	Nighttime SUHI	25	24	0.025	0.952
Gandhinagar	ΔNDVI	25	24	-0.175	0.913
Gandhinagar	ΔNDBI	25	24	0.238	0.913
Gandhinagar	ΔAOD	25	24	0.434	0.467
Gandhinagar	ΔAlbedo	23	21	-0.209	0.913
Rajkot	Daytime SUHI	25	24	0.411	0.467
Rajkot	Nighttime SUHI	25	24	-0.133	0.924
Rajkot	ΔNDVI	25	24	-0.208	0.913
Rajkot	ΔNDBI	25	24	0.170	0.913

Rajkot	ΔAOD	25	24	0.385	0.472
Rajkot	ΔAlbedo	24	23	0.075	0.924
Surat	Daytime SUHI	25	24	0.022	0.952
Surat	Nighttime SUHI	25	24	-0.091	0.924
Surat	ΔNDVI	25	24	0.095	0.924
Surat	ΔNDBI	25	24	0.256	0.913
Surat	ΔAOD	25	24	0.085	0.924
Surat	ΔAlbedo	24	23	-0.128	0.924
Vadodara	Daytime SUHI	25	24	-0.176	0.913
Vadodara	Nighttime SUHI	25	24	-0.214	0.913
Vadodara	ΔNDVI	25	24	0.189	0.913
Vadodara	ΔNDBI	25	24	-0.111	0.924
Vadodara	ΔAOD	25	24	0.229	0.913
Vadodara	ΔAlbedo	24	23	0.073	0.924

Note. For each city and series, a linear trend was fitted against year and removed; lag-1 Pearson correlation was then calculated between residuals from consecutive years only. N non-missing is the number of annual observations used to estimate the linear trend. The number of consecutive-year pairs is lower where ΔAlbedo is missing. p-values are adjusted across the 30 city-by-series tests using the Benjamini–Hochberg false-discovery-rate procedure. No result remained significant at adjusted $p < .05$. These are exploratory diagnostics based on short annual series (approximately 21–24 consecutive-year pairs), and should be interpreted cautiously.

Table S6: Annual temporal coverage and valid pixel-observation counts for daytime land surface temperature (LST) derived from MODIS MOD11A2 across five cities in Gujarat, India (2000–2024).

City	Year	Pixel Count	Available Composites	Valid Composites	Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Ahmedabad	2000	591	40	36	23640	18831	4809
Ahmedabad	2001	591	45	40	26595	21379	5216
Ahmedabad	2002	591	46	42	27186	22558	4628
Ahmedabad	2003	591	46	44	27186	22461	4725
Ahmedabad	2004	591	46	43	27186	23222	3964
Ahmedabad	2005	591	46	43	27186	21951	5235
Ahmedabad	2006	591	46	41	27186	22316	4870
Ahmedabad	2007	591	46	42	27186	22151	5035
Ahmedabad	2008	591	46	44	27186	21847	5339
Ahmedabad	2009	591	46	43	27186	24380	2806

City	Year	Pixel Count	Available Composites	Valid Composites	Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Ahmedabad	2010	591	46	42	27186	22131	5055
Ahmedabad	2011	591	46	40	27186	20684	6502
Ahmedabad	2012	591	46	40	27186	21839	5347
Ahmedabad	2013	591	46	40	27186	21125	6061
Ahmedabad	2014	591	46	44	27186	23042	4144
Ahmedabad	2015	591	46	42	27186	23347	3839
Ahmedabad	2016	591	46	43	27186	21402	5784
Ahmedabad	2017	591	46	44	27186	21993	5193
Ahmedabad	2018	591	46	42	27186	21777	5409
Ahmedabad	2019	591	46	41	27186	21778	5408
Ahmedabad	2020	591	46	44	27186	21883	5303
Ahmedabad	2021	591	46	39	27186	21042	6144
Ahmedabad	2022	591	45	39	26595	20982	5613
Ahmedabad	2023	591	46	38	27186	20980	6206
Ahmedabad	2024	591	24	22	14184	12787	1397
Gandhinagar	2000	58	40	34	2320	1822	498
Gandhinagar	2001	58	45	38	2610	2087	523
Gandhinagar	2002	58	46	42	2668	2273	395
Gandhinagar	2003	58	46	40	2668	2125	543
Gandhinagar	2004	58	46	42	2668	2293	375
Gandhinagar	2005	58	46	39	2668	2132	536
Gandhinagar	2006	58	46	39	2668	2137	531
Gandhinagar	2007	58	46	39	2668	2136	532
Gandhinagar	2008	58	46	38	2668	2106	562
Gandhinagar	2009	58	46	42	2668	2338	330
Gandhinagar	2010	58	46	39	2668	2148	520
Gandhinagar	2011	58	46	37	2668	2035	633
Gandhinagar	2012	58	46	39	2668	2135	533
Gandhinagar	2013	58	46	37	2668	2074	594
Gandhinagar	2014	58	46	40	2668	2186	482
Gandhinagar	2015	58	46	42	2668	2347	321
Gandhinagar	2016	58	46	37	2668	2048	620
Gandhinagar	2017	58	46	41	2668	2106	562
Gandhinagar	2018	58	46	38	2668	2148	520
Gandhinagar	2019	58	46	39	2668	2109	559
Gandhinagar	2020	58	46	43	2668	2168	500
Gandhinagar	2021	58	46	39	2668	2116	552
Gandhinagar	2022	58	45	36	2610	2020	590
Gandhinagar	2023	58	46	39	2668	2121	547
Gandhinagar	2024	58	24	22	1392	1234	158

City	Year	Pixel Count	Available Composites	Valid Composites	Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Rajkot	2000	203	40	37	8120	6646	1474
Rajkot	2001	203	45	40	9135	7498	1637
Rajkot	2002	203	46	43	9338	8147	1191
Rajkot	2003	203	46	44	9338	7902	1436
Rajkot	2004	203	46	43	9338	8395	943
Rajkot	2005	203	46	41	9338	7697	1641
Rajkot	2006	203	46	42	9338	8028	1310
Rajkot	2007	203	46	43	9338	7878	1460
Rajkot	2008	203	46	45	9338	7958	1380
Rajkot	2009	203	46	45	9338	8438	900
Rajkot	2010	203	46	44	9338	7971	1367
Rajkot	2011	203	46	39	9338	7386	1952
Rajkot	2012	203	46	38	9338	7628	1710
Rajkot	2013	203	46	42	9338	7772	1566
Rajkot	2014	203	46	44	9338	8250	1088
Rajkot	2015	203	46	42	9338	8139	1199
Rajkot	2016	203	46	39	9338	7492	1846
Rajkot	2017	203	46	44	9338	8100	1238
Rajkot	2018	203	46	41	9338	7814	1524
Rajkot	2019	203	46	42	9338	8147	1191
Rajkot	2020	203	46	43	9338	7879	1459
Rajkot	2021	203	46	42	9338	7839	1499
Rajkot	2022	203	45	41	9135	7616	1519
Rajkot	2023	203	46	40	9338	7774	1564
Rajkot	2024	203	24	22	4872	4406	466
Surat	2000	237	40	37	9480	7511	1969
Surat	2001	237	45	40	10665	8732	1933
Surat	2002	237	46	42	10902	8869	2033
Surat	2003	237	46	42	10902	8902	2000
Surat	2004	237	46	44	10902	9371	1531
Surat	2005	237	46	42	10902	8946	1956
Surat	2006	237	46	42	10902	8997	1905
Surat	2007	237	46	44	10902	9053	1849
Surat	2008	237	46	43	10902	8718	2184
Surat	2009	237	46	43	10902	9362	1540
Surat	2010	237	46	45	10902	8755	2147
Surat	2011	237	46	37	10902	7944	2958
Surat	2012	237	46	41	10902	8567	2335
Surat	2013	237	46	41	10902	8187	2715
Surat	2014	237	46	43	10902	9025	1877

City	Year	Pixel Count	Available Composites	Valid Composites	Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Surat	2015	237	46	43	10902	8941	1961
Surat	2016	237	46	41	10902	8319	2583
Surat	2017	237	46	45	10902	9106	1796
Surat	2018	237	46	41	10902	8681	2221
Surat	2019	237	46	42	10902	8482	2420
Surat	2020	237	46	45	10902	8672	2230
Surat	2021	237	46	41	10902	8438	2464
Surat	2022	237	45	40	10665	8271	2394
Surat	2023	237	46	39	10902	8424	2478
Surat	2024	237	24	23	5688	5040	648
Vadodara	2000	235	40	36	9400	7159	2241
Vadodara	2001	235	45	41	10575	8584	1991
Vadodara	2002	235	46	41	10810	8973	1837
Vadodara	2003	235	46	42	10810	8566	2244
Vadodara	2004	235	46	42	10810	9073	1737
Vadodara	2005	235	46	44	10810	8953	1857
Vadodara	2006	235	46	41	10810	8568	2242
Vadodara	2007	235	46	43	10810	8602	2208
Vadodara	2008	235	46	42	10810	8397	2413
Vadodara	2009	235	46	42	10810	9234	1576
Vadodara	2010	235	46	43	10810	8849	1961
Vadodara	2011	235	46	41	10810	8293	2517
Vadodara	2012	235	46	40	10810	8497	2313
Vadodara	2013	235	46	38	10810	8010	2800
Vadodara	2014	235	46	41	10810	8857	1953
Vadodara	2015	235	46	43	10810	9250	1560
Vadodara	2016	235	46	41	10810	8672	2138
Vadodara	2017	235	46	44	10810	8845	1965
Vadodara	2018	235	46	38	10810	8662	2148
Vadodara	2019	235	46	39	10810	8284	2526
Vadodara	2020	235	46	43	10810	8627	2183
Vadodara	2021	235	46	39	10810	8114	2696
Vadodara	2022	235	45	40	10575	8290	2285
Vadodara	2023	235	46	38	10810	8292	2518
Vadodara	2024	235	24	22	5640	5063	577

Table S7: Annual temporal coverage and valid pixel-observation counts for nighttime land surface temperature (LST) derived from MODIS MOD11A2 across five cities in Gujarat, India (2000–2024).

City	Year	Pixel Count	Available Composites	Valid Composites	Possible Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Ahmedabad	2000	591	40	38	23640	20988	2652
Ahmedabad	2001	591	45	40	26595	22677	3918
Ahmedabad	2002	591	46	44	27186	24865	2321
Ahmedabad	2003	591	46	41	27186	22659	4527
Ahmedabad	2004	591	46	43	27186	24753	2433
Ahmedabad	2005	591	46	41	27186	22589	4597
Ahmedabad	2006	591	46	41	27186	23157	4029
Ahmedabad	2007	591	46	41	27186	22700	4486
Ahmedabad	2008	591	46	44	27186	22870	4316
Ahmedabad	2009	591	46	43	27186	23584	3602
Ahmedabad	2010	591	46	40	27186	21485	5701
Ahmedabad	2011	591	46	40	27186	23185	4001
Ahmedabad	2012	591	46	39	27186	22196	4990
Ahmedabad	2013	591	46	38	27186	21736	5450
Ahmedabad	2014	591	46	44	27186	24819	2367
Ahmedabad	2015	591	46	44	27186	24194	2992
Ahmedabad	2016	591	46	39	27186	22671	4515
Ahmedabad	2017	591	46	40	27186	22980	4206
Ahmedabad	2018	591	46	43	27186	23680	3506
Ahmedabad	2019	591	46	43	27186	23426	3760
Ahmedabad	2020	591	46	40	27186	22512	4674
Ahmedabad	2021	591	46	40	27186	22304	4882
Ahmedabad	2022	591	45	37	26595	20657	5938
Ahmedabad	2023	591	46	40	27186	23025	4161
Ahmedabad	2024	591	24	22	14184	12460	1724
Gandhinagar	2000	58	40	35	2320	1935	385
Gandhinagar	2001	58	45	40	2610	2250	360
Gandhinagar	2002	58	46	44	2668	2450	218
Gandhinagar	2003	58	46	38	2668	2053	615
Gandhinagar	2004	58	46	43	2668	2494	174
Gandhinagar	2005	58	46	41	2668	2295	373
Gandhinagar	2006	58	46	38	2668	2191	477
Gandhinagar	2007	58	46	39	2668	2218	450
Gandhinagar	2008	58	46	39	2668	2182	486
Gandhinagar	2009	58	46	44	2668	2421	247
Gandhinagar	2010	58	46	37	2668	2117	551
Gandhinagar	2011	58	46	40	2668	2317	351

City	Year	Pixel Count	Available Composites	Valid Composites	Possible Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Gandhinagar	2012	58	46	37	2668	2146	522
Gandhinagar	2013	58	46	38	2668	2203	465
Gandhinagar	2014	58	46	42	2668	2409	259
Gandhinagar	2015	58	46	44	2668	2438	230
Gandhinagar	2016	58	46	38	2668	2204	464
Gandhinagar	2017	58	46	39	2668	2201	467
Gandhinagar	2018	58	46	41	2668	2337	331
Gandhinagar	2019	58	46	42	2668	2373	295
Gandhinagar	2020	58	46	39	2668	2247	421
Gandhinagar	2021	58	46	38	2668	2191	477
Gandhinagar	2022	58	45	36	2610	2037	573
Gandhinagar	2023	58	46	40	2668	2241	427
Gandhinagar	2024	58	24	21	1392	1218	174
Rajkot	2000	203	40	35	8120	7101	1019
Rajkot	2001	203	45	40	9135	7979	1156
Rajkot	2002	203	46	44	9338	8734	604
Rajkot	2003	203	46	44	9338	8361	977
Rajkot	2004	203	46	44	9338	8552	786
Rajkot	2005	203	46	42	9338	8381	957
Rajkot	2006	203	46	43	9338	8133	1205
Rajkot	2007	203	46	42	9338	8411	927
Rajkot	2008	203	46	44	9338	8770	568
Rajkot	2009	203	46	44	9338	8766	572
Rajkot	2010	203	46	42	9338	8062	1276
Rajkot	2011	203	46	42	9338	8314	1024
Rajkot	2012	203	46	43	9338	8306	1032
Rajkot	2013	203	46	40	9338	7978	1360
Rajkot	2014	203	46	44	9338	8746	592
Rajkot	2015	203	46	43	9338	8582	756
Rajkot	2016	203	46	43	9338	8140	1198
Rajkot	2017	203	46	42	9338	8369	969
Rajkot	2018	203	46	44	9338	8560	778
Rajkot	2019	203	46	42	9338	7972	1366
Rajkot	2020	203	46	43	9338	8268	1070
Rajkot	2021	203	46	43	9338	8011	1327
Rajkot	2022	203	45	40	9135	7967	1168
Rajkot	2023	203	46	43	9338	8269	1069
Rajkot	2024	203	24	22	4872	4466	406
Surat	2000	237	40	35	9480	7656	1824
Surat	2001	237	45	37	10665	8350	2315

City	Year	Pixel Count	Available Composites	Valid Composites	Possible Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Surat	2002	237	46	42	10902	9701	1201
Surat	2003	237	46	38	10902	8758	2144
Surat	2004	237	46	40	10902	9106	1796
Surat	2005	237	46	40	10902	8814	2088
Surat	2006	237	46	38	10902	8589	2313
Surat	2007	237	46	40	10902	8847	2055
Surat	2008	237	46	42	10902	9039	1863
Surat	2009	237	46	40	10902	9228	1674
Surat	2010	237	46	37	10902	8534	2368
Surat	2011	237	46	38	10902	8786	2116
Surat	2012	237	46	39	10902	8912	1990
Surat	2013	237	46	37	10902	8423	2479
Surat	2014	237	46	41	10902	9179	1723
Surat	2015	237	46	41	10902	9589	1313
Surat	2016	237	46	38	10902	8526	2376
Surat	2017	237	46	40	10902	9001	1901
Surat	2018	237	46	41	10902	9511	1391
Surat	2019	237	46	40	10902	9086	1816
Surat	2020	237	46	38	10902	8505	2397
Surat	2021	237	46	39	10902	9178	1724
Surat	2022	237	45	36	10665	8155	2510
Surat	2023	237	46	41	10902	8941	1961
Surat	2024	237	24	22	5688	4982	706
Vadodara	2000	235	40	35	9400	7931	1469
Vadodara	2001	235	45	39	10575	8758	1817
Vadodara	2002	235	46	43	10810	9878	932
Vadodara	2003	235	46	40	10810	8559	2251
Vadodara	2004	235	46	42	10810	9434	1376
Vadodara	2005	235	46	39	10810	8953	1857
Vadodara	2006	235	46	41	10810	9202	1608
Vadodara	2007	235	46	41	10810	9106	1704
Vadodara	2008	235	46	41	10810	8903	1907
Vadodara	2009	235	46	42	10810	9554	1256
Vadodara	2010	235	46	39	10810	8471	2339
Vadodara	2011	235	46	39	10810	8922	1888
Vadodara	2012	235	46	39	10810	8927	1883
Vadodara	2013	235	46	40	10810	8454	2356
Vadodara	2014	235	46	41	10810	9351	1459
Vadodara	2015	235	46	44	10810	9963	847
Vadodara	2016	235	46	37	10810	8418	2392

City	Year	Pixel Count	Available Composites	Valid Composites	Possible Pixel-Observations	Valid Pixel-Observations	Zero Values Excluded
Vadodara	2017	235	46	40	10810	9100	1710
Vadodara	2018	235	46	42	10810	9481	1329
Vadodara	2019	235	46	38	10810	8409	2401
Vadodara	2020	235	46	40	10810	8766	2044
Vadodara	2021	235	46	41	10810	8939	1871
Vadodara	2022	235	45	38	10575	8440	2135
Vadodara	2023	235	46	41	10810	9360	1450
Vadodara	2024	235	24	21	5640	4935	705

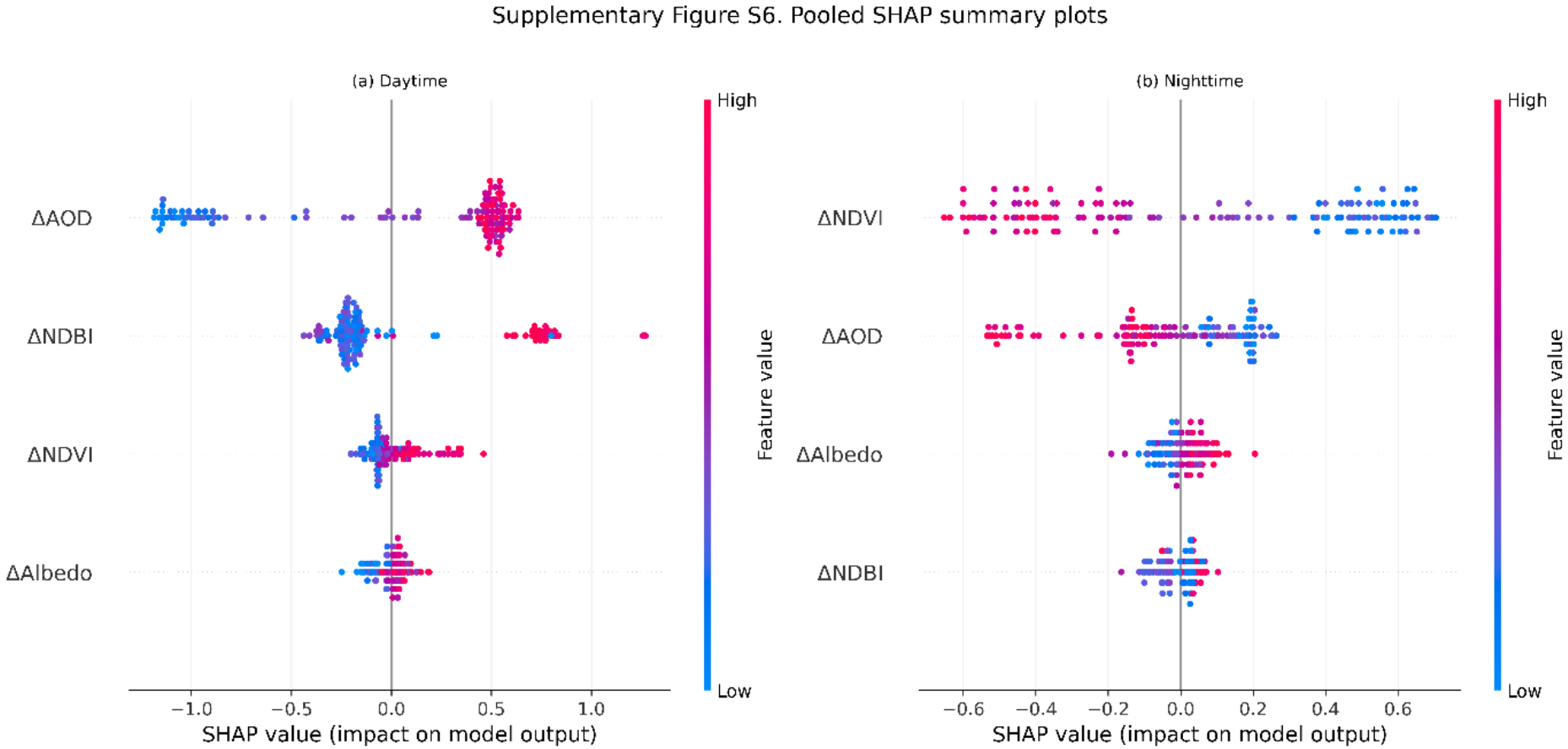

Figure S1: Pooled SHAP Summary Plots for Daytime and Nighttime Models

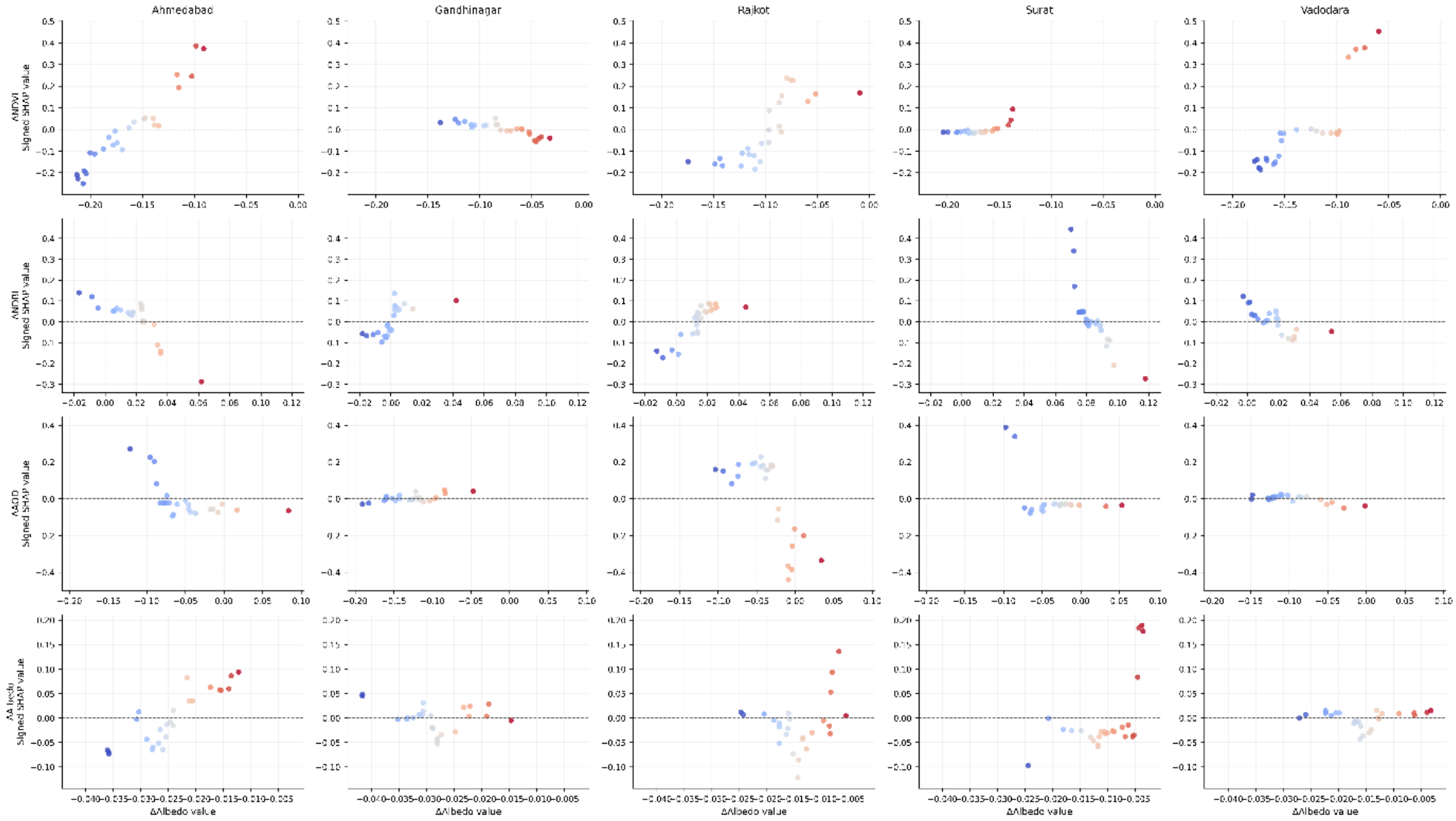

Figure S2a: City-Specific SHAP Dependence Plots for Daytime SUHI Variability

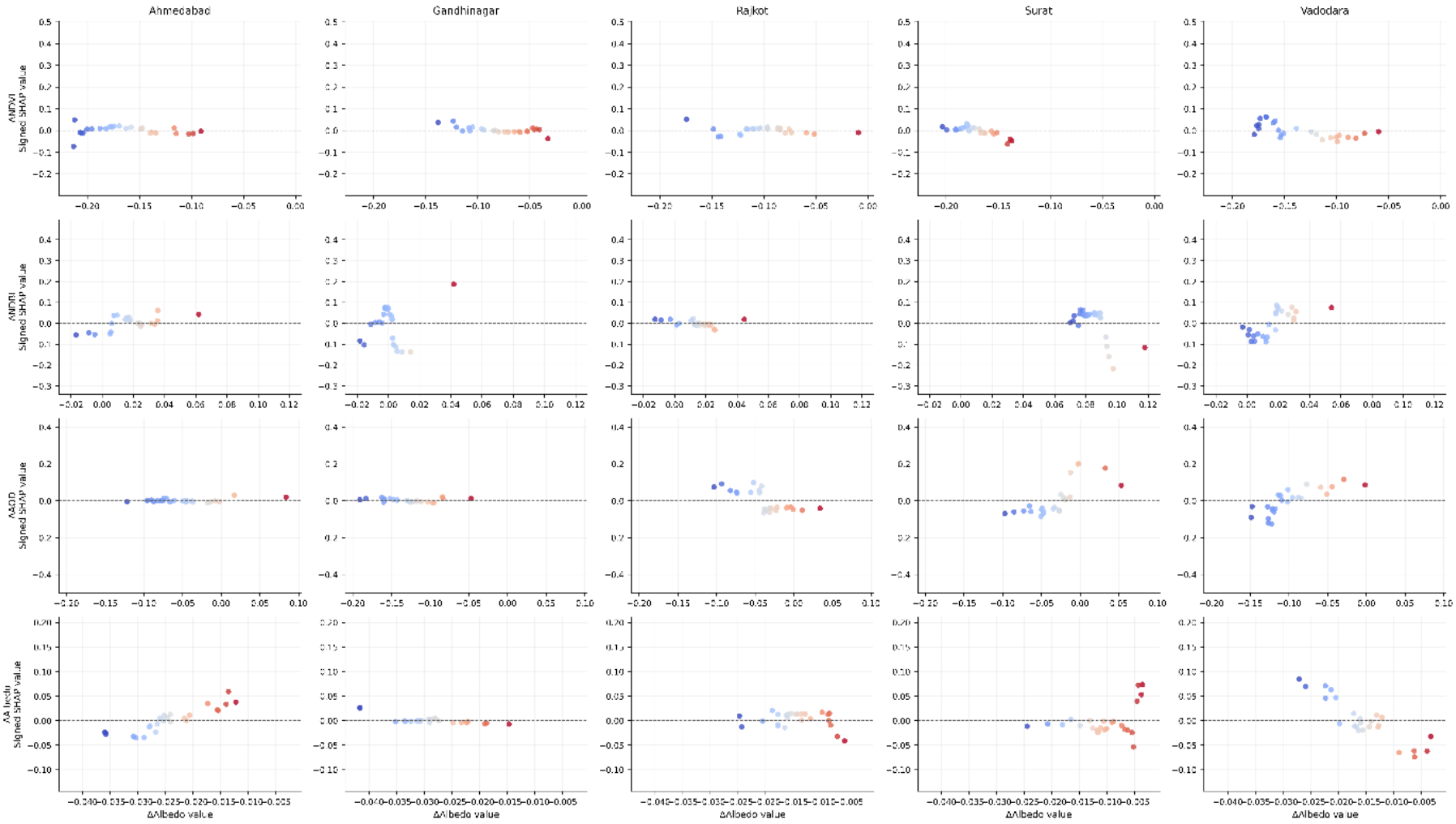

Figure S2b: City-Specific SHAP Dependence Plots for Nighttime SUHI Variability

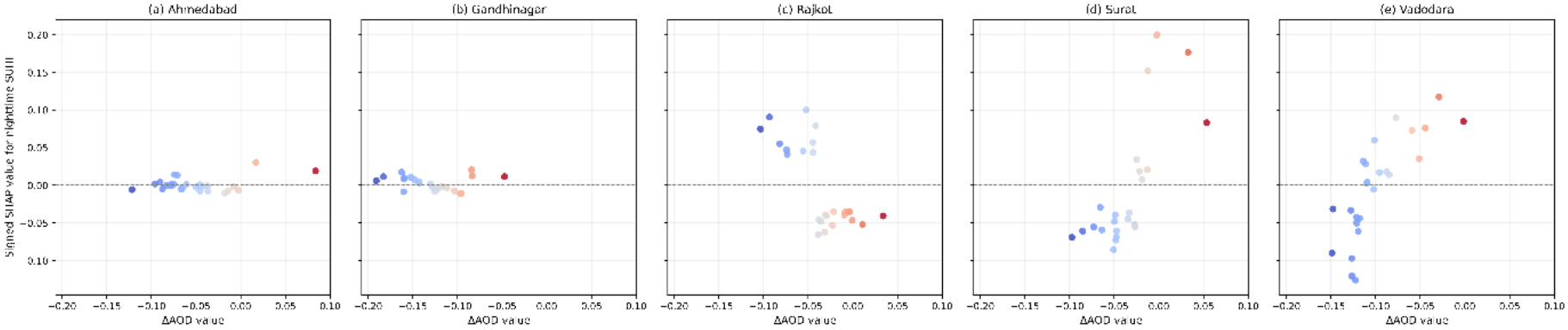

Figure S3: City-Specific SHAP Dependence Plots for Nighttime ΔAOD–SUHI Relationships Across Five Cities

Figure S4: Pooled Accumulated Local Effects (ALE) Plots for Daytime and Nighttime Models

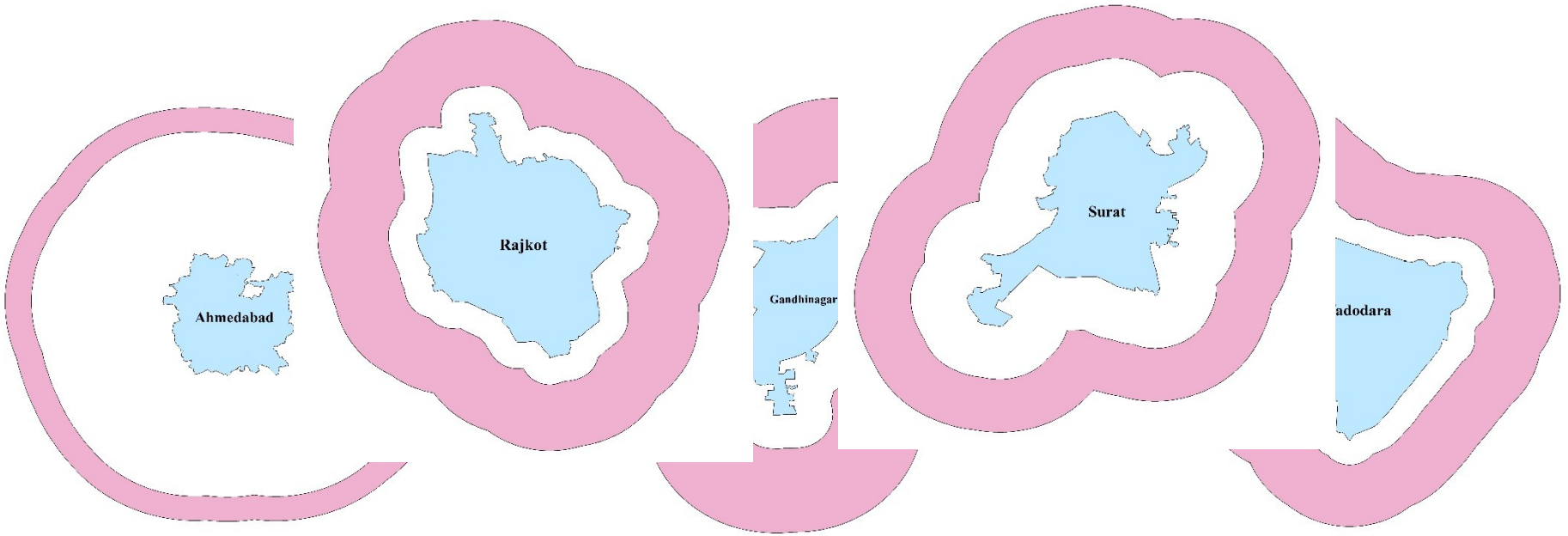

Figure S5: Spatial delineation of urban boundaries and city-specific rural reference zones used for SUHI assessment across five cities in Gujarat, India.

The urban areas are delineated by municipal boundaries, and the surrounding rural reference zones are defined using city-specific buffer annuli: Ahmedabad (25–30 km), Gandhinagar (2–7 km), Rajkot (2–7 km), Surat (5–10 km), and Vadodara (2–7 km). The inner buffer distance defines the excluded zone surrounding each urban boundary, while the outer buffer defines the extent of the rural reference zone. These zones were used to derive urban–rural land surface temperature contrasts for SUHI estimation.