

1 Supplementary Information for

2 **A Spatially Explicit Surface Urban Heat Island Database for the United States:**
3 **Characterization, Uncertainties, and Possible Applications**

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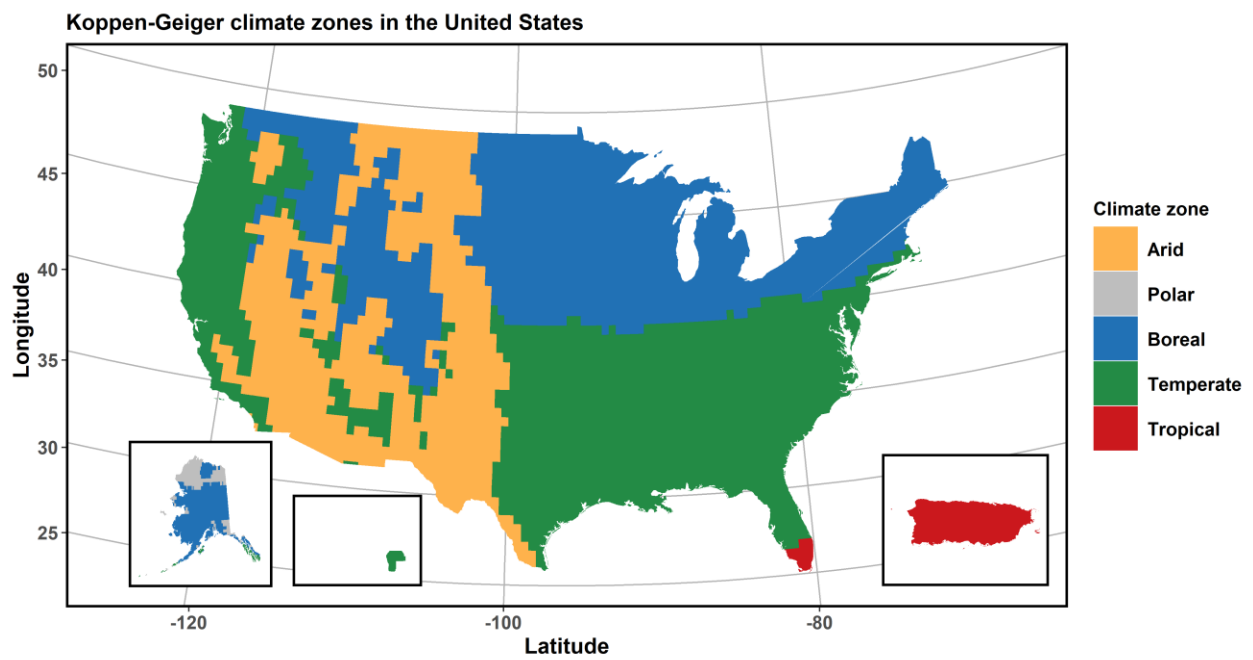
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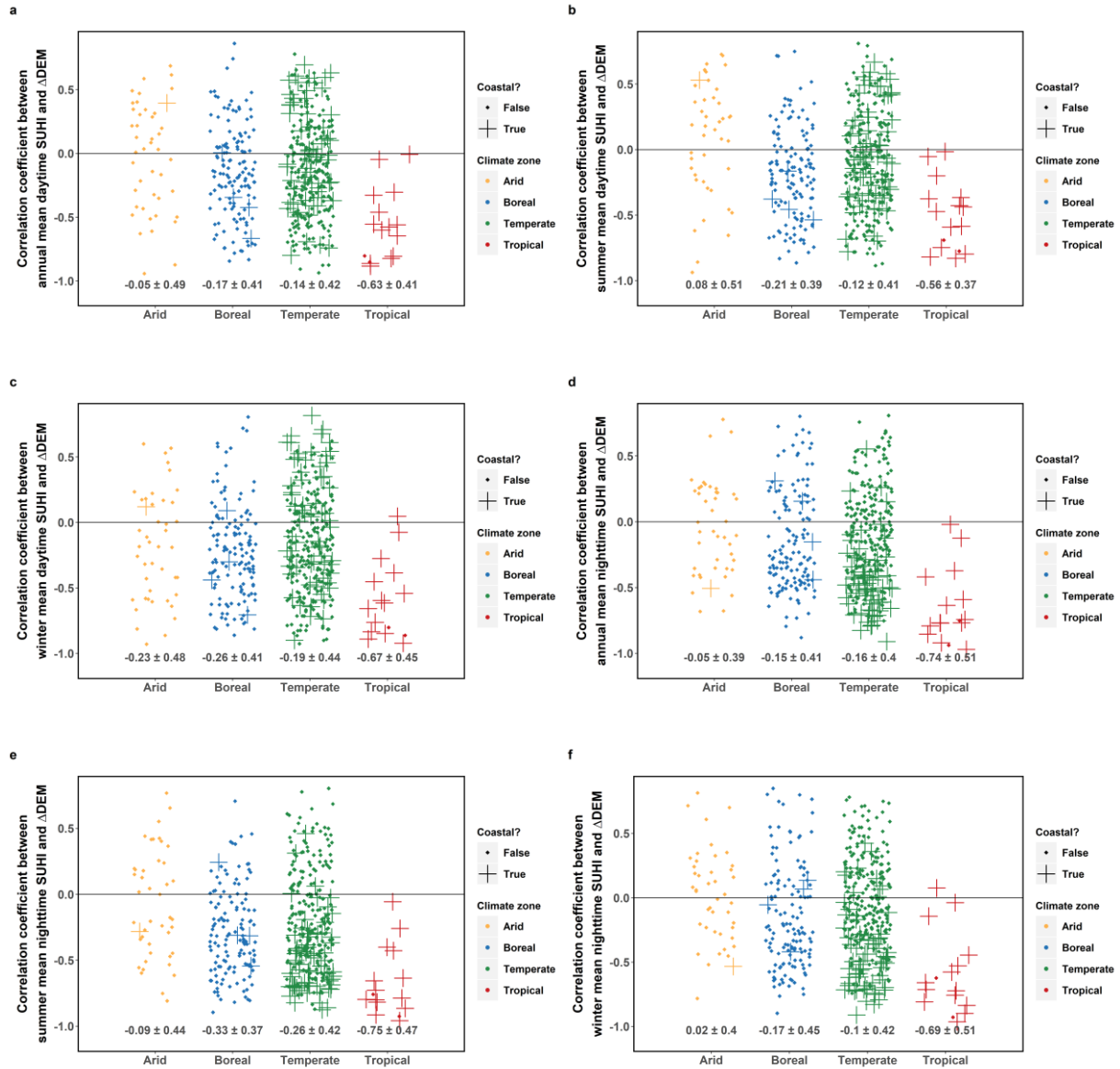
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Fig. S1 Map of Koppen-Geiger climate zones in the United States.



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66 **Fig. S2** Summary of intra-urban and inter-urban correlation of 2013-2017 **(a)** mean annual daytime
 67 SUHI, **(b)** mean summer daytime SUHI, **(c)** mean winter daytime SUHI, **(d)** mean annual nighttime
 68 SUHI, **(e)** mean summer nighttime SUHI, and **(f)** mean winter nighttime SUHI with Δ DEM. The
 69 points show the distribution (jittered) of the Pearson correlation coefficient (r) between the two
 70 variables for every US urbanized area divided into the climate zones, calculated from the census
 71 tract-level calculations. The numbers below the points give the mean and standard deviation of r
 72 after Fisher's z transformation and back-transformation.

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74 **Table S1** Evaluation of urban-area weighted SUHI intensities (mean \pm standard deviation)
 75 calculated in present study using the database from the Global Surface UHI Explorer
 76 (<https://yceo.yale.edu/research/global-surface-uhi-explorer>; Chakraborty and Lee, 2019)

Case	SUHI Intensity (area-weighted)	
	Chakraborty and Lee, 2019	Present study
Annual daytime (°C)	1.27 \pm 0.66	1.54 \pm 0.58
Annual nighttime (°C)	0.4 \pm 0.26	0.43 \pm 0.24
Summer daytime (°C)	1.8 \pm 0.94	2.22 \pm 0.93
Summer nighttime (°C)	0.67 \pm 0.31	0.67 \pm 0.22
Winter daytime (°C)	0.73 \pm 0.43	0.95 \pm 0.41
Winter nighttime (°C)	0.26 \pm 0.26	0.34 \pm 0.33

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103 **Table S2** Percentage of processed 8-day composite MODIS images (mean \pm standard deviation)
 104 for rural pixels for the cases and climate zones considered in the present study.

Period	Case	Regions of interest			
		Arid	Boreal	Temperate	Tropical
Annual daytime (%)	All	98.1 \pm 2.2	88.6 \pm 4.2	95.1 \pm 2.8	89.8 \pm 4
	Coastal	99.7 \pm 0	92.2 \pm 0.9	95.4 \pm 2.4	89.6 \pm 4.3
	Non-Coastal	98.1 \pm 2.2	88.5 \pm 4.2	95 \pm 2.9	91.1 \pm 1.9
Annual nighttime (%)	All	98.7 \pm 1.5	94.1 \pm 3.6	95.7 \pm 2.6	96.9 \pm 1.5
	Coastal	97 \pm 0	96.6 \pm 1.5	96.3 \pm 1.8	96.8 \pm 1.6
	Non-Coastal	98.7 \pm 1.4	94 \pm 3.6	95.5 \pm 2.7	97.4 \pm 0.6
Summer daytime (%)	All	99.8 \pm 1.1	98.4 \pm 1.7	95.6 \pm 5	87.3 \pm 7.2
	Coastal	99.8 \pm 0	96.9 \pm 3.1	94.7 \pm 5.8	86.8 \pm 7.6
	Non-Coastal	99.8 \pm 1.1	98.4 \pm 1.7	95.8 \pm 4.7	90.4 \pm 3
Summer nighttime (%)	All	99.3 \pm 1.3	98.4 \pm 1.6	97.2 \pm 2.8	96.7 \pm 2.6
	Coastal	92 \pm 0	95.9 \pm 5.2	96.7 \pm 2.3	96.5 \pm 2.8
	Non-Coastal	99.5 \pm 0.7	98.5 \pm 1.3	97.3 \pm 2.9	98.1 \pm 0.3
Winter daytime (%)	All	95 \pm 5.2	69.2 \pm 12.9	90.8 \pm 7.3	96 \pm 2.8
	Coastal	99.6 \pm 0	82.2 \pm 5.9	92.7 \pm 5.4	95.7 \pm 2.9
	Non-Coastal	94.9 \pm 5.2	68.8 \pm 12.8	90.3 \pm 7.7	97.9 \pm 0.8
Winter nighttime (%)	All	97 \pm 3.3	85 \pm 10.1	90.8 \pm 7.1	99.1 \pm 1.4
	Coastal	99.6 \pm 0	93.7 \pm 2.5	94 \pm 4.2	99 \pm 1.5
	Non-Coastal	97 \pm 3.3	84.7 \pm 10.1	89.9 \pm 7.5	99.9 \pm 0.2

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110 **Table S3** Percentage of processed daily MODIS images (mean \pm standard deviation) for urban
 111 pixels for the cases and climate zones considered in the present study.

Period	Case	Regions of interest			
		Arid	Boreal	Temperate	Tropical
Annual daytime (%)	All	62.1 \pm 9.8	35.1 \pm 5.5	44.3 \pm 10.8	35.2 \pm 5.8
	Coastal	68.6 \pm 0	39.7 \pm 1.1	45.4 \pm 10.5	34.7 \pm 6
	Non-Coastal	62 \pm 9.8	34.9 \pm 5.5	43.9 \pm 10.9	38.8 \pm 3.1
Annual nighttime (%)	All	62.7 \pm 10.6	39.6 \pm 6	44.8 \pm 8.7	50.3 \pm 4.8
	Coastal	50.6 \pm 0	42.8 \pm 1.2	45.3 \pm 6.7	49.9 \pm 4.9
	Non-Coastal	63 \pm 10.6	39.5 \pm 6.1	44.6 \pm 9.2	52.8 \pm 3.8
Summer daytime (%)	All	75.9 \pm 11.4	45.5 \pm 9.3	45.4 \pm 20	29.7 \pm 7.3
	Coastal	78.4 \pm 0	47.7 \pm 5.7	45.1 \pm 18.9	29.2 \pm 7.6
	Non-Coastal	75.9 \pm 11.5	45.4 \pm 9.4	45.5 \pm 20.3	33.2 \pm 4
Summer nighttime (%)	All	69 \pm 12.5	46 \pm 7.2	46.4 \pm 13.2	45.8 \pm 5.8
	Coastal	38.1 \pm 0	43 \pm 6.6	43.8 \pm 10.4	45.6 \pm 6.2
	Non-Coastal	69.7 \pm 11.7	46.1 \pm 7.3	47.1 \pm 13.9	47 \pm 2.3
Winter daytime (%)	All	44.5 \pm 9.7	17.9 \pm 7.2	37.9 \pm 10.1	44.6 \pm 7.9
	Coastal	57.7 \pm 0	26.1 \pm 5.8	40.4 \pm 9.7	43.9 \pm 8.2
	Non-Coastal	44.2 \pm 9.6	17.6 \pm 7.1	37.1 \pm 10.1	49.9 \pm 0.8
Winter nighttime (%)	All	53.1 \pm 10.7	29.5 \pm 9.3	37.6 \pm 10.3	62.7 \pm 9.2
	Coastal	57.9 \pm 0	36.9 \pm 3.9	41.3 \pm 8.6	61.7 \pm 9.2
	Non-Coastal	53 \pm 10.8	29.3 \pm 9.4	36.6 \pm 10.5	69.1 \pm 7.8

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118 **Table S4** Percentage of processed MODIS images (mean \pm standard deviation) for rural pixels
 119 for the cases and climate zones considered in the present study.

Period	Case	Regions of interest			
		Arid	Boreal	Temperate	Tropical
Annual daytime (%)	All	62.1 \pm 4.2	35.7 \pm 5.3	45 \pm 10.6	32.9 \pm 5.5
	Coastal	69.9 \pm 0	39.3 \pm 1.2	45.9 \pm 10.6	32.5 \pm 5.8
	Non-Coastal	61.9 \pm 9.7	35.6 \pm 5.3	44.8 \pm 10.6	35.5 \pm 2.9
Annual nighttime (%)	All	63.1 \pm 10.2	40.2 \pm 5.4	45.6 \pm 8.7	50.4 \pm 5.3
	Coastal	52.3 \pm 0	42.3 \pm 1.5	46.1 \pm 6.9	49.9 \pm 5.5
	Non-Coastal	63.3 \pm 10.2	40.1 \pm 5.5	45.5 \pm 9.1	53.7 \pm 3
Summer daytime (%)	All	75.8 \pm 11.5	46.6 \pm 8.6	47.3 \pm 19.1	27.5 \pm 6.5
	Coastal	81.2 \pm 0	47.7 \pm 6.4	46.4 \pm 19	27.1 \pm 6.8
	Non-Coastal	75.7 \pm 11.6	46.6 \pm 8.7	47.5 \pm 19.2	29.9 \pm 3.9
Summer nighttime (%)	All	69.4 \pm 12	48.7 \pm 6.3	48.2 \pm 13	45.6 \pm 5.9
	Coastal	40.7 \pm 0	43.4 \pm 7.4	45.6 \pm 10.2	45.3 \pm 6.3
	Non-Coastal	70 \pm 11.3	48.8 \pm 6.3	48.9 \pm 13.6	48.2 \pm 1.2
Winter daytime (%)	All	44.7 \pm 10.1	18.8 \pm 7.3	38 \pm 10.2	42.1 \pm 7.3
	Coastal	58.7 \pm 0	25.5 \pm 5.1	40.4 \pm 10.1	41.5 \pm 7.7
	Non-Coastal	44.4 \pm 10	18.6 \pm 7.3	37.3 \pm 10.1	46.1 \pm 0.1
Winter nighttime (%)	All	52.9 \pm 10.7	28.3 \pm 9	37.2 \pm 10.8	62.7 \pm 9.9
	Coastal	58.7 \pm 0	35.6 \pm 3.3	41 \pm 9.2	61.7 \pm 10
	Non-Coastal	52.7 \pm 10.8	28.1 \pm 9	36 \pm 11	69.8 \pm 6.7

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