Supplementary Information for

Forest cooling is not natural-vegetation cooling: pair-specific and environmentally conditioned land-cover thermal contrasts across India

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Table S1. Pairwise cooling frequencies and mean thermal contrasts among major land-cover classes. Number of valid matched observations, number and percentage for which the first land-cover class was cooler than the second, and mean ΔLST for daytime, nighttime and day-night mean conditions. Negative ΔLST indicates that the first land-cover class was cooler than the second

Variable	Pairs	Valid Pairs	Cooling Pairs	Cooling (%)	Mean ΔLST (°C)
Day	Forest-Savanna	20,929	20,070	95.90	-1.39
Day	Forest-Grass	686	663	96.65	-2.50
Day	Shrub-Grass	65	14	21.54	+1.05
Day	Savanna-Grass	1,320	1,219	92.35	-1.52
Day	Forest-Crop	4,825	4,804	99.56	-2.32
Day	Shrub-Crop	2,783	134	4.81	+2.21
Day	Savanna-Crop	4,124	3,606	87.44	-1.14
Day	Grass-Crop	13,729	3,063	22.31	+0.99
Day	Forest-Urban	83	81	97.59	-2.57
Day	Shrub-Urban	657	183	27.85	+0.72
Day	Savanna-Urban	801	680	84.89	-1.03
Day	Grass-Urban	1,230	421	34.23	+0.72
Day	Crop-Urban	151,984	111,049	73.07	-0.58
Day	Shrub-Barren	423	287	67.85	-0.76
Day	Grass-Barren	3,849	2,220	57.68	-0.34

Day	Crop-Barren	188	29	15.43	+1.30
Day	Urban-Barren	161	37	22.98	+0.96
Night	Forest-Savanna	20,929	6,191	29.58	+0.29
Night	Forest-Grass	686	208	30.32	+0.36
Night	Shrub-Grass	65	49	75.38	-0.87
Night	Savanna-Grass	1,320	639	48.41	+0.04
Night	Forest-Crop	4,825	974	20.19	+0.40
Night	Shrub-Crop	2,783	1,631	58.61	-0.02
Night	Savanna-Crop	4,124	1,279	31.01	+0.22
Night	Grass-Crop	13,729	2,208	16.08	+0.79
Night	Forest-Urban	83	70	84.34	-0.55
Night	Shrub-Urban	657	485	73.82	-0.54
Night	Savanna-Urban	801	707	88.26	-0.63
Night	Grass-Urban	1,230	916	74.47	-0.44
Night	Crop-Urban	151,984	138,053	90.83	-0.70
Night	Shrub-Barren	423	402	95.04	-1.34
Night	Grass-Barren	3,849	2,339	60.77	-0.21
Night	Crop-Barren	188	169	89.89	-0.98
Night	Urban-Barren	161	92	57.14	-0.35
Mean	Forest-Savanna	20,929	18,415	87.99	-0.55
Mean	Forest-Grass	686	650	94.75	-1.07
Mean	Shrub-Grass	65	28	43.08	+0.09
Mean	Savanna-Grass	1,320	1,196	90.61	-0.74
Mean	Forest-Crop	4,825	4,705	97.51	-0.96
Mean	Shrub-Crop	2,783	104	3.74	+1.09
Mean	Savanna-Crop	4,124	3,432	83.22	-0.46
Mean	Grass-Crop	13,729	2,046	14.90	+0.89

Mean	Forest-Urban	83	83	100.00	-1.56
Mean	Shrub-Urban	657	320	48.71	+0.09
Mean	Savanna-Urban	801	711	88.76	-0.83
Mean	Grass-Urban	1,230	611	49.67	+0.14
Mean	Crop-Urban	151,984	130,838	86.09	-0.64
Mean	Shrub-Barren	423	365	86.29	-1.05
Mean	Grass-Barren	3,849	2,360	61.31	-0.28
Mean	Crop-Barren	188	55	29.26	+0.16
Mean	Urban-Barren	161	40	24.84	+0.31

Table S2. Thermal contrasts for aggregated ecological land-cover comparison groups. Valid-pair counts, numbers and percentages showing relative cooling, and mean ΔLST for comparisons involving forest, non-forest natural vegetation, all natural vegetation and anthropogenic land covers during daytime, nighttime and day-night mean conditions.

LST Variable	Comparison Group	Description	Valid Pairs	Cooling Pairs	Cooling (%)	Mean ΔLST (°C)
Day	Crop vs Forest	Forest minus Crop	4,825	4,804	99.56	-2.32
Day	Crop vs Non-Forest Natural	Shrub/Savanna/Grass minus Crop	20,636	6,803	32.97	+0.73
Day	Crop vs All Natural	Forest/Shrub/Savanna/Grass minus Crop	25,461	11,607	45.59	+0.15
Day	Forest vs Anthropogenic	Forest minus Crop/Urban	4,908	4,885	99.53	-2.32
Day	Forest vs Remaining Natural	Forest minus Shrub/Savanna/Grass	21,615	20,733	95.92	-1.43
Night	Crop vs Forest	Forest minus Crop	4,825	974	20.19	+0.40
Night	Crop vs Non-Forest Natural	Shrub/Savanna/Grass minus Crop	20,636	5,118	24.80	+0.56
Night	Crop vs All Natural	Forest/Shrub/Savanna/Grass minus Crop	25,461	6,092	23.93	+0.53
Night	Forest vs Anthropogenic	Forest minus Crop/Urban	4,908	1,044	21.27	+0.38
Night	Forest vs Remaining Natural	Forest minus Shrub/Savanna/Grass	21,615	6,399	29.60	+0.29
Mean	Crop vs Forest	Forest minus Crop	4,825	4,705	97.51	-0.96
Mean	Crop vs Non-Forest Natural	Shrub/Savanna/Grass minus Crop	20,636	5,582	27.05	+0.64
Mean	Crop vs All Natural	Forest/Shrub/Savanna/Grass minus Crop	25,461	10,287	40.40	+0.34

Mean	Forest vs Anthropogenic	Forest minus Crop/Urban	4,908	4,788	97.56	-0.97
Mean	Forest vs Remaining Natural	Forest minus Shrub/Savanna/Grass	21,615	19,065	88.20	-0.57

Table S3. Spatial autocorrelation of pairwise land-cover thermal contrasts. Global Moran's I and permutation-based significance for daytime, nighttime and day-night mean ΔLST across eligible land-cover pairs using an eight-nearest-neighbour spatial-weights matrix and 999 permutations.

Pairs	N	Day			Night			Mean		
		I	p	Sig.?	I	p	Sig.?	I	p	Sig.?
Forest-Savanna	20,929	0.5805	0.0010	Yes	0.5992	0.0010	Yes	0.5328	0.0010	Yes
Forest-Grass	686	0.5503	0.0010	Yes	0.4868	0.0010	Yes	0.3841	0.0010	Yes
Forest-Crop	4,825	0.6546	0.0010	Yes	0.6690	0.0010	Yes	0.6440	0.0010	Yes
Forest-Urban	83	0.5063	0.0010	Yes	0.4017	0.0010	Yes	0.5186	0.0010	Yes
Shrub-Grass	65	0.5698	0.0010	Yes	0.5343	0.0010	Yes	0.2537	0.0020	Yes
Shrub-Crop	2,783	0.7496	0.0010	Yes	0.6812	0.0010	Yes	0.6899	0.0010	Yes
Shrub-Urban	657	0.6423	0.0010	Yes	0.5661	0.0010	Yes	0.4819	0.0010	Yes
Shrub-Barren	423	0.7215	0.0010	Yes	0.6040	0.0010	Yes	0.6357	0.0010	Yes
Savanna-Grass	1,320	0.5150	0.0010	Yes	0.5252	0.0010	Yes	0.5133	0.0010	Yes
Savanna-Crop	4,124	0.7191	0.0010	Yes	0.5920	0.0010	Yes	0.7281	0.0010	Yes
Savanna-Urban	801	0.4712	0.0010	Yes	0.5384	0.0010	Yes	0.5185	0.0010	Yes
Grass-Crop	13,729	0.8322	0.0010	Yes	0.8077	0.0010	Yes	0.8515	0.0010	Yes
Grass-Urban	1,230	0.7951	0.0010	Yes	0.6371	0.0010	Yes	0.7746	0.0010	Yes
Grass-Barren	3,849	0.6830	0.0010	Yes	0.5344	0.0010	Yes	0.6545	0.0010	Yes
Crop-Urban	151,984	0.7751	0.0010	Yes	0.7241	0.0010	Yes	0.7733	0.0010	Yes
Crop-Barren	188	0.4675	0.0010	Yes	0.6480	0.0010	Yes	0.2926	0.0010	Yes
Urban-Barren	161	0.7536	0.0010	Yes	0.7507	0.0010	Yes	0.7458	0.0010	Yes

Table S4a. Sensitivity of daytime land-cover thermal contrasts to non-overlapping spatial thinning. Comparison of India-wide daytime ΔLST estimated from the full overlapping moving-window sample and nine complete non-overlapping spatial phases, including sample size, mean contrast, phase range, magnitude of change, equivalence testing, sign stability and preservation of statistical significance

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Forest-Savanna	20,929	2325.4	2129-2452	-1.3941	-1.3939	-1.4233 to -1.3449	+0.0002	0.01%	0	0	-1.5638	[-0.0147, 0.0150]	0.000124	Yes	No	Yes	Yes
Forest-Grass	686	76.2	60-100	-2.5047	-2.5271	-2.9432 to -1.8167	-0.0224	0.89%	4.99e-195	3.55e-110	-1.6287	[-0.2545, 0.2097]	0.4152	No	No	Yes	Yes
Forest-Crop	4,825	536.1	450-647	-2.3151	-2.3184	-2.3844 to -2.2660	-0.0033	0.14%	0	0	-2.4428	[-0.0316, 0.0249]	0.00761	Yes	No	Yes	Yes
Forest-Urban	83	9.2	0-24	-2.5680	-2.6858	-3.4972 to -2.3150	-0.1178	4.59%	2.84e-27	3.35e-15	-1.7777	[-0.3499, 0.1143]	0.6992	No	No	No	No
Shrub-Grass	65	7.2	1-16	1.0538	0.9089	-0.4866 to 1.5428	-0.1449	13.75%	3.67e-07	6.22e-06	0.7034	[-0.5443, 0.2545]	0.6649	No	Yes	No	No
Shrub-Crop	2,783	309.2	264-339	2.2059	2.1987	2.0703 to 2.3624	-0.0072	0.33%	0	0	1.6968	[-0.0804, 0.0660]	0.1541	No	No	Yes	Yes
Shrub-Urban	657	73.0	54-106	0.7181	0.7422	0.4237 to 1.0318	+0.0242	3.36%	1.85e-59	2.36e-51	0.7044	[-0.1230, 0.1713]	0.3761	No	No	Yes	Yes
Shrub-Barren	423	47.0	31-69	-0.7593	-0.7702	-1.3550 to -0.0885	-0.0109	1.44%	4.44e-20	1.56e-17	-0.4697	[-0.2319, 0.2101]	0.3754	No	No	No	No
Savanna-Grass	1,320	146.7	133-171	-1.5235	-1.5116	-1.6828 to -1.2744	+0.0119	0.78%	3.71e-292	4.17e-190	-1.3228	[-0.0757, 0.0995]	0.2209	No	No	Yes	Yes
Savanna-Crop	4,124	458.2	432-491	-1.1421	-1.1451	-1.2323 to -1.0704	-0.0030	0.26%	0	0	-1.0767	[-0.0379, 0.0319]	0.01841	Yes	No	Yes	Yes
Savanna-Urban	801	89.0	58-120	-1.0329	-1.0031	-1.2149 to -0.9001	+0.0298	2.88%	9.78e-120	1.71e-94	-0.9833	[-0.0298, 0.0894]	0.2730	No	No	Yes	Yes
Savanna-Barren	15	1.7	0-6	1.1863	1.1863	1.1863 to 1.1863	+0.0000	0.00%	0.000129	0.000801	1.3487	[0.0000, 0.0000]	0	Yes	No	No	No
Grass-Crop	13,729	1525.4	1468-1603	0.9871	0.9878	0.8411 to 1.1098	+0.0007	0.07%	0	0	0.6290	[-0.0506, 0.0521]	0.05611	No	No	Yes	Yes

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Grass-Urban	1,230	136.7	112-164	0.7245	0.6066	0.1837 to 1.1266	-0.1180	16.28%	1.44e-47	3.98e-41	0.4315	[-0.3470, 0.1111]	0.7019	No	No	No	No
Grass-Barren	3,849	427.7	377-479	-0.3396	-0.3375	-0.6540 to -0.0519	+0.0021	0.61%	2.04e-09	1.16e-13	-0.0969	[-0.1475, 0.1516]	0.2839	No	No	No	No
Crop-Urban	151,984	16887.1	16455-17262	-0.5805	-0.5802	-0.6120 to -0.5395	+0.0003	0.05%	0	0	-0.5584	[-0.0151, 0.0156]	0.000157	Yes	No	Yes	Yes
Crop-Barren	188	20.9	7-31	1.3001	1.2726	0.5621 to 1.8968	-0.0275	2.11%	2.06e-17	3.95e-18	0.6851	[-0.2822, 0.2273]	0.4368	No	No	Yes	Yes
Urban-Barren	161	17.9	9-25	0.9576	0.9856	0.0813 to 1.6948	+0.0280	2.92%	5.27e-08	5.63e-10	0.4503	[-0.3398, 0.3958]	0.4571	No	No	No	No

Table S4b. Sensitivity of nighttime land-cover thermal contrasts to non-overlapping spatial thinning. Comparison of India-wide nighttime ΔLST estimated from the full overlapping moving-window sample and nine complete non-overlapping spatial phases, including sample size, mean contrast, phase range, magnitude of change, equivalence testing, sign stability and preservation of statistical significance.

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Forest-Savanna	20,929	2325.4	2129-2452	0.2915	0.2912	0.2527 to 0.3298	-0.0003	0.11%	0	0	0.4537	[-0.0167, 0.0160]	0.000243	Yes	No	Yes	Yes
Forest-Grass	686	76.2	60-100	0.3605	0.3782	0.1862 to 0.6092	+0.0177	4.91%	1.67e-27	1.13e-26	0.4336	[-0.0737, 0.1091]	0.2647	No	No	No	No
Forest-Crop	4,825	536.1	450-647	0.3986	0.4034	0.3391 to 0.4664	+0.0048	1.21%	0	0	0.7515	[-0.0191, 0.0287]	0.00395	Yes	No	Yes	Yes
Forest-Urban	83	9.2	0-24	-0.5479	-0.4519	-0.8205 to -0.0926	+0.0960	17.53%	8.29e-13	2.54e-10	-0.9293	[-0.0369, 0.2290]	0.7311	No	No	No	No
Shrub-Grass	65	7.2	1-16	-0.8750	-0.7630	-1.4238 to 0.2606	+0.1120	12.80%	1.43e-08	2.57e-07	-0.8053	[-0.2527, 0.4767]	0.6200	No	Yes	No	No
Shrub-Crop	2,783	309.2	264-339	-0.0179	-0.0144	-0.0736 to 0.0262	+0.0035	19.44%	0.02574	1.59e-18	-0.0423	[-0.0173, 0.0242]	0.00157	Yes	Yes	No	No
Shrub-Urban	657	73.0	54-106	-0.5405	-0.5432	-0.9135 to -0.3920	-0.0028	0.51%	1.66e-57	1.66e-50	-0.6898	[-0.1179, 0.1124]	0.2337	No	No	Yes	Yes
Shrub-Barren	423	47.0	31-69	-1.3377	-1.3148	-1.6663 to -0.6985	+0.0229	1.71%	9.86e-110	6.57e-68	-1.4943	[-0.1451, 0.1910]	0.3861	No	No	No	No

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Savanna-Grass	1,320	146.7	133-171	0.0430	0.0579	0.0028 to 0.1639	+0.0149	34.76%	0.01736	0.4720	0.0656	[-0.0210, 0.0509]	0.05370	No	No	No	No
Savanna-Crop	4,124	458.2	432-491	0.2158	0.2160	0.1830 to 0.2502	+0.0002	0.09%	1.83e-199	1.93e-179	0.4963	[-0.0151, 0.0155]	0.000152	Yes	No	Yes	Yes
Savanna-Urban	801	89.0	58-120	-0.6250	-0.6276	-0.8436 to -0.4661	-0.0026	0.42%	1.12e-143	3.57e-106	-1.1211	[-0.0788, 0.0736]	0.1403	No	No	Yes	Yes
Savanna-Barren	15	1.7	0-6	0.2252	0.2252	0.2252 to 0.2252	-0.0000	0.00%	0.03633	0.03084	0.5976	[-0.0000, -0.0000]	0	Yes	No	No	No
Grass-Crop	13,729	1525.4	1468-1603	0.7854	0.7855	0.7464 to 0.8756	+0.0001	0.01%	0	0	0.9616	[-0.0233, 0.0234]	0.00203	Yes	No	Yes	Yes
Grass-Urban	1,230	136.7	112-164	-0.4395	-0.4346	-0.6690 to -0.2378	+0.0048	1.10%	3.03e-87	1.88e-82	-0.6128	[-0.0838, 0.0935]	0.1857	No	No	No	No
Grass-Barren	3,849	427.7	377-479	-0.2113	-0.2076	-0.3167 to -0.0845	+0.0037	1.75%	2.21e-16	1.72e-30	-0.1329	[-0.0507, 0.0581]	0.07594	No	No	No	No
Crop-Urban	151,984	16887.1	16455-17262	-0.6993	-0.6992	-0.7044 to -0.6874	+0.0000	0.01%	0	0	-1.1613	[-0.0034, 0.0035]	1.83e-09	Yes	No	Yes	Yes
Crop-Barren	188	20.9	7-31	-0.9773	-0.9472	-1.1581 to -0.5543	+0.0301	3.08%	9.59e-40	3.28e-27	-1.2386	[-0.0744, 0.1345]	0.3659	No	No	Yes	Yes
Urban-Barren	161	17.9	9-25	-0.3466	-0.3604	-0.7286 to -0.1731	-0.0138	3.97%	3.10e-07	0.000289	-0.4211	[-0.1316, 0.1041]	0.2916	No	No	No	No

Table S4c. Sensitivity of day-night mean land-cover thermal contrasts to non-overlapping spatial thinning. Comparison of India-wide mean ΔLST estimated from the full overlapping moving-window sample and nine complete non-overlapping spatial phases, including sample size, mean contrast, phase range, magnitude of change, equivalence testing, sign stability and preservation of statistical significance.

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Forest-Savanna	20,929	2325.4	2129-2452	-0.5513	-0.5513	-0.5812 to -0.5353	-0.0001	0.01%	0	0	-1.0594	[-0.0098, 0.0097]	5.98e-06	Yes	No	Yes	Yes
Forest-Grass	686	76.2	60-100	-1.0721	-1.0744	-1.3093 to -0.6813	-0.0023	0.22%	1.06e-154	1.09e-103	-1.3365	[-0.1284, 0.1237]	0.2510	No	No	Yes	Yes
Forest-Crop	4,825	536.1	450-647	-0.9583	-0.9575	-0.9956 to -0.9211	+0.0007	0.08%	0	0	-1.8929	[-0.0126, 0.0141]	6.39e-05	Yes	No	Yes	Yes
Forest-Urban	83	9.2	0-24	-1.5580	-1.5689	-1.9226 to -1.3654	-0.0109	0.70%	6.37e-30	2.50e-15	-1.9553	[-0.1113, 0.0895]	0.2447	No	No	No	No

Pairs	N original	N thinned mean	N thinned range	Original mean ΔLST	Thinned mean ΔLST	Thinned range	Mean change	Magnitude change	t-test p	Wilcoxon p	Cohen's d	Mean change 90% CI	TOST p	Equivalent?	Sign reversal?	All phases spatial sig.?	Significance preserved?
Shrub-Grass	65	7.2	1-16	0.0894	0.0730	-0.1130 to 0.2953	-0.0165	18.40%	0.3129	0.02742	0.1262	[-0.0970, 0.0641]	0.2305	No	Yes	No	Yes
Shrub-Crop	2,783	309.2	264-339	1.0940	1.0921	1.0101 to 1.1764	-0.0018	0.17%	0	0	1.7597	[-0.0368, 0.0331]	0.01676	Yes	No	Yes	Yes
Shrub-Urban	657	73.0	54-106	0.0888	0.0995	-0.0926 to 0.2368	+0.0107	12.05%	5.45e-07	0.001172	0.1974	[-0.0598, 0.0812]	0.1652	No	Yes	No	No
Shrub-Barren	423	47.0	31-69	-1.0485	-1.0425	-1.4128 to -0.3935	+0.0060	0.57%	1.59e-63	2.28e-51	-0.9773	[-0.1790, 0.1910]	0.3350	No	No	No	No
Savanna-Grass	1,320	146.7	133-171	-0.7403	-0.7269	-0.8351 to -0.5985	+0.0134	1.81%	1.50e-217	5.64e-176	-1.0582	[-0.0426, 0.0694]	0.1296	No	No	Yes	Yes
Savanna-Crop	4,124	458.2	432-491	-0.4631	-0.4645	-0.5133 to -0.4393	-0.0014	0.30%	0	0	-0.7883	[-0.0168, 0.0140]	0.000190	Yes	No	Yes	Yes
Savanna-Urban	801	89.0	58-120	-0.8290	-0.8154	-1.0005 to -0.7021	+0.0136	1.64%	2.08e-164	6.47e-111	-1.2420	[-0.0465, 0.0737]	0.1464	No	No	Yes	Yes
Savanna-Barren	15	1.7	0-6	0.7058	0.7058	0.7058 to 0.7058	-0.0000	0.00%	2.22e-05	0.000652	1.6074	[-0.0000, -0.0000]	0	Yes	No	No	No
Grass-Crop	13,729	1525.4	1468-1603	0.8862	0.8866	0.8077 to 0.9927	+0.0004	0.04%	0	0	0.9652	[-0.0325, 0.0333]	0.01155	Yes	No	Yes	Yes
Grass-Urban	1,230	136.7	112-164	0.1425	0.0860	-0.1232 to 0.3786	-0.0566	39.68%	9.43e-09	9.89e-05	0.1648	[-0.1883, 0.0752]	0.5358	No	Yes	No	No
Grass-Barren	3,849	427.7	377-479	-0.2754	-0.2725	-0.4072 to -0.1168	+0.0029	1.05%	3.12e-14	7.04e-26	-0.1229	[-0.0691, 0.0749]	0.1291	No	No	No	No
Crop-Urban	151,984	16887.1	16455-17262	-0.6399	-0.6397	-0.6529 to -0.6175	+0.0002	0.03%	0	0	-0.9823	[-0.0072, 0.0075]	7.52e-07	Yes	No	Yes	Yes
Crop-Barren	188	20.9	7-31	0.1614	0.1627	-0.2159 to 0.4462	+0.0013	0.80%	0.01513	1.36e-07	0.1788	[-0.1371, 0.1396]	0.2655	No	Yes	No	No
Urban-Barren	161	17.9	9-25	0.3055	0.3126	-0.0459 to 0.7388	+0.0071	2.33%	0.001136	8.25e-07	0.2612	[-0.1522, 0.1664]	0.3151	No	Yes	No	No

Table S5. Nonlinear dependence of daytime land-cover thermal contrasts on background land-surface temperature. Continuous one-breakpoint hinge-regression estimates for natural vegetation-anthropogenic land-cover contrasts, including sample size, estimated breakpoint and bootstrap 95% confidence interval, pre- and post-break slopes, slope change, statistical significance, ΔAIC, ΔBIC, and classification of support for a hinge response.

Land-cover contrast	N	Breakpoint (95% CI)	Pre-break slope (95% CI)	Post-break slope (95% CI)	Slope change	*P*	ΔAIC	ΔBIC	Evidence
Forest-Crop	4,825	29.00 (28.92-29.16)	0.234 (0.192-0.278)	-0.143 (-0.162--0.126)	-0.377	4.37×10^{-73}	0.00	0.00	Strong hinge
Shrub-Crop	2,783	38.84 (38.78-39.24)	0.567 (0.479-0.631)	-0.175 (-0.337--0.076)	-0.741	1.70×10^{-33}	0.00	0.00	Strong hinge
Shrub-Urban	657	42.29 (42.15-42.43)	-0.245 (-0.326--0.170)	0.398 (0.240-0.608)	0.643	2.77×10^{-8}	0.00	0.00	Strong hinge
Savanna-Crop	4,124	36.25 (36.13-36.35)	0.015 (0.003-0.025)	0.958 (0.811-1.170)	0.943	1.69×10^{-53}	0.00	0.00	Strong hinge
Savanna-Urban	801	29.20 (28.66-31.41)	-0.038 (-0.115-0.039)	0.109 (0.075-0.198)	0.148	0.003	0.00	4.53	Partial support
Grass-Crop	13,729	38.51 (35.17-41.15)	0.327 (0.221-0.350)	0.271 (0.247-0.388)	-0.057	2.27×10^{-6}	35.08	42.61	Hinge not preferred
Grass-Urban	1,230	43.85 (39.52-43.85)	0.124 (0.098-0.289)	1.547 (-0.038-1.862)	1.423	3.14×10^{-10}	0.00	0.00	Strong hinge

Table S6. Nonlinear dependence of daytime land-cover thermal contrasts on hydroclimatic state represented by ET/PET. Continuous one-breakpoint hinge-regression estimates for natural vegetation-anthropogenic land-cover contrasts, including sample size, estimated ET/PET breakpoint and bootstrap 95% confidence interval, pre- and post-break slopes, slope change, statistical significance, ΔAIC, ΔBIC, and classification of support for a hinge response.

Land-cover contrast	N	Breakpoint (95% CI)	Pre-break slope (95% CI)	Post-break slope (95% CI)	Slope change	*P*	ΔAIC	ΔBIC	Evidence
Forest-Crop	4,825	0.395 (0.370-0.401)	-5.286 (-5.900--4.887)	4.677 (3.928-5.119)	9.963	4.81×10^{-143}	0.00	0.00	Strong hinge
Shrub-Crop	2,564	0.027 (0.026-0.030)	-164.092 (-178.555--151.081)	35.458 (22.992-45.558)	199.550	3.89×10^{-134}	29.45	35.30	Hinge not preferred
Shrub-Urban	74	0.017 (0.015-0.026)	-110.822 (-202.072--22.500)	-33.552 (-59.906--19.412)	77.270	0.023	0.00	3.14	Partial support

Land-cover contrast	N	Breakpoint (95% CI)	Pre-break slope (95% CI)	Post-break slope (95% CI)	Slope change	*P*	ΔAIC	ΔBIC	Evidence
Savanna-Crop	4,124	0.121 (0.115-0.123)	-29.896 (-32.691--27.999)	-0.512 (-0.852- -0.174)	29.384	1.73×10^{-190}	0.00	0.00	Strong hinge
Savanna-Urban	141	0.270 (0.077-0.270)	0.674 (-20.125-8.976)	-17.880 (-20.038-5.560)	-18.555	0.002	0.00	2.71	Partial support
Grass-Crop	13,616	0.103 (0.101-0.150)	-17.074 (-18.545--11.328)	-3.098 (-3.720-0.668)	13.975	2.46×10^{-44}	0.00	0.00	Strong hinge
Grass-Urban	422	0.089 (0.086-0.096)	-69.474 (-81.454--56.921)	-5.309 (-11.521-0.163)	64.165	4.20×10^{-23}	0.00	0.00	Strong hinge

Table S7. AIC-based comparison of alternative functional forms for environmental-gradient relationships. Differences in Akaike information criterion (ΔAIC) among linear, quadratic, and continuous one-breakpoint hinge models for each evaluated relationship with background daytime LST and ET/PET. ΔAIC = 0 identifies the AIC-best model; models with ΔAIC ≤ 2 have comparable empirical support.

Environmental control	Contrast	ΔAIC Linear	ΔAIC Quadratic	ΔAIC Hinge	AIC-supported model(s)
Daytime LST	Forest-Crop	323.22	172.38	0.00	Hinge
Daytime LST	Shrub-Crop	141.65	48.56	0.00	Hinge
Daytime LST	Shrub-Urban	27.03	13.75	0.00	Hinge
Daytime LST	Savanna-Crop	233.30	223.54	0.00	Hinge
Daytime LST	Savanna-Urban	4.84	0.93	0.00	Quadratic, Hinge
Daytime LST	Grass-Crop	53.44	0.00	35.08	Quadratic
Daytime LST	Grass-Urban	35.70	35.76	0.00	Hinge
ET/PET	Forest-Crop	644.94	120.91	0.00	Hinge
ET/PET	Shrub-Crop	633.80	0.00	29.45	Quadratic
ET/PET	Shrub-Urban	1.46	0.95	0.00	Linear, Quadratic, Hinge
ET/PET	Savanna-Crop	863.40	367.69	0.00	Hinge
ET/PET	Savanna-Urban	5.79	0.24	0.00	Quadratic, Hinge
ET/PET	Grass-Crop	191.15	94.06	0.00	Hinge
ET/PET	Grass-Urban	94.81	31.24	0.00	Hinge

Table S8. BIC-based comparison of alternative functional forms for environmental-gradient relationships. Differences in Bayesian information criterion (ΔBIC) among linear, quadratic, and continuous one-breakpoint hinge models for each evaluated relationship with background daytime LST and ET/PET. ΔBIC = 0 identifies the BIC-best model.

Environmental control	Contrast	ΔBIC Linear	ΔBIC Quadratic	ΔBIC Hinge	BIC-supported model(s)
Daytime LST	Forest-Crop	310.25	165.90	0.00	Hinge
Daytime LST	Shrub-Crop	129.78	42.63	0.00	Hinge
Daytime LST	Shrub-Urban	18.05	9.26	0.00	Hinge
Daytime LST	Savanna-Crop	220.65	217.22	0.00	Hinge
Daytime LST	Savanna-Urban	0.00	0.77	4.53	Linear, Quadratic
Daytime LST	Grass-Crop	45.91	0.00	42.61	Quadratic
Daytime LST	Grass-Urban	25.47	30.65	0.00	Hinge
ET/PET	Forest-Crop	631.98	114.42	0.00	Hinge
ET/PET	Shrub-Crop	627.95	0.00	35.30	Quadratic
ET/PET	Shrub-Urban	0.00	1.79	3.14	Linear, Quadratic
ET/PET	Savanna-Crop	850.75	361.37	0.00	Hinge
ET/PET	Savanna-Urban	2.60	0.00	2.71	Quadratic
ET/PET	Grass-Crop	176.11	86.54	0.00	Hinge
ET/PET	Grass-Urban	86.72	27.20	0.00	Hinge

Table S9. Classification of evidence for nonlinear environmental modulation of land-cover thermal contrasts. Summary of breakpoint estimates and evidence classifications for relationships with background daytime LST and ET/PET, distinguishing strong hinge support, partial hinge support, and significant nonlinear responses for which the hinge formulation was not preferred.

Environmental control	Land-cover contrast	Breakpoint	Evidence classification
Daytime LST	Forest-Crop	28.997	Strong hinge support
Daytime LST	Shrub-Crop	38.842	Strong hinge support
Daytime LST	Shrub-Urban	42.286	Strong hinge support
Daytime LST	Savanna-Crop	36.253	Strong hinge support
Daytime LST	Savanna-Urban	29.197	Partial hinge support
Daytime LST	Grass-Crop	38.513	Significant slope change; hinge not preferred
Daytime LST	Grass-Urban	43.848	Strong hinge support
ET/PET	Forest-Crop	0.395	Strong hinge support

Environmental control	Land-cover contrast	Breakpoint	Evidence classification
ET/PET	Shrub-Crop	0.027	Significant slope change; hinge not preferred
ET/PET	Shrub-Urban	0.017	Partial hinge support
ET/PET	Savanna-Crop	0.121	Strong hinge support
ET/PET	Savanna-Urban	0.270	Partial hinge support
ET/PET	Grass-Crop	0.103	Strong hinge support
ET/PET	Grass-Urban	0.089	Strong hinge support

Table S10. Overall robustness of nonlinear environmental-gradient relationships. Summary across the 14 evaluated background-LST and ET/PET relationships of directional consistency among candidate models, agreement between AIC- and BIC-selected models, strong hinge support, and bootstrap evidence for a non-zero change in slope.

Robustness criterion	Result	Percentage
Total relationships evaluated	14	100%
Same overall direction under all models	11/14	78.6%
AIC-BIC best-model agreement	11/14	78.6%
Strong hinge support	9/14	64.3%
Hinge supported but model form uncertain	0/14	0%
Bootstrap slope-change CI excludes zero	10/14	71.4%

Table S11. Out-of-sample predictive performance of Random Forest models under repeated nested cross-validation. Median held-out outer-fold R^2, RMSE and MAE, 95% intervals for R^2, and fraction of outer folds with positive R^2 for each daytime and nighttime land-cover contrast.

Response	Land-cover Pairs	N outer	Test R^2 median (95% CI)	RMSE median	MAE median	Fraction $R^2 > 0$
Day	Crop-Barren	10	0.329 [-0.336, 0.597]	0.985	0.688	0.90
Day	Crop-Urban	10	0.327 [0.310, 0.343]	0.907	0.703	1.00
Day	Forest-Crop	10	0.487 [0.457, 0.515]	0.680	0.512	1.00
Day	Forest-Grass	10	0.496 [0.372, 0.578]	1.076	0.768	1.00
Day	Forest-Savanna	10	0.359 [0.343, 0.378]	0.715	0.540	1.00
Day	Grass-Barren	10	0.536 [0.462, 0.645]	2.259	1.651	1.00
Day	Grass-Crop	10	0.463 [0.444, 0.493]	1.127	0.810	1.00
Day	Grass-Urban	10	0.584 [0.479, 0.657]	1.167	0.881	1.00
Day	Savanna-Crop	10	0.617 [0.569, 0.655]	0.652	0.504	1.00
Day	Savanna-Grass	10	0.365 [0.330, 0.421]	0.916	0.670	1.00

Response	Land-cover Pairs	N outer	Test R^2 median (95% CI)	RMSE median	MAE median	Fraction $R^2 > 0$
Day	Savanna-Urban	10	0.022 [-0.286, 0.215]	1.128	0.872	0.50
Day	Shrub-Barren	10	0.101 [-2.476, 0.287]	0.820	0.630	0.80
Day	Shrub-Crop	10	0.624 [0.590, 0.692]	0.773	0.605	1.00
Day	Shrub-Grass	10	0.831 [0.714, 0.965]	0.443	0.323	1.00
Day	Shrub-Urban	10	0.366 [-0.013, 0.681]	0.720	0.538	0.90
Day	Urban-Barren	10	0.759 [0.571, 0.899]	0.710	0.492	1.00
Night	Crop-Barren	10	0.375 [-0.517, 0.602]	0.531	0.456	0.80
Night	Crop-Urban	10	0.148 [0.139, 0.162]	0.568	0.447	1.00
Night	Forest-Crop	10	0.307 [0.280, 0.324]	0.444	0.319	1.00
Night	Forest-Grass	10	0.250 [0.199, 0.300]	0.708	0.545	1.00
Night	Forest-Savanna	10	0.129 [0.100, 0.145]	0.596	0.431	1.00
Night	Grass-Barren	10	0.318 [0.276, 0.471]	1.328	0.960	1.00
Night	Grass-Crop	10	0.325 [0.301, 0.354]	0.668	0.518	1.00
Night	Grass-Urban	10	0.320 [0.133, 0.537]	0.583	0.435	1.00
Night	Savanna-Crop	10	0.198 [0.135, 0.258]	0.392	0.295	1.00
Night	Savanna-Grass	10	0.283 [0.057, 0.452]	0.534	0.354	1.00
Night	Savanna-Urban	10	0.171 [-0.193, 0.354]	0.416	0.333	0.80
Night	Shrub-Barren	10	0.176 [-0.492, 0.767]	0.578	0.382	0.70
Night	Shrub-Crop	10	0.450 [0.331, 0.513]	0.316	0.219	1.00
Night	Shrub-Grass	10	0.377 [-0.859, 0.689]	0.800	0.635	0.80
Night	Shrub-Urban	10	0.281 [-0.160, 0.342]	0.632	0.494	0.70
Night	Urban-Barren	10	0.624 [0.344, 0.738]	0.403	0.257	1.00

Table S12. Out-of-sample predictive performance of XGBoost models under repeated nested cross-validation. Median held-out outer-fold R^2, RMSE and MAE, 95% intervals for R^2, and fraction of outer folds with positive R^2 for each daytime and nighttime land-cover contrast.

Response	Land-cover Pairs	N outer	Test R^2 median (95% CI)	RMSE median	MAE median	Fraction $R^2 > 0$
Day	Crop-Barren	10	0.340 [0.102, 0.581]	0.980	0.687	1.00
Day	Crop-Urban	10	0.323 [0.304, 0.338]	0.910	0.706	1.00
Day	Forest-Crop	10	0.456 [0.440, 0.516]	0.694	0.530	1.00
Day	Forest-Grass	10	0.468 [0.354, 0.555]	1.104	0.822	1.00

Response	Land-cover Pairs	N outer	Test R^2 median (95% CI)	RMSE median	MAE median	Fraction $R^2 > 0$
Day	Forest-Savanna	10	0.347 [0.324, 0.363]	0.721	0.546	1.00
Day	Grass-Barren	10	0.522 [0.446, 0.610]	2.330	1.672	1.00
Day	Grass-Crop	10	0.450 [0.423, 0.487]	1.137	0.818	1.00
Day	Grass-Urban	10	0.559 [0.432, 0.629]	1.186	0.904	1.00
Day	Savanna-Crop	10	0.617 [0.560, 0.650]	0.655	0.506	1.00
Day	Savanna-Grass	10	0.345 [0.303, 0.390]	0.930	0.690	1.00
Day	Savanna-Urban	10	0.049 [-0.312, 0.219]	1.127	0.884	0.60
Day	Shrub-Barren	10	0.225 [-3.935, 0.525]	0.830	0.629	0.70
Day	Shrub-Crop	10	0.614 [0.593, 0.680]	0.778	0.606	1.00
Day	Shrub-Grass	10	0.806 [0.507, 0.957]	0.709	0.496	1.00
Day	Shrub-Urban	10	0.425 [0.177, 0.722]	0.648	0.531	1.00
Day	Urban-Barren	10	0.754 [0.558, 0.881]	0.705	0.504	1.00
Night	Crop-Barren	10	0.269 [-0.412, 0.564]	0.575	0.459	0.80
Night	Crop-Urban	10	0.144 [0.137, 0.159]	0.569	0.448	1.00
Night	Forest-Crop	10	0.265 [0.228, 0.292]	0.458	0.335	1.00
Night	Forest-Grass	10	0.221 [0.157, 0.274]	0.725	0.562	1.00
Night	Forest-Savanna	10	0.117 [0.093, 0.130]	0.601	0.436	1.00
Night	Grass-Barren	10	0.286 [0.222, 0.410]	1.396	1.011	1.00
Night	Grass-Crop	10	0.304 [0.288, 0.335]	0.675	0.522	1.00
Night	Grass-Urban	10	0.300 [0.153, 0.478]	0.611	0.472	1.00
Night	Savanna-Crop	10	0.195 [0.134, 0.256]	0.393	0.298	1.00
Night	Savanna-Grass	10	0.276 [0.063, 0.411]	0.529	0.362	1.00
Night	Savanna-Urban	10	0.132 [-0.157, 0.308]	0.417	0.334	0.80
Night	Shrub-Barren	10	0.165 [-0.449, 0.728]	0.572	0.407	0.70
Night	Shrub-Crop	10	0.461 [0.373, 0.505]	0.313	0.218	1.00
Night	Shrub-Grass	10	0.383 [-0.651, 0.584]	0.807	0.652	0.80
Night	Shrub-Urban	10	0.274 [-0.128, 0.349]	0.625	0.492	0.70
Night	Urban-Barren	10	0.615 [0.385, 0.812]	0.383	0.263	1.00

Table S13. Multiple linear regression of daytime land-cover thermal contrasts against biophysical differences. Pair-specific standardized regression coefficients (β) and HC3-robust 95% confidence intervals for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP, together with sample size, model R^2, adjusted R^2, and the predictor with the largest absolute standardized coefficient.

Pairs	N	R^2	Adj. R^2	Albedo β (Sig.)	Albedo 95% CI	LAI β (Sig.)	LAI 95% CI	LE β (Sig.)	LE 95% CI	GPP β (Sig.)	GPP 95% CI	Dominant predictor
Forest-Savanna	20,927	0.115	0.115	+0.286***	[0.268, 0.303]	+0.186***	[0.156, 0.215]	-0.397*	[-0.419, -0.375]	+0.111***	[0.078, 0.145]	LE (-0.397)*
Forest-Grass	684	0.272	0.267	+0.501*	[0.387, 0.614]	+0.035 ns	[-0.095, 0.166]	-0.333***	[-0.448, -0.217]	+0.230**	[0.055, 0.404]	Albedo (+0.501)*
Forest-Crop	4,825	0.257	0.256	+0.482*	[0.452, 0.511]	+0.166***	[0.140, 0.192]	-0.292***	[-0.355, -0.229]	-0.040 ns	[-0.098, 0.019]	Albedo (+0.482)*
Shrub-Grass	64	0.785	0.770	+0.813*	[0.576, 1.051]	-0.602 ns	[-1.984, 0.780]	+0.410 ns	[-0.499, 1.320]	+0.119 ns	[-0.675, 0.912]	Albedo (+0.813)*
Shrub-Crop	2,564	0.529	0.529	+0.350***	[0.306, 0.394]	-0.494**	[-0.830, -0.158]	-0.073 ns	[-0.455, 0.309]	+0.103 ns	[-0.027, 0.232]	LAI (-0.494**)
Shrub-Urban	74	0.463	0.432	+0.227 ns	[-0.055, 0.508]	-0.119 ns	[-0.754, 0.516]	+0.551 ns	[-0.057, 1.159]	-0.940*	[-1.250, -0.630]	GPP (-0.940)*
Shrub-Barren	53	0.205	0.138	+0.115 ns	[-0.467, 0.697]	+0.288 ns	[-0.547, 1.124]	+0.404 ns	[-0.175, 0.982]	-0.411 ns	[-1.057, 0.235]	GPP (-0.411 ns)
Savanna-Grass	1,320	0.165	0.163	+0.180*	[0.030, 0.330]	-0.216 ns	[-0.465, 0.033]	-0.284*	[-0.443, -0.125]	+0.096 ns	[-0.089, 0.282]	LE (-0.284)*
Savanna-Crop	4,124	0.514	0.514	+0.440*	[0.411, 0.468]	-0.294***	[-0.339, -0.250]	-0.374***	[-0.499, -0.249]	+0.175**	[0.065, 0.285]	Albedo (+0.440)*
Savanna-Urban	141	0.265	0.243	+0.350**	[0.133, 0.567]	+0.005 ns	[-0.361, 0.370]	-0.410 ns	[-0.873, 0.053]	+0.078 ns	[-0.414, 0.571]	LE (-0.410 ns)
Grass-Crop	13,616	0.215	0.215	+0.216***	[0.192, 0.240]	-0.299*	[-0.349, -0.250]	-0.108***	[-0.162, -0.054]	+0.082***	[0.040, 0.125]	LAI (-0.299)*
Grass-Urban	422	0.459	0.454	+0.439*	[0.339, 0.539]	-0.146 ns	[-0.352, 0.060]	-0.256*	[-0.482, -0.030]	+0.044 ns	[-0.139, 0.226]	Albedo (+0.439)*
Grass-Barren	650	0.279	0.275	-0.407***	[-0.458, -0.355]	-0.467*	[-0.593, -0.341]	+0.116*	[0.016, 0.216]	+0.178**	[0.056, 0.300]	LAI (-0.467)*
Crop-Urban	42,243	0.266	0.266	+0.073***	[0.062, 0.085]	+0.013 ns	[-0.018, 0.044]	-0.395*	[-0.423, -0.367]	-0.147***	[-0.164, -0.130]	LE (-0.395)*

Pairs	N	R^2	Adj. R^2	Albedo β (Sig.)	Albedo 95% CI	LAI β (Sig.)	LAI 95% CI	LE β (Sig.)	LE 95% CI	GPP β (Sig.)	GPP 95% CI	Dominant predictor
Crop-Barren	102	0.281	0.252	+0.555*	[0.385, 0.725]	+0.154 ns	[-0.119, 0.427]	+0.011 ns	[-0.306, 0.328]	-0.282 ns	[-0.632, 0.068]	Albedo (+0.555)*
Urban-Barren	106	0.772	0.763	+0.587*	[0.364, 0.809]	-0.335 ns	[-1.223, 0.552]	+0.560*	[0.133, 0.987]	+0.143 ns	[-0.664, 0.950]	Albedo (+0.587)*

Table S14. Multiple linear regression of nighttime land-cover thermal contrasts against biophysical differences. Pair-specific standardized regression coefficients (β) and HC3-robust 95% confidence intervals for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP, together with sample size, model R^2, adjusted R^2, and the predictor with the largest absolute standardized coefficient.

Pairs	N	R^2	Adj. R^2	Albedo β (Sig.)	Albedo 95% CI	LAI β (Sig.)	LAI 95% CI	LE β (Sig.)	LE 95% CI	GPP β (Sig.)	GPP 95% CI	Dominant predictor
Forest-Savanna	20,927	0.012	0.012	-0.051***	[-0.069, -0.034]	+0.016 ns	[-0.015, 0.046]	+0.090*	[0.065, 0.115]	+0.006 ns	[-0.030, 0.041]	LE (+0.090)*
Forest-Grass	684	0.041	0.036	-0.190*	[-0.275, -0.105]	+0.087 ns	[-0.047, 0.221]	+0.046 ns	[-0.126, 0.217]	-0.156 ns	[-0.389, 0.077]	Albedo (-0.190)*
Forest-Crop	4,825	0.088	0.087	-0.154***	[-0.183, -0.125]	+0.010 ns	[-0.018, 0.039]	-0.438*	[-0.510, -0.366]	+0.237***	[0.165, 0.308]	LE (-0.438)*
Shrub-Grass	64	0.512	0.479	-0.464***	[-0.715, -0.212]	+0.866 ns	[-0.937, 2.670]	-0.383 ns	[-1.452, 0.685]	-0.843 ns	[-1.729, 0.043]	LAI (+0.866 ns)
Shrub-Crop	2,564	0.398	0.397	-0.789*	[-0.842, -0.737]	-0.083 ns	[-0.298, 0.133]	+0.347**	[0.133, 0.562]	-0.575***	[-0.663, -0.486]	Albedo (-0.789)*
Shrub-Urban	74	0.280	0.238	-0.504*	[-0.735, -0.274]	-0.332 ns	[-0.978, 0.313]	+0.149 ns	[-0.507, 0.805]	+0.277 ns	[-0.013, 0.566]	Albedo (-0.504)*
Shrub-Barren	53	0.369	0.316	-0.169 ns	[-0.580, 0.241]	-0.487 ns	[-1.045, 0.072]	-0.373 ns	[-0.971, 0.225]	+0.874**	[0.218, 1.530]	GPP (+0.874**)
Savanna-Grass	1,320	0.256	0.253	-0.397*	[-0.511, -0.284]	+0.139**	[0.041, 0.238]	-0.114 ns	[-0.329, 0.101]	-0.212*	[-0.423, -0.002]	Albedo (-0.397)*
Savanna-Crop	4,124	0.087	0.086	-0.143***	[-0.177, -0.110]	-0.046*	[-0.091, -0.001]	-0.532*	[-0.657, -0.408]	+0.322***	[0.207, 0.437]	LE (-0.532)*
Savanna-Urban	141	0.351	0.332	-0.535***	[-0.728, -0.342]	-0.629***	[-0.926, -0.332]	-0.445*	[-0.830, -0.060]	+0.712*	[0.324, 1.100]	GPP (+0.712)*
Grass-Crop	13,616	0.092	0.092	-0.046***	[-0.072, -0.021]	+0.385***	[0.329, 0.441]	-0.672*	[-0.734, -0.611]	+0.024 ns	[-0.019, 0.067]	LE (-0.672)*

Pairs	N	R^2	Adj. R^2	Albedo β (Sig.)	Albedo 95% CI	LAI β (Sig.)	LAI 95% CI	LE β (Sig.)	LE 95% CI	GPP β (Sig.)	GPP 95% CI	Dominant predictor
Grass-Urban	422	0.135	0.126	+0.031 ns	[-0.073, 0.135]	-0.166 ns	[-0.426, 0.093]	-0.072 ns	[-0.341, 0.196]	-0.125 ns	[-0.364, 0.114]	LAI (-0.166 ns)
Grass-Barren	650	0.273	0.269	-0.477*	[-0.544, -0.409]	-0.283***	[-0.385, -0.182]	-0.063 ns	[-0.133, 0.007]	+0.297***	[0.180, 0.415]	Albedo (-0.477)*
Crop-Urban	42,243	0.090	0.090	-0.172***	[-0.182, -0.161]	-0.421*	[-0.452, -0.390]	+0.225***	[0.195, 0.255]	-0.021**	[-0.037, -0.005]	LAI (-0.421)*
Crop-Barren	102	0.391	0.366	-0.668*	[-0.843, -0.494]	+0.243 ns	[-0.147, 0.633]	-0.252 ns	[-0.551, 0.046]	+0.209 ns	[-0.090, 0.508]	Albedo (-0.668)*
Urban-Barren	106	0.763	0.754	+0.052 ns	[-0.185, 0.289]	+1.962*	[1.044, 2.880]	-1.036***	[-1.491, -0.581]	-1.728***	[-2.567, -0.890]	LAI (+1.962)*

Table S15. Partial-regression attribution of daytime land-cover thermal contrasts. Pair-specific partial-regression slopes, partial correlations ($r_{partial}$), and partial coefficients of determination (partial R^2) for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP after adjustment for the other three predictors, together with the predictor explaining the largest unique fraction of variance.

Pairs	N	Albedo slope	Albedo partial r	Albedo partial R^2	LAI slope	LAI partial r	LAI partial R^2	LE slope	LE partial r	LE partial R^2	GPP slope	GPP partial r	GPP partial R^2	Dominant predictor
Forest-Savanna	20,927	+0.286***	+0.284***	0.081***	+0.186***	+0.089***	0.008***	-0.397***	-0.237***	0.056***	+0.111***	+0.049***	0.002***	Albedo (+0.284; R^2=0.081)*
Forest-Grass	684	+0.501***	+0.501***	0.251***	+0.035 ns	+0.021 ns	0.000 ns	-0.333***	-0.256***	0.066***	+0.230**	+0.124**	0.015**	Albedo (+0.501; R^2=0.251)*
Forest-Crop	4,825	+0.482***	+0.478***	0.228***	+0.166***	+0.163***	0.027***	-0.292***	-0.132***	0.017***	-0.040 ns	-0.019 ns	0.000 ns	Albedo (+0.478; R^2=0.228)*
Shrub-Grass	64	+0.813***	+0.778***	0.605***	-0.602 ns	-0.182 ns	0.033 ns	+0.410 ns	+0.240 ns	0.058 ns	+0.119 ns	+0.055 ns	0.003 ns	Albedo (+0.778; R^2=0.605)*
Shrub-Crop	2,564	+0.350***	+0.357***	0.128***	-0.494**	-0.124**	0.015**	-0.073 ns	-0.018 ns	0.000 ns	+0.103 ns	+0.063 ns	0.004 ns	Albedo (+0.357; R^2=0.128)*
Shrub-Urban	74	+0.227 ns	+0.270 ns	0.073 ns	-0.119 ns	-0.055 ns	0.003 ns	+0.551 ns	+0.241 ns	0.058 ns	-0.940***	-0.536***	0.287***	GPP (-0.536; R^2=0.287)*

Pairs	N	Albedo slope	Albedo partial r	Albedo partial R^2	LAI slope	LAI partial r	LAI partial R^2	LE slope	LE partial r	LE partial R^2	GPP slope	GPP partial r	GPP partial R^2	Dominant predictor
Shrub-Barren	53	+0.115 ns	+0.113 ns	0.013 ns	+0.288 ns	+0.164 ns	0.027 ns	+0.404 ns	+0.310 ns	0.096 ns	-0.411 ns	-0.234 ns	0.055 ns	LE (+0.310 ns; R^2=0.096)
Savanna-Grass	1,320	+0.180*	+0.182*	0.033*	-0.216 ns	-0.124 ns	0.015 ns	-0.284***	-0.140***	0.019***	+0.096 ns	+0.044 ns	0.002 ns	*Albedo (+0.182; R^2=0.033)**
Savanna-Crop	4,124	+0.440***	+0.508***	0.258***	-0.294***	-0.267***	0.071***	-0.374***	-0.127***	0.016***	+0.175**	+0.067**	0.004**	Albedo (+0.508*; R^2=0.258)**
Savanna-Urban	141	+0.350**	+0.352**	0.124**	+0.005 ns	+0.003 ns	0.000 ns	-0.410 ns	-0.159 ns	0.025 ns	+0.078 ns	+0.034 ns	0.001 ns	Albedo (+0.352; R^2=0.124)**
Grass-Crop	13,616	+0.216***	+0.207***	0.043***	-0.299***	-0.110***	0.012***	-0.108***	-0.038***	0.001***	+0.082***	+0.038***	0.001***	Albedo (+0.207*; R^2=0.043)**
Grass-Urban	422	+0.439***	+0.463***	0.214***	-0.146 ns	-0.074 ns	0.005 ns	-0.256*	-0.122*	0.015*	+0.044 ns	+0.023 ns	0.001 ns	Albedo (+0.463*; R^2=0.214)**
Grass-Barren	650	-0.407***	-0.431***	0.186***	-0.467***	-0.333***	0.111***	+0.116*	+0.118*	0.014*	+0.178**	+0.127**	0.016**	Albedo (-0.431*; R^2=0.186)**
Crop-Urban	42,243	+0.073***	+0.084***	0.007***	+0.013 ns	+0.005 ns	0.000 ns	-0.395***	-0.147***	0.022***	-0.147***	-0.097***	0.009***	LE (-0.147*; R^2=0.022)**
Crop-Barren	102	+0.555***	+0.508***	0.259***	+0.154 ns	+0.139 ns	0.019 ns	+0.011 ns	+0.011 ns	0.000 ns	-0.282 ns	-0.229 ns	0.052 ns	Albedo (+0.508*; R^2=0.259)**
Urban-Barren	106	+0.587***	+0.580***	0.336***	-0.335 ns	-0.114 ns	0.013 ns	+0.560**	+0.379**	0.143**	+0.143 ns	+0.050 ns	0.002 ns	Albedo (+0.580*; R^2=0.336)**

Table S16. Partial-regression attribution of nighttime land-cover thermal contrasts. Pair-specific partial-regression slopes, partial correlations ($r_{partial}$), and partial coefficients of determination (partial R^2) for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP after adjustment for the other three predictors, together with the predictor explaining the largest unique fraction of variance.

Pairs	N	Albedo slope	Albedo partial r	Albedo partial R^2	LAI slope	LAI partial r	LAI partial R^2	LE slope	LE partial r	LE partial R^2	GPP slope	GPP partial r	GPP partial R^2	Dominant predictor
Forest-Savanna	20,927	-0.051***	-0.050***	0.003***	+0.016 ns	+0.007 ns	0.000 ns	+0.090***	+0.052***	0.003***	+0.006 ns	+0.002 ns	0.000 ns	LE (+0.052; *R^2=0.003)**
Forest-Grass	684	-0.190***	-0.188***	0.035***	+0.087 ns	+0.045 ns	0.002 ns	+0.046 ns	+0.032 ns	0.001 ns	-0.156 ns	-0.074 ns	0.005 ns	Albedo (-0.188; *R^2=0.035)**
Forest-Crop	4,825	-0.154***	-0.155***	0.024***	+0.010 ns	+0.009 ns	0.000 ns	-0.438***	-0.178***	0.032***	+0.237***	+0.100***	0.010***	LE (-0.178; *R^2=0.032)**
Shrub-Grass	64	-0.464***	-0.424***	0.180***	+0.866 ns	+0.174 ns	0.030 ns	-0.383 ns	-0.152 ns	0.023 ns	-0.843*	-0.250*	0.062*	Albedo (-0.424; *R^2=0.180)**
Shrub-Crop	2,564	-0.789***	-0.607***	0.368***	-0.083 ns	-0.018 ns	0.000 ns	+0.347**	+0.077**	0.006**	-0.575***	-0.297***	0.088***	Albedo (-0.607; *R^2=0.368)**
Shrub-Urban	74	-0.504***	-0.473***	0.224***	-0.332 ns	-0.131 ns	0.017 ns	+0.149 ns	+0.058 ns	0.003 ns	+0.277 ns	+0.159 ns	0.025 ns	Albedo (-0.473; *R^2=0.224)**
Shrub-Barren	53	-0.169 ns	-0.185 ns	0.034 ns	-0.487 ns	-0.300 ns	0.090 ns	-0.373 ns	-0.320 ns	0.102 ns	+0.874**	+0.498**	0.248**	GPP (+0.498; R^2=0.248)**
Savanna-Grass	1,320	-0.397***	-0.396***	0.157***	+0.139**	+0.085**	0.007**	-0.114 ns	-0.060 ns	0.004 ns	-0.212*	-0.102*	0.010*	Albedo (-0.396; *R^2=0.157)**
Savanna-Crop	4,124	-0.143***	-0.139***	0.019***	-0.046*	-0.032*	0.001*	-0.532***	-0.132***	0.017***	+0.322***	+0.090***	0.008***	Albedo (-0.139; *R^2=0.019)**
Savanna-Urban	141	-0.535***	-0.522***	0.272***	-0.629***	-0.339***	0.115***	-0.445*	-0.183*	0.034*	+0.712***	+0.309***	0.096***	Albedo (-0.522; *R^2=0.272)**
Grass-Crop	13,616	-0.046***	-0.042***	0.002***	+0.385***	+0.131***	0.017***	-0.672***	-0.214***	0.046***	+0.024 ns	+0.010 ns	0.000 ns	LE (-0.214; *R^2=0.046)**
Grass-Urban	422	+0.031 ns	+0.029 ns	0.001 ns	-0.166 ns	-0.067 ns	0.004 ns	-0.072 ns	-0.027 ns	0.001 ns	-0.125 ns	-0.052 ns	0.003 ns	LAI (-0.067 ns; R^2=0.004)
Grass-Barren	650	-0.477***	-0.487***	0.237***	-0.283***	-0.209***	0.044***	-0.063 ns	-0.064 ns	0.004 ns	+0.297***	+0.208***	0.043***	Albedo (-0.487; *R^2=0.237)**
Crop-Urban	42,243	-0.172***	-0.175***	0.031***	-0.421***	-0.133***	0.018***	+0.225***	+0.076***	0.006***	-0.021**	-0.013**	0.000**	Albedo (-0.175; *R^2=0.031)**

Pairs	N	Albedo slope	Albedo partial r	Albedo partial R^2	LAI slope	LAI partial r	LAI partial R^2	LE slope	LE partial r	LE partial R^2	GPP slope	GPP partial r	GPP partial R^2	Dominant predictor
Crop-Barren	102	-0.668***	-0.611***	0.374***	+0.243 ns	+0.234 ns	0.055 ns	-0.252*	-0.255*	0.065*	+0.209 ns	+0.186 ns	0.035 ns	Albedo (-0.611; *R^2=0.374)**
Urban-Barren	106	+0.052 ns	+0.062 ns	0.004 ns	+1.962***	+0.550***	0.303***	-1.036***	-0.596***	0.355***	-1.728***	-0.507***	0.257***	LE (-0.596; *R^2=0.355)**

Table S17. Random Forest held-out permutation importance and predictor-ranking stability. Median held-out permutation importance and 95% interval for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP, together with the fraction of outer test folds in which importance was positive and the fraction in which each predictor ranked first for daytime and nighttime ΔLST.

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Crop-Barren	Albedo	0.698 [0.587, 0.884]	1.00	1.00
Day	Crop-Barren	LAI	0.029 [-0.025, 0.082]	0.80	0.00
Day	Crop-Barren	LE	0.004 [-0.361, 0.182]	0.50	0.00
Day	Crop-Barren	GPP	0.019 [-0.340, 0.335]	0.60	0.00
Day	Crop-Urban	Albedo	0.082 [0.072, 0.090]	1.00	0.00
Day	Crop-Urban	LAI	0.132 [0.110, 0.154]	1.00	0.00
Day	Crop-Urban	LE	0.361 [0.288, 0.438]	1.00	1.00
Day	Crop-Urban	GPP	0.183 [0.163, 0.203]	1.00	0.00
Day	Forest-Crop	Albedo	0.513 [0.497, 0.589]	1.00	1.00
Day	Forest-Crop	LAI	0.200 [0.164, 0.217]	1.00	0.00
Day	Forest-Crop	LE	0.175 [0.129, 0.195]	1.00	0.00
Day	Forest-Crop	GPP	0.415 [0.342, 0.487]	1.00	0.00
Day	Forest-Grass	Albedo	0.634 [0.490, 0.673]	1.00	1.00
Day	Forest-Grass	LAI	0.155 [0.110, 0.209]	1.00	0.00
Day	Forest-Grass	LE	0.206 [0.117, 0.237]	1.00	0.00
Day	Forest-Grass	GPP	0.108 [0.042, 0.151]	1.00	0.00
Day	Forest-Savanna	Albedo	0.306 [0.288, 0.322]	1.00	1.00
Day	Forest-Savanna	LAI	0.232 [0.214, 0.243]	1.00	0.00
Day	Forest-Savanna	LE	0.245 [0.222, 0.284]	1.00	0.00
Day	Forest-Savanna	GPP	0.239 [0.217, 0.265]	1.00	0.00
Day	Grass-Barren	Albedo	0.657 [0.548, 0.787]	1.00	1.00
Day	Grass-Barren	LAI	0.319 [0.181, 0.371]	1.00	0.00
Day	Grass-Barren	LE	0.238 [0.172, 0.347]	1.00	0.00
Day	Grass-Barren	GPP	0.223 [0.156, 0.246]	1.00	0.00
Day	Grass-Crop	Albedo	0.509 [0.451, 0.565]	1.00	1.00
Day	Grass-Crop	LAI	0.197 [0.152, 0.214]	1.00	0.00
Day	Grass-Crop	LE	0.281 [0.261, 0.305]	1.00	0.00
Day	Grass-Crop	GPP	0.442 [0.396, 0.514]	1.00	0.00
Day	Grass-Urban	Albedo	0.484 [0.381, 0.758]	1.00	1.00
Day	Grass-Urban	LAI	0.166 [0.077, 0.270]	1.00	0.00
Day	Grass-Urban	LE	0.037 [-0.021, 0.111]	0.80	0.00

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Grass-Urban	GPP	0.034 [-0.012, 0.079]	0.80	0.00
Day	Savanna-Crop	Albedo	0.392 [0.330, 0.457]	1.00	0.80
Day	Savanna-Crop	LAI	0.355 [0.309, 0.441]	1.00	0.20
Day	Savanna-Crop	LE	0.202 [0.166, 0.229]	1.00	0.00
Day	Savanna-Crop	GPP	0.086 [0.059, 0.112]	1.00	0.00
Day	Savanna-Grass	Albedo	0.262 [0.234, 0.277]	1.00	0.00
Day	Savanna-Grass	LAI	0.360 [0.281, 0.448]	1.00	1.00
Day	Savanna-Grass	LE	0.179 [0.151, 0.207]	1.00	0.00
Day	Savanna-Grass	GPP	0.094 [0.055, 0.122]	1.00	0.00
Day	Savanna-Urban	Albedo	0.112 [-0.241, 0.293]	0.70	0.70
Day	Savanna-Urban	LAI	0.096 [-0.032, 0.287]	0.90	0.20
Day	Savanna-Urban	LE	0.003 [-0.067, 0.123]	0.50	0.10
Day	Savanna-Urban	GPP	0.031 [-0.027, 0.183]	0.70	0.00
Day	Shrub-Barren	Albedo	0.022 [-0.469, 0.183]	0.70	0.20
Day	Shrub-Barren	LAI	0.081 [0.015, 0.404]	1.00	0.50
Day	Shrub-Barren	LE	0.030 [-0.496, 0.324]	0.70	0.30
Day	Shrub-Barren	GPP	0.026 [-0.152, 0.096]	0.80	0.00
Day	Shrub-Crop	Albedo	0.281 [0.263, 0.321]	1.00	0.00
Day	Shrub-Crop	LAI	0.394 [0.337, 0.428]	1.00	1.00
Day	Shrub-Crop	LE	0.109 [0.065, 0.168]	1.00	0.00
Day	Shrub-Crop	GPP	0.275 [0.227, 0.326]	1.00	0.00
Day	Shrub-Grass	Albedo	1.646 [0.948, 1.948]	1.00	1.00
Day	Shrub-Grass	LAI	0.001 [-0.032, 0.031]	0.60	0.00
Day	Shrub-Grass	LE	0.015 [-0.065, 0.074]	0.60	0.00
Day	Shrub-Grass	GPP	0.003 [-0.008, 0.009]	0.70	0.00
Day	Shrub-Urban	Albedo	0.266 [0.001, 0.542]	0.90	0.20
Day	Shrub-Urban	LAI	0.043 [-0.075, 0.156]	0.70	0.00
Day	Shrub-Urban	LE	0.005 [-0.064, 0.067]	0.60	0.00
Day	Shrub-Urban	GPP	0.397 [0.078, 0.547]	1.00	0.80
Day	Urban-Barren	Albedo	0.196 [0.086, 0.425]	1.00	0.60
Day	Urban-Barren	LAI	0.132 [0.039, 0.206]	1.00	0.10
Day	Urban-Barren	LE	0.061 [-0.022, 0.183]	0.90	0.00

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Urban-Barren	GPP	0.166 [0.063, 0.215]	1.00	0.30
Night	Crop-Barren	Albedo	0.792 [-0.091, 1.287]	0.90	0.90
Night	Crop-Barren	LAI	-0.000 [-0.143, 0.024]	0.50	0.00
Night	Crop-Barren	LE	-0.001 [-0.042, 0.017]	0.50	0.00
Night	Crop-Barren	GPP	0.054 [-0.047, 0.245]	0.90	0.10
Night	Crop-Urban	Albedo	0.133 [0.123, 0.145]	1.00	0.00
Night	Crop-Urban	LAI	0.262 [0.247, 0.303]	1.00	1.00
Night	Crop-Urban	LE	0.132 [0.107, 0.158]	1.00	0.00
Night	Crop-Urban	GPP	0.074 [0.065, 0.084]	1.00	0.00
Night	Forest-Crop	Albedo	0.172 [0.149, 0.208]	1.00	0.00
Night	Forest-Crop	LAI	0.183 [0.152, 0.212]	1.00	0.00
Night	Forest-Crop	LE	0.420 [0.376, 0.527]	1.00	1.00
Night	Forest-Crop	GPP	0.367 [0.251, 0.449]	1.00	0.00
Night	Forest-Grass	Albedo	0.427 [0.390, 0.494]	1.00	1.00
Night	Forest-Grass	LAI	0.117 [0.072, 0.167]	1.00	0.00
Night	Forest-Grass	LE	0.103 [0.026, 0.145]	1.00	0.00
Night	Forest-Grass	GPP	0.122 [0.061, 0.162]	1.00	0.00
Night	Forest-Savanna	Albedo	0.142 [0.102, 0.162]	1.00	0.80
Night	Forest-Savanna	LAI	0.110 [0.083, 0.128]	1.00	0.00
Night	Forest-Savanna	LE	0.099 [0.073, 0.112]	1.00	0.00
Night	Forest-Savanna	GPP	0.133 [0.113, 0.157]	1.00	0.20
Night	Grass-Barren	Albedo	0.547 [0.478, 0.780]	1.00	1.00
Night	Grass-Barren	LAI	0.056 [0.028, 0.112]	1.00	0.00
Night	Grass-Barren	LE	0.061 [0.030, 0.081]	1.00	0.00
Night	Grass-Barren	GPP	0.195 [0.116, 0.292]	1.00	0.00
Night	Grass-Crop	Albedo	0.191 [0.165, 0.208]	1.00	0.00
Night	Grass-Crop	LAI	0.274 [0.241, 0.297]	1.00	0.00
Night	Grass-Crop	LE	0.551 [0.475, 0.574]	1.00	1.00
Night	Grass-Crop	GPP	0.301 [0.226, 0.399]	1.00	0.00
Night	Grass-Urban	Albedo	0.150 [0.059, 0.223]	1.00	0.00
Night	Grass-Urban	LAI	0.144 [0.047, 0.280]	1.00	0.00
Night	Grass-Urban	LE	0.137 [0.017, 0.284]	1.00	0.00
Night	Grass-Urban	GPP	0.363 [0.186, 0.659]	1.00	1.00
Night	Savanna-Crop	Albedo	0.206 [0.179, 0.265]	1.00	0.10

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Night	Savanna-Crop	LAI	0.237 [0.188, 0.350]	1.00	0.90
Night	Savanna-Crop	LE	0.160 [0.102, 0.178]	1.00	0.00
Night	Savanna-Crop	GPP	0.136 [0.076, 0.163]	1.00	0.00
Night	Savanna-Grass	Albedo	0.446 [0.165, 0.587]	1.00	1.00
Night	Savanna-Grass	LAI	0.087 [0.032, 0.214]	1.00	0.00
Night	Savanna-Grass	LE	0.123 [0.034, 0.289]	1.00	0.00
Night	Savanna-Grass	GPP	0.093 [0.043, 0.181]	1.00	0.00
Night	Savanna-Urban	Albedo	0.173 [0.056, 0.223]	1.00	0.80
Night	Savanna-Urban	LAI	0.108 [-0.026, 0.216]	0.90	0.20
Night	Savanna-Urban	LE	0.036 [-0.046, 0.078]	0.70	0.00
Night	Savanna-Urban	GPP	-0.006 [-0.032, 0.018]	0.30	0.00
Night	Shrub-Barren	Albedo	0.411 [-0.075, 0.723]	0.90	0.70
Night	Shrub-Barren	LAI	0.163 [-0.275, 0.834]	0.80	0.20
Night	Shrub-Barren	LE	-0.018 [-0.067, 0.101]	0.40	0.10
Night	Shrub-Barren	GPP	0.030 [-0.145, 0.333]	0.60	0.00
Night	Shrub-Crop	Albedo	0.918 [0.732, 0.998]	1.00	1.00
Night	Shrub-Crop	LAI	0.055 [0.032, 0.120]	1.00	0.00
Night	Shrub-Crop	LE	0.047 [0.024, 0.107]	1.00	0.00
Night	Shrub-Crop	GPP	0.418 [0.177, 0.548]	1.00	0.00
Night	Shrub-Grass	Albedo	0.603 [0.358, 0.780]	1.00	1.00
Night	Shrub-Grass	LAI	0.005 [-0.162, 0.116]	0.60	0.00
Night	Shrub-Grass	LE	0.008 [-0.252, 0.059]	0.60	0.00
Night	Shrub-Grass	GPP	0.021 [-0.155, 0.094]	0.70	0.00
Night	Shrub-Urban	Albedo	0.456 [0.346, 0.834]	1.00	1.00
Night	Shrub-Urban	LAI	0.001 [-0.108, 0.015]	0.60	0.00
Night	Shrub-Urban	LE	0.007 [-0.092, 0.038]	0.70	0.00
Night	Shrub-Urban	GPP	-0.001 [-0.047, 0.025]	0.30	0.00
Night	Urban-Barren	Albedo	0.036 [0.012, 0.082]	1.00	0.00
Night	Urban-Barren	LAI	0.027 [-0.040, 0.064]	0.70	0.00
Night	Urban-Barren	LE	0.602 [0.333, 1.059]	1.00	0.90

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Night	Urban-Barren	GPP	0.176 [0.067, 0.400]	1.00	0.10

Table S18. XGBoost held-out permutation importance and predictor-ranking stability. Median held-out permutation importance and 95% interval for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP, together with the fraction of outer test folds in which importance was positive and the fraction in which each predictor ranked first for daytime and nighttime ΔLST.

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Crop-Barren	Albedo	0.611 [0.476, 1.137]	1.00	1.00
Day	Crop-Barren	LAI	0.051 [-0.058, 0.085]	0.90	0.00
Day	Crop-Barren	LE	0.015 [-0.081, 0.133]	0.60	0.00
Day	Crop-Barren	GPP	0.020 [-0.064, 0.128]	0.80	0.00
Day	Crop-Urban	Albedo	0.088 [0.079, 0.098]	1.00	0.00
Day	Crop-Urban	LAI	0.205 [0.109, 0.365]	1.00	0.00
Day	Crop-Urban	LE	0.445 [0.336, 0.522]	1.00	1.00
Day	Crop-Urban	GPP	0.242 [0.207, 0.310]	1.00	0.00
Day	Forest-Crop	Albedo	0.505 [0.434, 0.564]	1.00	0.50
Day	Forest-Crop	LAI	0.236 [0.192, 0.277]	1.00	0.00
Day	Forest-Crop	LE	0.122 [0.104, 0.195]	1.00	0.00
Day	Forest-Crop	GPP	0.526 [0.370, 0.617]	1.00	0.50
Day	Forest-Grass	Albedo	0.585 [0.459, 0.767]	1.00	1.00
Day	Forest-Grass	LAI	0.172 [0.111, 0.327]	1.00	0.00
Day	Forest-Grass	LE	0.259 [0.206, 0.344]	1.00	0.00
Day	Forest-Grass	GPP	0.142 [0.048, 0.185]	1.00	0.00
Day	Forest-Savanna	Albedo	0.289 [0.265, 0.306]	1.00	0.30
Day	Forest-Savanna	LAI	0.228 [0.160, 0.264]	1.00	0.00
Day	Forest-Savanna	LE	0.323 [0.214, 0.399]	1.00	0.70
Day	Forest-Savanna	GPP	0.273 [0.211, 0.320]	1.00	0.00
Day	Grass-Barren	Albedo	0.647 [0.518, 0.784]	1.00	1.00
Day	Grass-Barren	LAI	0.230 [0.145, 0.349]	1.00	0.00
Day	Grass-Barren	LE	0.254 [0.167, 0.398]	1.00	0.00
Day	Grass-Barren	GPP	0.197 [0.145, 0.313]	1.00	0.00
Day	Grass-Crop	Albedo	0.550 [0.429, 0.583]	1.00	0.30
Day	Grass-Crop	LAI	0.231 [0.147, 0.306]	1.00	0.00
Day	Grass-Crop	LE	0.434 [0.308, 0.499]	1.00	0.00
Day	Grass-Crop	GPP	0.557 [0.445, 0.709]	1.00	0.70

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Grass-Urban	Albedo	0.448 [0.356, 0.669]	1.00	1.00
Day	Grass-Urban	LAI	0.261 [0.137, 0.327]	1.00	0.00
Day	Grass-Urban	LE	0.034 [-0.053, 0.102]	0.80	0.00
Day	Grass-Urban	GPP	0.049 [-0.016, 0.133]	0.80	0.00
Day	Savanna-Crop	Albedo	0.419 [0.366, 0.495]	1.00	0.80
Day	Savanna-Crop	LAI	0.313 [0.278, 0.369]	1.00	0.00
Day	Savanna-Crop	LE	0.369 [0.292, 0.467]	1.00	0.20
Day	Savanna-Crop	GPP	0.129 [0.073, 0.174]	1.00	0.00
Day	Savanna-Grass	Albedo	0.268 [0.201, 0.381]	1.00	0.10
Day	Savanna-Grass	LAI	0.357 [0.271, 0.530]	1.00	0.90
Day	Savanna-Grass	LE	0.183 [0.129, 0.331]	1.00	0.00
Day	Savanna-Grass	GPP	0.149 [0.061, 0.243]	1.00	0.00
Day	Savanna-Urban	Albedo	0.145 [-0.184, 0.410]	0.60	0.60
Day	Savanna-Urban	LAI	0.122 [-0.014, 0.280]	0.90	0.30
Day	Savanna-Urban	LE	0.054 [-0.048, 0.252]	0.70	0.00
Day	Savanna-Urban	GPP	0.106 [0.015, 0.666]	1.00	0.10
Day	Shrub-Barren	Albedo	0.041 [-1.526, 0.268]	0.60	0.00
Day	Shrub-Barren	LAI	0.190 [-0.038, 0.378]	0.90	0.50
Day	Shrub-Barren	LE	0.161 [-0.653, 0.361]	0.90	0.30
Day	Shrub-Barren	GPP	0.071 [-0.228, 0.266]	0.80	0.20
Day	Shrub-Crop	Albedo	0.308 [0.278, 0.348]	1.00	0.00
Day	Shrub-Crop	LAI	0.580 [0.303, 0.883]	1.00	0.60
Day	Shrub-Crop	LE	0.240 [0.106, 0.516]	1.00	0.00
Day	Shrub-Crop	GPP	0.443 [0.330, 0.646]	1.00	0.40
Day	Shrub-Grass	Albedo	1.800 [0.802, 2.612]	1.00	1.00
Day	Shrub-Grass	LAI	0.007 [-0.055, 0.057]	0.60	0.00
Day	Shrub-Grass	LE	0.031 [-0.058, 0.164]	0.70	0.00
Day	Shrub-Grass	GPP	-0.002 [-0.027, 0.019]	0.30	0.00
Day	Shrub-Urban	Albedo	0.338 [0.154, 0.782]	1.00	0.40

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Day	Shrub-Urban	LAI	0.098 [-0.060, 0.277]	0.80	0.00
Day	Shrub-Urban	LE	0.099 [0.037, 0.256]	1.00	0.00
Day	Shrub-Urban	GPP	0.469 [0.135, 0.855]	1.00	0.60
Day	Urban-Barren	Albedo	0.349 [0.184, 0.703]	1.00	0.70
Day	Urban-Barren	LAI	0.111 [0.037, 0.421]	1.00	0.20
Day	Urban-Barren	LE	0.073 [-0.019, 0.189]	0.90	0.00
Day	Urban-Barren	GPP	0.053 [-0.070, 0.245]	0.80	0.10
Night	Crop-Barren	Albedo	0.716 [-0.063, 1.012]	0.90	0.90
Night	Crop-Barren	LAI	0.013 [-0.144, 0.077]	0.80	0.00
Night	Crop-Barren	LE	-0.017 [-0.059, 0.023]	0.30	0.00
Night	Crop-Barren	GPP	0.075 [-0.066, 0.274]	0.70	0.10
Night	Crop-Urban	Albedo	0.122 [0.111, 0.131]	1.00	0.00
Night	Crop-Urban	LAI	0.405 [0.305, 0.624]	1.00	1.00
Night	Crop-Urban	LE	0.204 [0.145, 0.332]	1.00	0.00
Night	Crop-Urban	GPP	0.071 [0.055, 0.108]	1.00	0.00
Night	Forest-Crop	Albedo	0.153 [0.126, 0.172]	1.00	0.00
Night	Forest-Crop	LAI	0.164 [0.136, 0.224]	1.00	0.00
Night	Forest-Crop	LE	0.545 [0.339, 0.754]	1.00	0.60
Night	Forest-Crop	GPP	0.503 [0.322, 0.693]	1.00	0.40
Night	Forest-Grass	Albedo	0.429 [0.321, 0.569]	1.00	1.00
Night	Forest-Grass	LAI	0.086 [0.074, 0.186]	1.00	0.00
Night	Forest-Grass	LE	0.055 [0.032, 0.200]	1.00	0.00
Night	Forest-Grass	GPP	0.106 [0.044, 0.191]	1.00	0.00
Night	Forest-Savanna	Albedo	0.109 [0.087, 0.140]	1.00	0.00
Night	Forest-Savanna	LAI	0.114 [0.083, 0.146]	1.00	0.20
Night	Forest-Savanna	LE	0.086 [0.059, 0.125]	1.00	0.00
Night	Forest-Savanna	GPP	0.149 [0.091, 0.193]	1.00	0.80
Night	Grass-Barren	Albedo	0.448 [0.410, 0.619]	1.00	1.00
Night	Grass-Barren	LAI	0.054 [0.010, 0.118]	1.00	0.00
Night	Grass-Barren	LE	0.038 [0.013, 0.064]	1.00	0.00
Night	Grass-Barren	GPP	0.129 [0.043, 0.264]	1.00	0.00
Night	Grass-Crop	Albedo	0.194 [0.156, 0.219]	1.00	0.00
Night	Grass-Crop	LAI	0.433 [0.313, 0.664]	1.00	0.00

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Night	Grass-Crop	LE	0.745 [0.568, 0.945]	1.00	1.00
Night	Grass-Crop	GPP	0.348 [0.273, 0.469]	1.00	0.00
Night	Grass-Urban	Albedo	0.131 [0.073, 0.252]	1.00	0.00
Night	Grass-Urban	LAI	0.109 [0.036, 0.327]	1.00	0.00
Night	Grass-Urban	LE	0.114 [0.029, 0.182]	1.00	0.10
Night	Grass-Urban	GPP	0.309 [0.124, 0.711]	1.00	0.90
Night	Savanna-Crop	Albedo	0.180 [0.153, 0.249]	1.00	0.10
Night	Savanna-Crop	LAI	0.197 [0.139, 0.313]	1.00	0.40
Night	Savanna-Crop	LE	0.212 [0.112, 0.341]	1.00	0.40
Night	Savanna-Crop	GPP	0.187 [0.128, 0.332]	1.00	0.10
Night	Savanna-Grass	Albedo	0.390 [0.111, 0.569]	1.00	0.80
Night	Savanna-Grass	LAI	0.109 [0.010, 0.172]	1.00	0.00
Night	Savanna-Grass	LE	0.194 [0.052, 0.375]	1.00	0.20
Night	Savanna-Grass	GPP	0.108 [0.040, 0.203]	1.00	0.00
Night	Savanna-Urban	Albedo	0.200 [0.059, 0.281]	1.00	0.60
Night	Savanna-Urban	LAI	0.158 [-0.019, 0.347]	0.90	0.40
Night	Savanna-Urban	LE	0.034 [-0.031, 0.097]	0.80	0.00
Night	Savanna-Urban	GPP	0.007 [-0.114, 0.082]	0.60	0.00
Night	Shrub-Barren	Albedo	0.321 [0.072, 0.777]	1.00	0.60
Night	Shrub-Barren	LAI	0.125 [-0.257, 0.746]	0.80	0.40
Night	Shrub-Barren	LE	0.020 [-0.135, 0.134]	0.70	0.00
Night	Shrub-Barren	GPP	0.026 [-0.165, 0.231]	0.60	0.00
Night	Shrub-Crop	Albedo	0.939 [0.807, 1.118]	1.00	0.80
Night	Shrub-Crop	LAI	0.082 [0.052, 0.115]	1.00	0.00
Night	Shrub-Crop	LE	0.080 [0.061, 0.204]	1.00	0.00
Night	Shrub-Crop	GPP	0.783 [0.423, 1.035]	1.00	0.20
Night	Shrub-Grass	Albedo	0.562 [0.378, 0.931]	1.00	1.00
Night	Shrub-Grass	LAI	0.086 [-0.147, 0.303]	0.70	0.00
Night	Shrub-Grass	LE	0.003 [-0.398, 0.092]	0.50	0.00
Night	Shrub-Grass	GPP	-0.032 [-0.102, 0.099]	0.30	0.00
Night	Shrub-Urban	Albedo	0.461 [0.343, 0.717]	1.00	1.00

Response	Land-cover Pairs	Predictor	Importance median [95% interval]	Fraction importance > 0	Fraction ranked first
Night	Shrub-Urban	LAI	-0.001 [-0.103, 0.018]	0.50	0.00
Night	Shrub-Urban	LE	0.021 [-0.079, 0.145]	0.70	0.00
Night	Shrub-Urban	GPP	0.016 [-0.071, 0.101]	0.70	0.00
Night	Urban-Barren	Albedo	0.117 [0.017, 0.322]	1.00	0.00
Night	Urban-Barren	LAI	0.157 [-0.110, 1.401]	0.70	0.00
Night	Urban-Barren	LE	0.694 [0.326, 1.480]	1.00	0.70
Night	Urban-Barren	GPP	0.409 [0.127, 2.088]	1.00	0.30

Table S19. Agreement between Random Forest and XGBoost dominant-predictor rankings. Comparison of the dominant predictor, permutation importance, first-rank frequency, and positive-importance frequency identified by Random Forest and XGBoost for each daytime and nighttime land-cover contrast, together with an indicator of whether the two algorithms identified the same dominant predictor.

Response	Pair Name	Pairs Group	RF Dominant	RF Importance	RF 1st-Rank Frac.	RF Positive Frac.	XGB Dominant	XGB Importance	XGB 1st-Rank Frac.	XGB Positive Frac.	Agree
Day	Forest-Savanna	Natural_Natural	Albedo	0.306410	1.0	1.0	LE	0.323047	0.7	1.0	No
Day	Forest-Grass	Natural_Natural	Albedo	0.634021	1.0	1.0	Albedo	0.585071	1.0	1.0	Yes
Day	Forest-Crop	Natural_Crop	Albedo	0.513425	1.0	1.0	GPP	0.525733	0.5	1.0	No
Day	Shrub-Grass	Natural_Natural	Albedo	1.645938	1.0	1.0	Albedo	1.800155	1.0	1.0	Yes
Day	Shrub-Crop	Natural_Crop	LAI	0.393798	1.0	1.0	LAI	0.579778	0.6	1.0	Yes
Day	Shrub-Urban	Natural_Urban	GPP	0.396589	0.8	1.0	GPP	0.468819	0.6	1.0	Yes
Day	Shrub-Barren	Barren_Related	LAI	0.081332	0.5	1.0	LAI	0.189897	0.5	0.9	Yes
Day	Savanna-Grass	Natural_Natural	LAI	0.360498	1.0	1.0	LAI	0.356882	0.9	1.0	Yes
Day	Savanna-Crop	Natural_Crop	Albedo	0.392326	0.8	1.0	Albedo	0.419399	0.8	1.0	Yes
Day	Savanna-Urban	Natural_Urban	Albedo	0.111710	0.7	0.7	Albedo	0.144899	0.6	0.6	Yes
Day	Grass-Crop	Natural_Crop	Albedo	0.508947	1.0	1.0	GPP	0.556799	0.7	1.0	No
Day	Grass-Urban	Natural_Urban	Albedo	0.483641	1.0	1.0	Albedo	0.448125	1.0	1.0	Yes
Day	Grass-Barren	Barren_Related	Albedo	0.657448	1.0	1.0	Albedo	0.647189	1.0	1.0	Yes
Day	Crop-Urban	Anthropogenic_Anthropogenic	LE	0.361023	1.0	1.0	LE	0.445224	1.0	1.0	Yes
Day	Crop-Barren	Barren_Related	Albedo	0.698202	1.0	1.0	Albedo	0.610563	1.0	1.0	Yes
Day	Urban-Barren	Barren_Related	Albedo	0.195705	0.6	1.0	Albedo	0.349472	0.7	1.0	Yes
Night	Forest-Savanna	Natural_Natural	Albedo	0.141588	0.8	1.0	GPP	0.149112	0.8	1.0	No
Night	Forest-Grass	Natural_Natural	Albedo	0.427281	1.0	1.0	Albedo	0.429484	1.0	1.0	Yes
Night	Forest-Crop	Natural_Crop	LE	0.420362	1.0	1.0	LE	0.545261	0.6	1.0	Yes
Night	Shrub-Grass	Natural_Natural	Albedo	0.603413	1.0	1.0	Albedo	0.562472	1.0	1.0	Yes
Night	Shrub-Crop	Natural_Crop	Albedo	0.917804	1.0	1.0	Albedo	0.939476	0.8	1.0	Yes

Response	Pair Name	Pairs Group	RF Dominant	RF Importance	RF 1st-Rank Frac.	RF Positive Frac.	XGB Dominant	XGB Importance	XGB 1st-Rank Frac.	XGB Positive Frac.	Agree
Night	Shrub-Urban	Natural_Urban	Albedo	0.455981	1.0	1.0	Albedo	0.461008	1.0	1.0	Yes
Night	Shrub-Barren	Barren_Related	Albedo	0.411021	0.7	0.9	Albedo	0.320924	0.6	1.0	Yes
Night	Savanna-Grass	Natural_Natural	Albedo	0.446320	1.0	1.0	Albedo	0.389514	0.8	1.0	Yes
Night	Savanna-Crop	Natural_Crop	LAI	0.236630	0.9	1.0	LE	0.211986	0.4	1.0	No
Night	Savanna-Urban	Natural_Urban	Albedo	0.172842	0.8	1.0	Albedo	0.199816	0.6	1.0	Yes
Night	Grass-Crop	Natural_Crop	LE	0.550514	1.0	1.0	LE	0.745389	1.0	1.0	Yes
Night	Grass-Urban	Natural_Urban	GPP	0.363390	1.0	1.0	GPP	0.308910	0.9	1.0	Yes
Night	Grass-Barren	Barren_Related	Albedo	0.546689	1.0	1.0	Albedo	0.447907	1.0	1.0	Yes
Night	Crop-Urban	Anthropogenic_Anthropogenic	LAI	0.262194	1.0	1.0	LAI	0.405164	1.0	1.0	Yes
Night	Crop-Barren	Barren_Related	Albedo	0.792314	0.9	0.9	Albedo	0.715699	0.9	0.9	Yes
Night	Urban-Barren	Barren_Related	LE	0.602209	0.9	1.0	LE	0.693814	0.7	1.0	Yes

Table S20. Dominant XGBoost SHAP attribution for pair-specific land-cover thermal contrasts. Dominant SHAP predictor, mean absolute SHAP value, normalized SHAP importance, number of observations used in the SHAP evaluation, median held-out XGBoost R^2, and fraction of outer folds with positive R^2 for each daytime and nighttime land-cover contrast.

Response	Pair Name	Pairs Group	N SHAP	Dominant Predictor	Mean |SHAP|	Normalized SHAP Importance	Median Test R^2	Positive R^2 Fraction
Day	Forest-Savanna	Natural_Natural	5000	Albedo	0.246719	0.319557	0.346658	1.0
Day	Forest-Grass	Natural_Natural	684	Albedo	0.658551	0.426345	0.468185	1.0
Day	Forest-Crop	Natural_Crop	4825	Albedo	0.348380	0.375490	0.456337	1.0
Day	Shrub-Grass	Natural_Natural	64	Albedo	0.941422	0.825012	0.806246	1.0
Day	Shrub-Crop	Natural_Crop	2564	Albedo	0.337943	0.296574	0.614242	1.0
Day	Shrub-Urban	Natural_Urban	74	Albedo	0.373874	0.328190	0.425495	1.0
Day	Shrub-Barren	Barren_Related	53	GPP	0.333261	0.309830	0.224731	0.7
Day	Savanna-Grass	Natural_Natural	1320	LAI	0.395620	0.353963	0.345217	1.0
Day	Savanna-Crop	Natural_Crop	4124	Albedo	0.347612	0.375746	0.617244	1.0
Day	Savanna-Urban	Natural_Urban	141	Albedo	0.310498	0.310797	0.048522	0.6
Day	Grass-Crop	Natural_Crop	5000	LE	0.364467	0.317623	0.450142	1.0
Day	Grass-Urban	Natural_Urban	422	Albedo	0.703637	0.465529	0.558760	1.0
Day	Grass-Barren	Barren_Related	650	Albedo	1.594746	0.452952	0.522086	1.0
Day	Crop-Urban	Anthropogenic_Anthropogenic	5000	LE	0.423456	0.554526	0.322815	1.0
Day	Crop-Barren	Barren_Related	102	Albedo	0.665640	0.564734	0.339521	1.0
Day	Urban-Barren	Barren_Related	106	LAI	0.609736	0.450906	0.753841	1.0
Night	Forest-Savanna	Natural_Natural	5000	Albedo	0.065985	0.278128	0.116628	1.0
Night	Forest-Grass	Natural_Natural	684	Albedo	0.284180	0.508353	0.220789	1.0
Night	Forest-Crop	Natural_Crop	4825	LE	0.151677	0.340376	0.265250	1.0
Night	Shrub-Grass	Natural_Natural	64	Albedo	0.507870	0.432729	0.382521	0.8
Night	Shrub-Crop	Natural_Crop	2564	Albedo	0.184959	0.530796	0.461369	1.0
Night	Shrub-Urban	Natural_Urban	74	Albedo	0.160471	0.580399	0.273841	0.7
Night	Shrub-Barren	Barren_Related	53	Albedo	0.199656	0.405828	0.164818	0.7
Night	Savanna-Grass	Natural_Natural	1320	Albedo	0.136665	0.383947	0.276449	1.0
Night	Savanna-Crop	Natural_Crop	4124	LE	0.080159	0.286144	0.195206	1.0
Night	Savanna-Urban	Natural_Urban	141	Albedo	0.148617	0.402757	0.131563	0.8
Night	Grass-Crop	Natural_Crop	5000	LE	0.269176	0.451682	0.304429	1.0
Night	Grass-Urban	Natural_Urban	422	GPP	0.240895	0.374374	0.300179	1.0
Night	Grass-Barren	Barren_Related	650	Albedo	0.734832	0.554546	0.285968	1.0
Night	Crop-Urban	Anthropogenic_Anthropogenic	5000	LAI	0.166012	0.434269	0.144248	1.0
Night	Crop-Barren	Barren_Related	102	Albedo	0.382512	0.515686	0.269318	0.8

Response	Pair Name	Pairs Group	N SHAP	Dominant Predictor	Mean |SHAP|	Normalized SHAP Importance	Median Test R^2	Positive R^2 Fraction
Night	Urban-Barren	Barren_Related	106	LE	0.337311	0.388856	0.615269	1.0

Table S21. Predictor-specific SHAP importance for daytime land-cover thermal contrasts. Mean absolute SHAP values and normalized SHAP importance for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP for each eligible daytime land-cover contrast, together with the number of observations used for SHAP evaluation, median held-out XGBoost R^2, and fraction of outer folds with positive R^2.

Pair Name	Group	N	Predictor	Mean Abs SHAP	Normalized SHAP	Median Test R^2	Fraction $R^2 > 0$
Forest-Savanna	Natural_Natural	5000	Albedo	0.246719	0.319557	0.346658	1.0
Forest-Savanna	Natural_Natural	5000	LAI	0.168996	0.218887	0.346658	1.0
Forest-Savanna	Natural_Natural	5000	LE	0.167444	0.216878	0.346658	1.0
Forest-Savanna	Natural_Natural	5000	GPP	0.188907	0.244677	0.346658	1.0
Forest-Grass	Natural_Natural	684	Albedo	0.658551	0.426345	0.468185	1.0
Forest-Grass	Natural_Natural	684	LAI	0.343288	0.222244	0.468185	1.0
Forest-Grass	Natural_Natural	684	LE	0.334347	0.216456	0.468185	1.0
Forest-Grass	Natural_Natural	684	GPP	0.208457	0.134955	0.468185	1.0
Forest-Crop	Natural_Crop	4825	Albedo	0.348380	0.375490	0.456337	1.0
Forest-Crop	Natural_Crop	4825	LAI	0.129121	0.139169	0.456337	1.0
Forest-Crop	Natural_Crop	4825	LE	0.115452	0.124436	0.456337	1.0
Forest-Crop	Natural_Crop	4825	GPP	0.334848	0.360905	0.456337	1.0
Shrub-Grass	Natural_Natural	64	Albedo	0.941422	0.825012	0.806246	1.0
Shrub-Grass	Natural_Natural	64	LAI	0.037401	0.032776	0.806246	1.0
Shrub-Grass	Natural_Natural	64	LE	0.130480	0.114345	0.806246	1.0
Shrub-Grass	Natural_Natural	64	GPP	0.031798	0.027866	0.806246	1.0
Shrub-Crop	Natural_Crop	2564	Albedo	0.337943	0.296574	0.614242	1.0
Shrub-Crop	Natural_Crop	2564	LAI	0.335747	0.294647	0.614242	1.0
Shrub-Crop	Natural_Crop	2564	LE	0.143971	0.126347	0.614242	1.0
Shrub-Crop	Natural_Crop	2564	GPP	0.321828	0.282432	0.614242	1.0
Shrub-Urban	Natural_Urban	74	Albedo	0.373874	0.328190	0.425495	1.0
Shrub-Urban	Natural_Urban	74	LAI	0.222399	0.195224	0.425495	1.0
Shrub-Urban	Natural_Urban	74	LE	0.177816	0.156089	0.425495	1.0
Shrub-Urban	Natural_Urban	74	GPP	0.365109	0.320496	0.425495	1.0
Shrub-Barren	Barren_Related	53	Albedo	0.172655	0.160516	0.224731	0.7
Shrub-Barren	Barren_Related	53	LAI	0.323108	0.300391	0.224731	0.7
Shrub-Barren	Barren_Related	53	LE	0.246602	0.229264	0.224731	0.7
Shrub-Barren	Barren_Related	53	GPP	0.333261	0.309830	0.224731	0.7
Savanna-Grass	Natural_Natural	1320	Albedo	0.260152	0.232760	0.345217	1.0
Savanna-Grass	Natural_Natural	1320	LAI	0.395620	0.353963	0.345217	1.0

Pair Name	Group	N	Predictor	Mean Abs SHAP	Normalized SHAP	Median Test R^2	Fraction $R^2 > 0$
Savanna-Grass	Natural_Natural	1320	LE	0.259328	0.232022	0.345217	1.0
Savanna-Grass	Natural_Natural	1320	GPP	0.202586	0.181254	0.345217	1.0
Savanna-Crop	Natural_Crop	4124	Albedo	0.347612	0.375746	0.617244	1.0
Savanna-Crop	Natural_Crop	4124	LAI	0.257222	0.278040	0.617244	1.0
Savanna-Crop	Natural_Crop	4124	LE	0.234552	0.253536	0.617244	1.0
Savanna-Crop	Natural_Crop	4124	GPP	0.085739	0.092678	0.617244	1.0
Savanna-Urban	Natural_Urban	141	Albedo	0.310498	0.310797	0.048522	0.6
Savanna-Urban	Natural_Urban	141	LAI	0.251877	0.252120	0.048522	0.6
Savanna-Urban	Natural_Urban	141	LE	0.182514	0.182690	0.048522	0.6
Savanna-Urban	Natural_Urban	141	GPP	0.254150	0.254394	0.048522	0.6
Grass-Crop	Natural_Crop	5000	Albedo	0.329735	0.287355	0.450142	1.0
Grass-Crop	Natural_Crop	5000	LAI	0.168335	0.146699	0.450142	1.0
Grass-Crop	Natural_Crop	5000	LE	0.364467	0.317623	0.450142	1.0
Grass-Crop	Natural_Crop	5000	GPP	0.284946	0.248323	0.450142	1.0
Grass-Urban	Natural_Urban	422	Albedo	0.703637	0.465529	0.558760	1.0
Grass-Urban	Natural_Urban	422	LAI	0.438715	0.290255	0.558760	1.0
Grass-Urban	Natural_Urban	422	LE	0.177198	0.117235	0.558760	1.0
Grass-Urban	Natural_Urban	422	GPP	0.191928	0.126980	0.558760	1.0
Grass-Barren	Barren_Related	650	Albedo	1.594746	0.452952	0.522086	1.0
Grass-Barren	Barren_Related	650	LAI	0.590976	0.167853	0.522086	1.0
Grass-Barren	Barren_Related	650	LE	0.820822	0.233136	0.522086	1.0
Grass-Barren	Barren_Related	650	GPP	0.514243	0.146059	0.522086	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	Albedo	0.090965	0.119121	0.322815	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	LAI	0.111561	0.146092	0.322815	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	LE	0.423456	0.554526	0.322815	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	GPP	0.137653	0.180261	0.322815	1.0
Crop-Barren	Barren_Related	102	Albedo	0.665640	0.564734	0.339521	1.0
Crop-Barren	Barren_Related	102	LAI	0.182561	0.154886	0.339521	1.0
Crop-Barren	Barren_Related	102	LE	0.153837	0.130516	0.339521	1.0
Crop-Barren	Barren_Related	102	GPP	0.176642	0.149864	0.339521	1.0
Urban-Barren	Barren_Related	106	Albedo	0.363738	0.268988	0.753841	1.0
Urban-Barren	Barren_Related	106	LAI	0.609736	0.450906	0.753841	1.0
Urban-Barren	Barren_Related	106	LE	0.191888	0.141903	0.753841	1.0
Urban-Barren	Barren_Related	106	GPP	0.186884	0.138203	0.753841	1.0

Table S22. Predictor-specific SHAP importance for nighttime land-cover thermal contrasts. Mean absolute SHAP values and normalized SHAP importance for ΔAlbedo, ΔLAI, ΔLE, and ΔGPP for each eligible nighttime land-cover contrast, together with the number of observations used for SHAP evaluation, median held-out XGBoost R^2, and fraction of outer folds with positive R^2.

Pair Name	Group	N	Predictor	Mean Abs SHAP	Normalized SHAP	Median Test R^2	Fraction $R^2 > 0$
Forest-Savanna	Natural_Natural	5000	Albedo	0.065985	0.278128	0.116628	1.0
Forest-Savanna	Natural_Natural	5000	LAI	0.051096	0.215369	0.116628	1.0
Forest-Savanna	Natural_Natural	5000	LE	0.055660	0.234610	0.116628	1.0
Forest-Savanna	Natural_Natural	5000	GPP	0.064505	0.271892	0.116628	1.0
Forest-Grass	Natural_Natural	684	Albedo	0.284180	0.508353	0.220789	1.0
Forest-Grass	Natural_Natural	684	LAI	0.084019	0.150297	0.220789	1.0
Forest-Grass	Natural_Natural	684	LE	0.079596	0.142385	0.220789	1.0
Forest-Grass	Natural_Natural	684	GPP	0.111226	0.198966	0.220789	1.0
Forest-Crop	Natural_Crop	4825	Albedo	0.085250	0.191309	0.265250	1.0
Forest-Crop	Natural_Crop	4825	LAI	0.085666	0.192240	0.265250	1.0
Forest-Crop	Natural_Crop	4825	LE	0.151677	0.340376	0.265250	1.0
Forest-Crop	Natural_Crop	4825	GPP	0.123024	0.276075	0.265250	1.0
Shrub-Grass	Natural_Natural	64	Albedo	0.507870	0.432729	0.382521	0.8
Shrub-Grass	Natural_Natural	64	LAI	0.321158	0.273641	0.382521	0.8
Shrub-Grass	Natural_Natural	64	LE	0.156941	0.133721	0.382521	0.8
Shrub-Grass	Natural_Natural	64	GPP	0.187677	0.159909	0.382521	0.8
Shrub-Crop	Natural_Crop	2564	Albedo	0.184959	0.530796	0.461369	1.0
Shrub-Crop	Natural_Crop	2564	LAI	0.048419	0.138953	0.461369	1.0
Shrub-Crop	Natural_Crop	2564	LE	0.026377	0.075698	0.461369	1.0
Shrub-Crop	Natural_Crop	2564	GPP	0.088701	0.254553	0.461369	1.0
Shrub-Urban	Natural_Urban	74	Albedo	0.160471	0.580399	0.273841	0.7
Shrub-Urban	Natural_Urban	74	LAI	0.034718	0.125569	0.273841	0.7
Shrub-Urban	Natural_Urban	74	LE	0.040027	0.144770	0.273841	0.7
Shrub-Urban	Natural_Urban	74	GPP	0.041269	0.149262	0.273841	0.7
Shrub-Barren	Barren_Related	53	Albedo	0.199656	0.405828	0.164818	0.7
Shrub-Barren	Barren_Related	53	LAI	0.157054	0.319233	0.164818	0.7
Shrub-Barren	Barren_Related	53	LE	0.038746	0.078755	0.164818	0.7
Shrub-Barren	Barren_Related	53	GPP	0.096517	0.196183	0.164818	0.7
Savanna-Grass	Natural_Natural	1320	Albedo	0.136665	0.383947	0.276449	1.0
Savanna-Grass	Natural_Natural	1320	LAI	0.051564	0.144864	0.276449	1.0
Savanna-Grass	Natural_Natural	1320	LE	0.088047	0.247358	0.276449	1.0
Savanna-Grass	Natural_Natural	1320	GPP	0.079673	0.223831	0.276449	1.0
Savanna-Crop	Natural_Crop	4124	Albedo	0.076132	0.271769	0.195206	1.0
Savanna-Crop	Natural_Crop	4124	LAI	0.071199	0.254160	0.195206	1.0
Savanna-Crop	Natural_Crop	4124	LE	0.080159	0.286144	0.195206	1.0
Savanna-Crop	Natural_Crop	4124	GPP	0.052645	0.187926	0.195206	1.0
Savanna-Urban	Natural_Urban	141	Albedo	0.148617	0.402757	0.131563	0.8
Savanna-Urban	Natural_Urban	141	LAI	0.121284	0.328686	0.131563	0.8

Pair Name	Group	N	Predictor	Mean Abs SHAP	Normalized SHAP	Median Test R^2	Fraction $R^2 > 0$
Savanna-Urban	Natural_Urban	141	LE	0.053235	0.144269	0.131563	0.8
Savanna-Urban	Natural_Urban	141	GPP	0.045862	0.124288	0.131563	0.8
Grass-Crop	Natural_Crop	5000	Albedo	0.091835	0.154100	0.304429	1.0
Grass-Crop	Natural_Crop	5000	LAI	0.120854	0.202796	0.304429	1.0
Grass-Crop	Natural_Crop	5000	LE	0.269176	0.451682	0.304429	1.0
Grass-Crop	Natural_Crop	5000	GPP	0.114076	0.191422	0.304429	1.0
Grass-Urban	Natural_Urban	422	Albedo	0.150987	0.234648	0.300179	1.0
Grass-Urban	Natural_Urban	422	LAI	0.116834	0.181572	0.300179	1.0
Grass-Urban	Natural_Urban	422	LE	0.134744	0.209405	0.300179	1.0
Grass-Urban	Natural_Urban	422	GPP	0.240895	0.374374	0.300179	1.0
Grass-Barren	Barren_Related	650	Albedo	0.734832	0.554546	0.285968	1.0
Grass-Barren	Barren_Related	650	LAI	0.211956	0.159954	0.285968	1.0
Grass-Barren	Barren_Related	650	LE	0.109959	0.082981	0.285968	1.0
Grass-Barren	Barren_Related	650	GPP	0.268358	0.202518	0.285968	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	Albedo	0.102976	0.269374	0.144248	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	LAI	0.166012	0.434269	0.144248	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	LE	0.071909	0.188105	0.144248	1.0
Crop-Urban	Anthropogenic_Anthropogenic	5000	GPP	0.041383	0.108253	0.144248	1.0
Crop-Barren	Barren_Related	102	Albedo	0.382512	0.515686	0.269318	0.8
Crop-Barren	Barren_Related	102	LAI	0.107233	0.144566	0.269318	0.8
Crop-Barren	Barren_Related	102	LE	0.087262	0.117643	0.269318	0.8
Crop-Barren	Barren_Related	102	GPP	0.164747	0.222104	0.269318	0.8
Urban-Barren	Barren_Related	106	Albedo	0.083773	0.096574	0.615269	1.0
Urban-Barren	Barren_Related	106	LAI	0.153682	0.177167	0.615269	1.0
Urban-Barren	Barren_Related	106	LE	0.337311	0.388856	0.615269	1.0
Urban-Barren	Barren_Related	106	GPP	0.292679	0.337403	0.615269	1.0

Table S23. Biophysical predictor-set specifications evaluated in sensitivity analyses. Composition of the primary and alternative linear-model predictor sets based on ΔAlbedo, ΔLAI, ΔLE, ΔET, ΔGPP, ΔPsnNet, ΔNPP, and elevation difference (ΔDEM). The primary specification contains ΔAlbedo, ΔLAI, ΔLE, and ΔGPP; alternative specifications replace LE with ET, replace GPP with PsnNet or NPP, combine these substitutions, and assess the additional contribution of ΔDEM

Model ID	Model	Specification	Albedo	LAI	LE	ET	GPP	PsnNet	NPP	Delta DEM
M1	Primary_LE_GPP	Primary	Yes	Yes	Yes	No	Yes	No	No	No
M7	Primary_LE_GPP_plus_DEM	Primary + Delta DEM	Yes	Yes	Yes	No	Yes	No	No	Yes
M2	ET_for_LE	ET replaces LE	Yes	Yes	No	Yes	Yes	No	No	No
M8	ET_for_LE_plus_DEM	ET replaces LE + Delta DEM	Yes	Yes	No	Yes	Yes	No	No	Yes
M3	PsnNet_for_GPP	PsnNet replaces GPP	Yes	Yes	Yes	No	No	Yes	No	No
M9	PsnNet_for_GPP_plus_DEM	PsnNet replaces GPP + Delta DEM	Yes	Yes	Yes	No	No	Yes	No	Yes

M4	NPP_for_GPP	NPP replaces GPP	Yes	Yes	Yes	No	No	No	Yes	No
M10	NPP_for_GPP_plus_DEM	NPP replaces GPP + Delta DEM	Yes	Yes	Yes	No	No	No	Yes	Yes
M5	ET_PsnNet	ET + PsnNet replacement	Yes	Yes	No	Yes	No	Yes	No	No
M11	ET_PsnNet_plus_DEM	ET + PsnNet replacement + Delta DEM	Yes	Yes	No	Yes	No	Yes	No	Yes
M6	ET_NPP	ET + NPP replacement	Yes	Yes	No	Yes	No	No	Yes	No
M12	ET_NPP_plus_DEM	ET + NPP replacement + Delta DEM	Yes	Yes	No	Yes	No	No	Yes	Yes

Table S24. Summary of multicollinearity diagnostics for biophysical attribution models. Land-cover contrasts and predictors exhibiting elevated variance inflation factors (VIF), together with their approximate VIF ranges, maximum VIF, and qualitative degree of multicollinearity across the evaluated predictor specifications.

Land-cover contrast	Predictor(s) affected	Approximate VIF range	Maximum VIF	Multicollinearity level
Forest-Savanna	GPP	5.91-5.98	5.98	Moderate
Forest-Crop	LE/ET, GPP	6.01-6.52	6.52	Moderate
Shrub-Grass	LAI, LE/ET, GPP, PsnNet	5.21-52.53	52.53	Severe
Shrub-Crop	LAI, LE/ET, GPP	5.65-38.86	38.86	Severe
Shrub-Urban	LAI, LE/ET	8.12-9.65	9.65	Moderate-high
Savanna-Grass	GPP	5.71-5.88	5.88	Moderate
Savanna-Crop	LAI, LE/ET, GPP	5.96-17.61	17.61	High
Savanna-Urban	LE/ET, GPP	5.46-8.78	8.78	Moderate-high
Grass-Crop	LAI, LE/ET, GPP	6.14-10.77	10.77	High
Grass-Urban	LAI, LE/ET, GPP	5.86-8.23	8.23	Moderate-high
Crop-Urban	LAI, LE/ET	9.43-10.90	10.90	High
Urban-Barren	LAI, LE/ET, GPP/PsnNet/NPP	7.99-37.50	37.50	Severe

Table S25. Predictor-specific variance inflation factors across biophysical attribution model specifications. Complete VIF diagnostics for each land-cover contrast, response period, model specification, and predictor used in the primary and alternative linear attribution analyses.

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Forest-Savanna	Primary_LE_GPP	GPP	5.912525
Day	Forest-Savanna	Primary_LE_GPP_plus_DEM	GPP	5.961093
Day	Forest-Savanna	ET_for_LE	GPP	5.930967
Day	Forest-Savanna	ET_for_LE_plus_DEM	GPP	5.978579
Day	Forest-Crop	Primary_LE_GPP	LE	6.461539
Day	Forest-Crop	Primary_LE_GPP	GPP	6.018869
Day	Forest-Crop	Primary_LE_GPP_plus_DEM	LE	6.519030
Day	Forest-Crop	Primary_LE_GPP_plus_DEM	GPP	6.023357
Day	Forest-Crop	ET_for_LE	ET	6.465417
Day	Forest-Crop	ET_for_LE	GPP	6.014582
Day	Forest-Crop	ET_for_LE_plus_DEM	ET	6.519983
Day	Forest-Crop	ET_for_LE_plus_DEM	GPP	6.019821
Day	Shrub-Grass	Primary_LE_GPP	LAI	49.100197
Day	Shrub-Grass	Primary_LE_GPP	LE	12.777362
Day	Shrub-Grass	Primary_LE_GPP	GPP	21.874027
Day	Shrub-Grass	Primary_LE_GPP_plus_DEM	LAI	52.144039
Day	Shrub-Grass	Primary_LE_GPP_plus_DEM	LE	13.320094
Day	Shrub-Grass	Primary_LE_GPP_plus_DEM	GPP	22.300094
Day	Shrub-Grass	ET_for_LE	LAI	49.518669
Day	Shrub-Grass	ET_for_LE	ET	12.828280
Day	Shrub-Grass	ET_for_LE	GPP	22.030316
Day	Shrub-Grass	ET_for_LE_plus_DEM	LAI	52.527925
Day	Shrub-Grass	ET_for_LE_plus_DEM	ET	13.357839
Day	Shrub-Grass	ET_for_LE_plus_DEM	GPP	22.454938
Day	Shrub-Grass	PsnNet_for_GPP	LAI	25.160894
Day	Shrub-Grass	PsnNet_for_GPP	LE	15.008224
Day	Shrub-Grass	PsnNet_for_GPP_plus_DEM	LAI	28.768170
Day	Shrub-Grass	PsnNet_for_GPP_plus_DEM	LE	16.212983
Day	Shrub-Grass	PsnNet_for_GPP_plus_DEM	PsnNet	5.208194
Day	Shrub-Grass	NPP_for_GPP	LAI	15.747359
Day	Shrub-Grass	NPP_for_GPP	LE	11.100930
Day	Shrub-Grass	NPP_for_GPP_plus_DEM	LAI	18.739796
Day	Shrub-Grass	NPP_for_GPP_plus_DEM	LE	11.996169
Day	Shrub-Grass	ET_PsnNet	LAI	25.677513
Day	Shrub-Grass	ET_PsnNet	ET	15.248274
Day	Shrub-Grass	ET_PsnNet_plus_DEM	LAI	29.337368
Day	Shrub-Grass	ET_PsnNet_plus_DEM	ET	16.469528

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Shrub-Grass	ET_PsnNet_plus_DEM	PsnNet	5.312288
Day	Shrub-Grass	ET_NPP	LAI	16.000681
Day	Shrub-Grass	ET_NPP	ET	11.213292
Day	Shrub-Grass	ET_NPP_plus_DEM	LAI	19.047092
Day	Shrub-Grass	ET_NPP_plus_DEM	ET	12.127093
Day	Shrub-Crop	Primary_LE_GPP	LAI	33.474189
Day	Shrub-Crop	Primary_LE_GPP	LE	33.915371
Day	Shrub-Crop	Primary_LE_GPP	GPP	5.656721
Day	Shrub-Crop	Primary_LE_GPP_plus_DEM	LAI	33.816638
Day	Shrub-Crop	Primary_LE_GPP_plus_DEM	LE	33.920513
Day	Shrub-Crop	Primary_LE_GPP_plus_DEM	GPP	5.729551
Day	Shrub-Crop	ET_for_LE	LAI	34.894963
Day	Shrub-Crop	ET_for_LE	ET	35.343831
Day	Shrub-Crop	ET_for_LE	GPP	5.650232
Day	Shrub-Crop	ET_for_LE_plus_DEM	LAI	35.141702
Day	Shrub-Crop	ET_for_LE_plus_DEM	ET	35.371830
Day	Shrub-Crop	ET_for_LE_plus_DEM	GPP	5.728385
Day	Shrub-Crop	PsnNet_for_GPP	LAI	36.993587
Day	Shrub-Crop	PsnNet_for_GPP	LE	33.278892
Day	Shrub-Crop	PsnNet_for_GPP_plus_DEM	LAI	37.126451
Day	Shrub-Crop	PsnNet_for_GPP_plus_DEM	LE	33.279417
Day	Shrub-Crop	NPP_for_GPP	LAI	37.307942
Day	Shrub-Crop	NPP_for_GPP	LE	33.554677
Day	Shrub-Crop	NPP_for_GPP_plus_DEM	LAI	37.364307
Day	Shrub-Crop	NPP_for_GPP_plus_DEM	LE	33.568639
Day	Shrub-Crop	ET_PsnNet	LAI	38.165357
Day	Shrub-Crop	ET_PsnNet	ET	34.477937
Day	Shrub-Crop	ET_PsnNet_plus_DEM	LAI	38.242668
Day	Shrub-Crop	ET_PsnNet_plus_DEM	ET	34.489438
Day	Shrub-Crop	ET_NPP	LAI	38.840499
Day	Shrub-Crop	ET_NPP	ET	34.990557
Day	Shrub-Crop	ET_NPP_plus_DEM	LAI	38.859537
Day	Shrub-Crop	ET_NPP_plus_DEM	ET	35.036764
Day	Shrub-Urban	Primary_LE_GPP	LAI	8.757771
Day	Shrub-Urban	Primary_LE_GPP	LE	9.185613
Day	Shrub-Urban	Primary_LE_GPP_plus_DEM	LAI	8.770603
Day	Shrub-Urban	Primary_LE_GPP_plus_DEM	LE	9.650111
Day	Shrub-Urban	ET_for_LE	LAI	8.608704
Day	Shrub-Urban	ET_for_LE	ET	8.995705
Day	Shrub-Urban	ET_for_LE_plus_DEM	LAI	8.620517
Day	Shrub-Urban	ET_for_LE_plus_DEM	ET	9.456691

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Shrub-Urban	PsnNet_for_GPP	LAI	8.547090
Day	Shrub-Urban	PsnNet_for_GPP	LE	8.724782
Day	Shrub-Urban	PsnNet_for_GPP_plus_DEM	LAI	8.625424
Day	Shrub-Urban	PsnNet_for_GPP_plus_DEM	LE	9.176213
Day	Shrub-Urban	NPP_for_GPP	LAI	8.301472
Day	Shrub-Urban	NPP_for_GPP	LE	8.500166
Day	Shrub-Urban	NPP_for_GPP_plus_DEM	LAI	8.372468
Day	Shrub-Urban	NPP_for_GPP_plus_DEM	LE	8.961539
Day	Shrub-Urban	ET_PsnNet	LAI	8.365907
Day	Shrub-Urban	ET_PsnNet	ET	8.538303
Day	Shrub-Urban	ET_PsnNet_plus_DEM	LAI	8.441907
Day	Shrub-Urban	ET_PsnNet_plus_DEM	ET	8.985224
Day	Shrub-Urban	ET_NPP	LAI	8.124581
Day	Shrub-Urban	ET_NPP	ET	8.314976
Day	Shrub-Urban	ET_NPP_plus_DEM	LAI	8.192943
Day	Shrub-Urban	ET_NPP_plus_DEM	ET	8.770555
Day	Savanna-Grass	Primary_LE_GPP	GPP	5.712106
Day	Savanna-Grass	Primary_LE_GPP_plus_DEM	GPP	5.869574
Day	Savanna-Grass	ET_for_LE	GPP	5.720989
Day	Savanna-Grass	ET_for_LE_plus_DEM	GPP	5.877043
Day	Savanna-Crop	Primary_LE_GPP	LE	17.599461
Day	Savanna-Crop	Primary_LE_GPP	GPP	14.025353
Day	Savanna-Crop	Primary_LE_GPP_plus_DEM	LE	17.609951
Day	Savanna-Crop	Primary_LE_GPP_plus_DEM	GPP	14.059181
Day	Savanna-Crop	ET_for_LE	ET	17.373015
Day	Savanna-Crop	ET_for_LE	GPP	13.806128
Day	Savanna-Crop	ET_for_LE_plus_DEM	ET	17.380490
Day	Savanna-Crop	ET_for_LE_plus_DEM	GPP	13.845173
Day	Savanna-Crop	PsnNet_for_GPP	LAI	5.999907

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Savanna-Crop	PsnNet_for_GPP	LE	8.245719
Day	Savanna-Crop	PsnNet_for_GPP_plus_DEM	LAI	6.061301
Day	Savanna-Crop	PsnNet_for_GPP_plus_DEM	LE	8.248752
Day	Savanna-Crop	ET_PsnNet	LAI	5.962647
Day	Savanna-Crop	ET_PsnNet	ET	8.155841
Day	Savanna-Crop	ET_PsnNet_plus_DEM	LAI	6.026387
Day	Savanna-Crop	ET_PsnNet_plus_DEM	ET	8.158230
Day	Savanna-Urban	Primary_LE_GPP	LE	8.781553
Day	Savanna-Urban	Primary_LE_GPP	GPP	7.391437
Day	Savanna-Urban	Primary_LE_GPP_plus_DEM	LE	8.781554
Day	Savanna-Urban	Primary_LE_GPP_plus_DEM	GPP	7.781179
Day	Savanna-Urban	ET_for_LE	ET	8.502282
Day	Savanna-Urban	ET_for_LE	GPP	7.276566
Day	Savanna-Urban	ET_for_LE_plus_DEM	ET	8.502470
Day	Savanna-Urban	ET_for_LE_plus_DEM	GPP	7.678391
Day	Savanna-Urban	PsnNet_for_GPP	LE	5.913460
Day	Savanna-Urban	PsnNet_for_GPP_plus_DEM	LE	5.920070
Day	Savanna-Urban	NPP_for_GPP	LE	5.610254
Day	Savanna-Urban	NPP_for_GPP_plus_DEM	LE	5.620512
Day	Savanna-Urban	ET_PsnNet	ET	5.698082
Day	Savanna-Urban	ET_PsnNet_plus_DEM	ET	5.704503
Day	Savanna-Urban	ET_NPP	ET	5.455680

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Savanna-Urban	ET_NPP_plus_DEM	ET	5.464674
Day	Grass-Crop	Primary_LE_GPP	LAI	9.291460
Day	Grass-Crop	Primary_LE_GPP	LE	10.407393
Day	Grass-Crop	Primary_LE_GPP	GPP	6.139545
Day	Grass-Crop	Primary_LE_GPP_plus_DEM	LAI	9.502283
Day	Grass-Crop	Primary_LE_GPP_plus_DEM	LE	10.768858
Day	Grass-Crop	Primary_LE_GPP_plus_DEM	GPP	6.195508
Day	Grass-Crop	ET_for_LE	LAI	9.268888
Day	Grass-Crop	ET_for_LE	ET	10.354544
Day	Grass-Crop	ET_for_LE	GPP	6.144563
Day	Grass-Crop	ET_for_LE_plus_DEM	LAI	9.477232
Day	Grass-Crop	ET_for_LE_plus_DEM	ET	10.711009
Day	Grass-Crop	ET_for_LE_plus_DEM	GPP	6.200374
Day	Grass-Crop	PsnNet_for_GPP	LAI	8.140403
Day	Grass-Crop	PsnNet_for_GPP	LE	9.599085
Day	Grass-Crop	PsnNet_for_GPP_plus_DEM	LAI	8.459240
Day	Grass-Crop	PsnNet_for_GPP_plus_DEM	LE	9.906964
Day	Grass-Crop	NPP_for_GPP	LAI	8.310598
Day	Grass-Crop	NPP_for_GPP	LE	8.918774
Day	Grass-Crop	NPP_for_GPP_plus_DEM	LAI	8.578622
Day	Grass-Crop	NPP_for_GPP_plus_DEM	LE	9.183275
Day	Grass-Crop	ET_PsnNet	LAI	8.117343
Day	Grass-Crop	ET_PsnNet	ET	9.505590
Day	Grass-Crop	ET_PsnNet_plus_DEM	LAI	8.431011
Day	Grass-Crop	ET_PsnNet_plus_DEM	ET	9.805447
Day	Grass-Crop	ET_NPP	LAI	8.297334
Day	Grass-Crop	ET_NPP	ET	8.859562
Day	Grass-Crop	ET_NPP_plus_DEM	LAI	8.561502
Day	Grass-Crop	ET_NPP_plus_DEM	ET	9.118438
Day	Grass-Urban	Primary_LE_GPP	LAI	7.142216
Day	Grass-Urban	Primary_LE_GPP	LE	8.007302
Day	Grass-Urban	Primary_LE_GPP	GPP	6.555396
Day	Grass-Urban	Primary_LE_GPP_plus_DEM	LAI	7.237623
Day	Grass-Urban	Primary_LE_GPP_plus_DEM	LE	8.232227
Day	Grass-Urban	Primary_LE_GPP_plus_DEM	GPP	7.357320
Day	Grass-Urban	ET_for_LE	LAI	7.101593
Day	Grass-Urban	ET_for_LE	ET	7.949900
Day	Grass-Urban	ET_for_LE	GPP	6.566140
Day	Grass-Urban	ET_for_LE_plus_DEM	LAI	7.197069
Day	Grass-Urban	ET_for_LE_plus_DEM	ET	8.177559

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Grass-Urban	ET_for_LE_plus_DEM	GPP	7.373166
Day	Grass-Urban	PsnNet_for_GPP	LAI	6.394212
Day	Grass-Urban	PsnNet_for_GPP	LE	6.905309
Day	Grass-Urban	PsnNet_for_GPP_plus_DEM	LAI	6.414914
Day	Grass-Urban	PsnNet_for_GPP_plus_DEM	LE	6.975946
Day	Grass-Urban	NPP_for_GPP	LAI	5.904387
Day	Grass-Urban	NPP_for_GPP	LE	6.462174
Day	Grass-Urban	NPP_for_GPP_plus_DEM	LAI	5.909533
Day	Grass-Urban	NPP_for_GPP_plus_DEM	LE	6.500500
Day	Grass-Urban	ET_PsnNet	LAI	6.346577
Day	Grass-Urban	ET_PsnNet	ET	6.852316
Day	Grass-Urban	ET_PsnNet_plus_DEM	LAI	6.366795
Day	Grass-Urban	ET_PsnNet_plus_DEM	ET	6.924596
Day	Grass-Urban	ET_NPP	LAI	5.857112
Day	Grass-Urban	ET_NPP	ET	6.413742
Day	Grass-Urban	ET_NPP_plus_DEM	LAI	5.861873
Day	Grass-Urban	ET_NPP_plus_DEM	ET	6.453635
Day	Crop-Urban	Primary_LE_GPP	LAI	10.800235
Day	Crop-Urban	Primary_LE_GPP	LE	9.668936
Day	Crop-Urban	Primary_LE_GPP_plus_DEM	LAI	10.895975
Day	Crop-Urban	Primary_LE_GPP_plus_DEM	LE	9.743611
Day	Crop-Urban	ET_for_LE	LAI	10.696245
Day	Crop-Urban	ET_for_LE	ET	9.568136
Day	Crop-Urban	ET_for_LE_plus_DEM	LAI	10.791340
Day	Crop-Urban	ET_for_LE_plus_DEM	ET	9.642399
Day	Crop-Urban	PsnNet_for_GPP	LAI	9.535500
Day	Crop-Urban	PsnNet_for_GPP	LE	9.623468
Day	Crop-Urban	PsnNet_for_GPP_plus_DEM	LAI	9.605613
Day	Crop-Urban	PsnNet_for_GPP_plus_DEM	LE	9.702791
Day	Crop-Urban	NPP_for_GPP	LAI	9.803968
Day	Crop-Urban	NPP_for_GPP	LE	9.697847
Day	Crop-Urban	NPP_for_GPP_plus_DEM	LAI	9.872697
Day	Crop-Urban	NPP_for_GPP_plus_DEM	LE	9.778330
Day	Crop-Urban	ET_PsnNet	LAI	9.433724
Day	Crop-Urban	ET_PsnNet	ET	9.509394
Day	Crop-Urban	ET_PsnNet_plus_DEM	LAI	9.503606
Day	Crop-Urban	ET_PsnNet_plus_DEM	ET	9.588467
Day	Crop-Urban	ET_NPP	LAI	9.711637
Day	Crop-Urban	ET_NPP	ET	9.602234
Day	Crop-Urban	ET_NPP_plus_DEM	LAI	9.779998
Day	Crop-Urban	ET_NPP_plus_DEM	ET	9.682353

Response	Pair_Name	Model	Predictor_Label	VIF
Day	Urban-Barren	Primary_LE_GPP	LAI	37.442794
Day	Urban-Barren	Primary_LE_GPP	LE	8.215629
Day	Urban-Barren	Primary_LE_GPP	GPP	36.380474
Day	Urban-Barren	Primary_LE_GPP_plus_DEM	LAI	37.500640
Day	Urban-Barren	Primary_LE_GPP_plus_DEM	LE	8.370227
Day	Urban-Barren	Primary_LE_GPP_plus_DEM	GPP	36.462501
Day	Urban-Barren	ET_for_LE	LAI	37.433822
Day	Urban-Barren	ET_for_LE	ET	7.986483
Day	Urban-Barren	ET_for_LE	GPP	36.216663
Day	Urban-Barren	ET_for_LE_plus_DEM	LAI	37.491338
Day	Urban-Barren	ET_for_LE_plus_DEM	ET	8.139680
Day	Urban-Barren	ET_for_LE_plus_DEM	GPP	36.296723
Day	Urban-Barren	PsnNet_for_GPP	LAI	16.571034
Day	Urban-Barren	PsnNet_for_GPP	LE	8.587405
Day	Urban-Barren	PsnNet_for_GPP	PsnNet	11.629402
Day	Urban-Barren	PsnNet_for_GPP_plus_DEM	LAI	16.574278
Day	Urban-Barren	PsnNet_for_GPP_plus_DEM	LE	8.730097
Day	Urban-Barren	PsnNet_for_GPP_plus_DEM	PsnNet	11.637025
Day	Urban-Barren	NPP_for_GPP	LAI	14.632619
Day	Urban-Barren	NPP_for_GPP	LE	9.386721
Day	Urban-Barren	NPP_for_GPP	NPP	11.277274
Day	Urban-Barren	NPP_for_GPP_plus_DEM	LAI	14.667722
Day	Urban-Barren	NPP_for_GPP_plus_DEM	LE	9.626086
Day	Urban-Barren	NPP_for_GPP_plus_DEM	NPP	11.384707
Day	Urban-Barren	ET_PsnNet	LAI	16.489586
Day	Urban-Barren	ET_PsnNet	ET	8.338504
Day	Urban-Barren	ET_PsnNet	PsnNet	11.564022
Day	Urban-Barren	ET_PsnNet_plus_DEM	LAI	16.492901
Day	Urban-Barren	ET_PsnNet_plus_DEM	ET	8.480311
Day	Urban-Barren	ET_PsnNet_plus_DEM	PsnNet	11.571390
Day	Urban-Barren	ET_NPP	LAI	14.540661
Day	Urban-Barren	ET_NPP	ET	9.102267
Day	Urban-Barren	ET_NPP	NPP	11.198635
Day	Urban-Barren	ET_NPP_plus_DEM	LAI	14.576944
Day	Urban-Barren	ET_NPP_plus_DEM	ET	9.337404
Day	Urban-Barren	ET_NPP_plus_DEM	NPP	11.304441
Night	Forest-Savanna	Primary_LE_GPP	GPP	5.912525
Night	Forest-Savanna	Primary_LE_GPP_plus_DEM	GPP	5.961093

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Forest-Savanna	ET_for_LE	GPP	5.930967
Night	Forest-Savanna	ET_for_LE_plus_DEM	GPP	5.978579
Night	Forest-Crop	Primary_LE_GPP	LE	6.461539
Night	Forest-Crop	Primary_LE_GPP	GPP	6.018869
Night	Forest-Crop	Primary_LE_GPP_plus_DEM	LE	6.519030
Night	Forest-Crop	Primary_LE_GPP_plus_DEM	GPP	6.023357
Night	Forest-Crop	ET_for_LE	ET	6.465417
Night	Forest-Crop	ET_for_LE	GPP	6.014582
Night	Forest-Crop	ET_for_LE_plus_DEM	ET	6.519983
Night	Forest-Crop	ET_for_LE_plus_DEM	GPP	6.019821
Night	Shrub-Grass	Primary_LE_GPP	LAI	49.100197
Night	Shrub-Grass	Primary_LE_GPP	LE	12.777362
Night	Shrub-Grass	Primary_LE_GPP	GPP	21.874027
Night	Shrub-Grass	Primary_LE_GPP_plus_DEM	LAI	52.144039
Night	Shrub-Grass	Primary_LE_GPP_plus_DEM	LE	13.320094
Night	Shrub-Grass	Primary_LE_GPP_plus_DEM	GPP	22.300094
Night	Shrub-Grass	ET_for_LE	LAI	49.518669
Night	Shrub-Grass	ET_for_LE	ET	12.828280
Night	Shrub-Grass	ET_for_LE	GPP	22.030316
Night	Shrub-Grass	ET_for_LE_plus_DEM	LAI	52.527925
Night	Shrub-Grass	ET_for_LE_plus_DEM	ET	13.357839
Night	Shrub-Grass	ET_for_LE_plus_DEM	GPP	22.454938
Night	Shrub-Grass	PsnNet_for_GPP	LAI	25.160894
Night	Shrub-Grass	PsnNet_for_GPP	LE	15.008224
Night	Shrub-Grass	PsnNet_for_GPP_plus_DEM	LAI	28.768170
Night	Shrub-Grass	PsnNet_for_GPP_plus_DEM	LE	16.212983
Night	Shrub-Grass	PsnNet_for_GPP_plus_DEM	PsnNet	5.208194
Night	Shrub-Grass	NPP_for_GPP	LAI	15.747359
Night	Shrub-Grass	NPP_for_GPP	LE	11.100930
Night	Shrub-Grass	NPP_for_GPP_plus_DEM	LAI	18.739796
Night	Shrub-Grass	NPP_for_GPP_plus_DEM	LE	11.996169
Night	Shrub-Grass	ET_PsnNet	LAI	25.677513
Night	Shrub-Grass	ET_PsnNet	ET	15.248274
Night	Shrub-Grass	ET_PsnNet_plus_DEM	LAI	29.337368
Night	Shrub-Grass	ET_PsnNet_plus_DEM	ET	16.469528
Night	Shrub-Grass	ET_PsnNet_plus_DEM	PsnNet	5.312288
Night	Shrub-Grass	ET_NPP	LAI	16.000681
Night	Shrub-Grass	ET_NPP	ET	11.213292
Night	Shrub-Grass	ET_NPP_plus_DEM	LAI	19.047092

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Shrub-Grass	ET_NPP_plus_DEM	ET	12.127093
Night	Shrub-Crop	Primary_LE_GPP	LAI	33.474189
Night	Shrub-Crop	Primary_LE_GPP	LE	33.915371
Night	Shrub-Crop	Primary_LE_GPP	GPP	5.656721
Night	Shrub-Crop	Primary_LE_GPP_plus_DEM	LAI	33.816638
Night	Shrub-Crop	Primary_LE_GPP_plus_DEM	LE	33.920513
Night	Shrub-Crop	Primary_LE_GPP_plus_DEM	GPP	5.729551
Night	Shrub-Crop	ET_for_LE	LAI	34.894963
Night	Shrub-Crop	ET_for_LE	ET	35.343831
Night	Shrub-Crop	ET_for_LE	GPP	5.650232
Night	Shrub-Crop	ET_for_LE_plus_DEM	LAI	35.141702
Night	Shrub-Crop	ET_for_LE_plus_DEM	ET	35.371830
Night	Shrub-Crop	ET_for_LE_plus_DEM	GPP	5.728385
Night	Shrub-Crop	PsnNet_for_GPP	LAI	36.993587
Night	Shrub-Crop	PsnNet_for_GPP	LE	33.278892
Night	Shrub-Crop	PsnNet_for_GPP_plus_DEM	LAI	37.126451
Night	Shrub-Crop	PsnNet_for_GPP_plus_DEM	LE	33.279417
Night	Shrub-Crop	NPP_for_GPP	LAI	37.307942
Night	Shrub-Crop	NPP_for_GPP	LE	33.554677
Night	Shrub-Crop	NPP_for_GPP_plus_DEM	LAI	37.364307
Night	Shrub-Crop	NPP_for_GPP_plus_DEM	LE	33.568639
Night	Shrub-Crop	ET_PsnNet	LAI	38.165357
Night	Shrub-Crop	ET_PsnNet	ET	34.477937
Night	Shrub-Crop	ET_PsnNet_plus_DEM	LAI	38.242668
Night	Shrub-Crop	ET_PsnNet_plus_DEM	ET	34.489438
Night	Shrub-Crop	ET_NPP	LAI	38.840499
Night	Shrub-Crop	ET_NPP	ET	34.990557
Night	Shrub-Crop	ET_NPP_plus_DEM	LAI	38.859537
Night	Shrub-Crop	ET_NPP_plus_DEM	ET	35.036764
Night	Shrub-Urban	Primary_LE_GPP	LAI	8.757771
Night	Shrub-Urban	Primary_LE_GPP	LE	9.185613
Night	Shrub-Urban	Primary_LE_GPP_plus_DEM	LAI	8.770603
Night	Shrub-Urban	Primary_LE_GPP_plus_DEM	LE	9.650111
Night	Shrub-Urban	ET_for_LE	LAI	8.608704
Night	Shrub-Urban	ET_for_LE	ET	8.995705
Night	Shrub-Urban	ET_for_LE_plus_DEM	LAI	8.620517
Night	Shrub-Urban	ET_for_LE_plus_DEM	ET	9.456691
Night	Shrub-Urban	PsnNet_for_GPP	LAI	8.547090
Night	Shrub-Urban	PsnNet_for_GPP	LE	8.724782
Night	Shrub-Urban	PsnNet_for_GPP_plus_DEM	LAI	8.625424
Night	Shrub-Urban	PsnNet_for_GPP_plus_DEM	LE	9.176213

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Shrub-Urban	NPP_for_GPP	LAI	8.301472
Night	Shrub-Urban	NPP_for_GPP	LE	8.500166
Night	Shrub-Urban	NPP_for_GPP_plus_DEM	LAI	8.372468
Night	Shrub-Urban	NPP_for_GPP_plus_DEM	LE	8.961539
Night	Shrub-Urban	ET_PsnNet	LAI	8.365907
Night	Shrub-Urban	ET_PsnNet	ET	8.538303
Night	Shrub-Urban	ET_PsnNet_plus_DEM	LAI	8.441907
Night	Shrub-Urban	ET_PsnNet_plus_DEM	ET	8.985224
Night	Shrub-Urban	ET_NPP	LAI	8.124581
Night	Shrub-Urban	ET_NPP	ET	8.314976
Night	Shrub-Urban	ET_NPP_plus_DEM	LAI	8.192943
Night	Shrub-Urban	ET_NPP_plus_DEM	ET	8.770555
Night	Savanna-Grass	Primary_LE_GPP	GPP	5.712106
Night	Savanna-Grass	Primary_LE_GPP_plus_DEM	GPP	5.869574
Night	Savanna-Grass	ET_for_LE	GPP	5.720989
Night	Savanna-Grass	ET_for_LE_plus_DEM	GPP	5.877043
Night	Savanna-Crop	Primary_LE_GPP	LE	17.599461
Night	Savanna-Crop	Primary_LE_GPP	GPP	14.025353
Night	Savanna-Crop	Primary_LE_GPP_plus_DEM	LE	17.609951
Night	Savanna-Crop	Primary_LE_GPP_plus_DEM	GPP	14.059181
Night	Savanna-Crop	ET_for_LE	ET	17.373015
Night	Savanna-Crop	ET_for_LE	GPP	13.806128
Night	Savanna-Crop	ET_for_LE_plus_DEM	ET	17.380490
Night	Savanna-Crop	ET_for_LE_plus_DEM	GPP	13.845173
Night	Savanna-Crop	PsnNet_for_GPP	LAI	5.999907
Night	Savanna-Crop	PsnNet_for_GPP	LE	8.245719
Night	Savanna-Crop	PsnNet_for_GPP_plus_DEM	LAI	6.061301

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Savanna-Crop	PsnNet_for_GPP_plus_DEM	LE	8.248752
Night	Savanna-Crop	ET_PsnNet	LAI	5.962647
Night	Savanna-Crop	ET_PsnNet	ET	8.155841
Night	Savanna-Crop	ET_PsnNet_plus_DEM	LAI	6.026387
Night	Savanna-Crop	ET_PsnNet_plus_DEM	ET	8.158230
Night	Savanna-Urban	Primary_LE_GPP	LE	8.781553
Night	Savanna-Urban	Primary_LE_GPP	GPP	7.391437
Night	Savanna-Urban	Primary_LE_GPP_plus_DEM	LE	8.781554
Night	Savanna-Urban	Primary_LE_GPP_plus_DEM	GPP	7.781179
Night	Savanna-Urban	ET_for_LE	ET	8.502282
Night	Savanna-Urban	ET_for_LE	GPP	7.276566
Night	Savanna-Urban	ET_for_LE_plus_DEM	ET	8.502470
Night	Savanna-Urban	ET_for_LE_plus_DEM	GPP	7.678391
Night	Savanna-Urban	PsnNet_for_GPP	LE	5.913460
Night	Savanna-Urban	PsnNet_for_GPP_plus_DEM	LE	5.920070
Night	Savanna-Urban	NPP_for_GPP	LE	5.610254
Night	Savanna-Urban	NPP_for_GPP_plus_DEM	LE	5.620512
Night	Savanna-Urban	ET_PsnNet	ET	5.698082
Night	Savanna-Urban	ET_PsnNet_plus_DEM	ET	5.704503
Night	Savanna-Urban	ET_NPP	ET	5.455680
Night	Savanna-Urban	ET_NPP_plus_DEM	ET	5.464674
Night	Grass-Crop	Primary_LE_GPP	LAI	9.291460
Night	Grass-Crop	Primary_LE_GPP	LE	10.407393

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Grass-Crop	Primary_LE_GPP	GPP	6.139545
Night	Grass-Crop	Primary_LE_GPP_plus_DEM	LAI	9.502283
Night	Grass-Crop	Primary_LE_GPP_plus_DEM	LE	10.768858
Night	Grass-Crop	Primary_LE_GPP_plus_DEM	GPP	6.195508
Night	Grass-Crop	ET_for_LE	LAI	9.268888
Night	Grass-Crop	ET_for_LE	ET	10.354544
Night	Grass-Crop	ET_for_LE	GPP	6.144563
Night	Grass-Crop	ET_for_LE_plus_DEM	LAI	9.477232
Night	Grass-Crop	ET_for_LE_plus_DEM	ET	10.711009
Night	Grass-Crop	ET_for_LE_plus_DEM	GPP	6.200374
Night	Grass-Crop	PsnNet_for_GPP	LAI	8.140403
Night	Grass-Crop	PsnNet_for_GPP	LE	9.599085
Night	Grass-Crop	PsnNet_for_GPP_plus_DEM	LAI	8.459240
Night	Grass-Crop	PsnNet_for_GPP_plus_DEM	LE	9.906964
Night	Grass-Crop	NPP_for_GPP	LAI	8.310598
Night	Grass-Crop	NPP_for_GPP	LE	8.918774
Night	Grass-Crop	NPP_for_GPP_plus_DEM	LAI	8.578622
Night	Grass-Crop	NPP_for_GPP_plus_DEM	LE	9.183275
Night	Grass-Crop	ET_PsnNet	LAI	8.117343
Night	Grass-Crop	ET_PsnNet	ET	9.505590
Night	Grass-Crop	ET_PsnNet_plus_DEM	LAI	8.431011
Night	Grass-Crop	ET_PsnNet_plus_DEM	ET	9.805447
Night	Grass-Crop	ET_NPP	LAI	8.297334
Night	Grass-Crop	ET_NPP	ET	8.859562
Night	Grass-Crop	ET_NPP_plus_DEM	LAI	8.561502
Night	Grass-Crop	ET_NPP_plus_DEM	ET	9.118438
Night	Grass-Urban	Primary_LE_GPP	LAI	7.142216
Night	Grass-Urban	Primary_LE_GPP	LE	8.007302
Night	Grass-Urban	Primary_LE_GPP	GPP	6.555396
Night	Grass-Urban	Primary_LE_GPP_plus_DEM	LAI	7.237623
Night	Grass-Urban	Primary_LE_GPP_plus_DEM	LE	8.232227
Night	Grass-Urban	Primary_LE_GPP_plus_DEM	GPP	7.357320
Night	Grass-Urban	ET_for_LE	LAI	7.101593
Night	Grass-Urban	ET_for_LE	ET	7.949900
Night	Grass-Urban	ET_for_LE	GPP	6.566140
Night	Grass-Urban	ET_for_LE_plus_DEM	LAI	7.197069
Night	Grass-Urban	ET_for_LE_plus_DEM	ET	8.177559
Night	Grass-Urban	ET_for_LE_plus_DEM	GPP	7.373166
Night	Grass-Urban	PsnNet_for_GPP	LAI	6.394212
Night	Grass-Urban	PsnNet_for_GPP	LE	6.905309
Night	Grass-Urban	PsnNet_for_GPP_plus_DEM	LAI	6.414914

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Grass-Urban	PsnNet_for_GPP_plus_DEM	LE	6.975946
Night	Grass-Urban	NPP_for_GPP	LAI	5.904387
Night	Grass-Urban	NPP_for_GPP	LE	6.462174
Night	Grass-Urban	NPP_for_GPP_plus_DEM	LAI	5.909533
Night	Grass-Urban	NPP_for_GPP_plus_DEM	LE	6.500500
Night	Grass-Urban	ET_PsnNet	LAI	6.346577
Night	Grass-Urban	ET_PsnNet	ET	6.852316
Night	Grass-Urban	ET_PsnNet_plus_DEM	LAI	6.366795
Night	Grass-Urban	ET_PsnNet_plus_DEM	ET	6.924596
Night	Grass-Urban	ET_NPP	LAI	5.857112
Night	Grass-Urban	ET_NPP	ET	6.413742
Night	Grass-Urban	ET_NPP_plus_DEM	LAI	5.861873
Night	Grass-Urban	ET_NPP_plus_DEM	ET	6.453635
Night	Crop-Urban	Primary_LE_GPP	LAI	10.800235
Night	Crop-Urban	Primary_LE_GPP	LE	9.668936
Night	Crop-Urban	Primary_LE_GPP_plus_DEM	LAI	10.895975
Night	Crop-Urban	Primary_LE_GPP_plus_DEM	LE	9.743611
Night	Crop-Urban	ET_for_LE	LAI	10.696245
Night	Crop-Urban	ET_for_LE	ET	9.568136
Night	Crop-Urban	ET_for_LE_plus_DEM	LAI	10.791340
Night	Crop-Urban	ET_for_LE_plus_DEM	ET	9.642399
Night	Crop-Urban	PsnNet_for_GPP	LAI	9.535500
Night	Crop-Urban	PsnNet_for_GPP	LE	9.623468
Night	Crop-Urban	PsnNet_for_GPP_plus_DEM	LAI	9.605613
Night	Crop-Urban	PsnNet_for_GPP_plus_DEM	LE	9.702791
Night	Crop-Urban	NPP_for_GPP	LAI	9.803968
Night	Crop-Urban	NPP_for_GPP	LE	9.697847
Night	Crop-Urban	NPP_for_GPP_plus_DEM	LAI	9.872697
Night	Crop-Urban	NPP_for_GPP_plus_DEM	LE	9.778330
Night	Crop-Urban	ET_PsnNet	LAI	9.433724
Night	Crop-Urban	ET_PsnNet	ET	9.509394
Night	Crop-Urban	ET_PsnNet_plus_DEM	LAI	9.503606
Night	Crop-Urban	ET_PsnNet_plus_DEM	ET	9.588467
Night	Crop-Urban	ET_NPP	LAI	9.711637
Night	Crop-Urban	ET_NPP	ET	9.602234
Night	Crop-Urban	ET_NPP_plus_DEM	LAI	9.779998
Night	Crop-Urban	ET_NPP_plus_DEM	ET	9.682353
Night	Urban-Barren	Primary_LE_GPP	LAI	37.442794
Night	Urban-Barren	Primary_LE_GPP	LE	8.215629
Night	Urban-Barren	Primary_LE_GPP	GPP	36.380474
Night	Urban-Barren	Primary_LE_GPP_plus_DEM	LAI	37.500640

Response	Pair_Name	Model	Predictor_Label	VIF
Night	Urban-Barren	Primary_LE_GPP_plus_DEM	LE	8.370227
Night	Urban-Barren	Primary_LE_GPP_plus_DEM	GPP	36.462501
Night	Urban-Barren	ET_for_LE	LAI	37.433822
Night	Urban-Barren	ET_for_LE	ET	7.986483
Night	Urban-Barren	ET_for_LE	GPP	36.216663
Night	Urban-Barren	ET_for_LE_plus_DEM	LAI	37.491338
Night	Urban-Barren	ET_for_LE_plus_DEM	ET	8.139680
Night	Urban-Barren	ET_for_LE_plus_DEM	GPP	36.296723
Night	Urban-Barren	PsnNet_for_GPP	LAI	16.571034
Night	Urban-Barren	PsnNet_for_GPP	LE	8.587405
Night	Urban-Barren	PsnNet_for_GPP	PsnNet	11.629402
Night	Urban-Barren	PsnNet_for_GPP_plus_DEM	LAI	16.574278
Night	Urban-Barren	PsnNet_for_GPP_plus_DEM	LE	8.730097
Night	Urban-Barren	PsnNet_for_GPP_plus_DEM	PsnNet	11.637025
Night	Urban-Barren	NPP_for_GPP	LAI	14.632619
Night	Urban-Barren	NPP_for_GPP	LE	9.386721
Night	Urban-Barren	NPP_for_GPP	NPP	11.277274
Night	Urban-Barren	NPP_for_GPP_plus_DEM	LAI	14.667722
Night	Urban-Barren	NPP_for_GPP_plus_DEM	LE	9.626086
Night	Urban-Barren	NPP_for_GPP_plus_DEM	NPP	11.384707
Night	Urban-Barren	ET_PsnNet	LAI	16.489586
Night	Urban-Barren	ET_PsnNet	ET	8.338504
Night	Urban-Barren	ET_PsnNet	PsnNet	11.564022
Night	Urban-Barren	ET_PsnNet_plus_DEM	LAI	16.492901
Night	Urban-Barren	ET_PsnNet_plus_DEM	ET	8.480311
Night	Urban-Barren	ET_PsnNet_plus_DEM	PsnNet	11.571390
Night	Urban-Barren	ET_NPP	LAI	14.540661
Night	Urban-Barren	ET_NPP	ET	9.102267
Night	Urban-Barren	ET_NPP	NPP	11.198635
Night	Urban-Barren	ET_NPP_plus_DEM	LAI	14.576944
Night	Urban-Barren	ET_NPP_plus_DEM	ET	9.337404
Night	Urban-Barren	ET_NPP_plus_DEM	NPP	11.304441

Table S26. Sensitivity of linear biophysical attribution to alternative predictor specifications. Model R^2, adjusted R^2, matched-primary R^2, change in R^2 relative to the corresponding primary specification, and the dominant standardized predictor and coefficient for alternative models involving ET, PsnNet, NPP, and ΔDEM.

Response	Pair	Model	N	R^2	Adjusted R^2	Matched Primary R^2	Delta R^2 vs Matched Primary	Dominant Predictor	Dominant Beta	Significance
Day	Forest-Savanna	ET_NPP	20927	0.122	0.122	0.115	0.007	ET	-0.369	***
Day	Forest-Savanna	ET_NPP_plus_DEM	20927	0.198	0.198	0.194	0.005	ET	-0.340	***
Day	Forest-Savanna	ET_PsnNet	20927	0.114	0.114	0.115	-0.001	ET	-0.367	***
Day	Forest-Savanna	ET_PsnNet_plus_DEM	20927	0.193	0.192	0.194	-0.001	ET	-0.337	***
Day	Forest-Savanna	ET_for_LE	20927	0.112	0.112	0.115	-0.003	ET	-0.389	***
Day	Forest-Savanna	ET_for_LE_plus_DEM	20927	0.192	0.191	0.194	-0.002	ET	-0.344	***
Day	Forest-Savanna	NPP_for_GPP	20927	0.125	0.125	0.115	0.010	LE	-0.375	***
Day	Forest-Savanna	NPP_for_GPP_plus_DEM	20927	0.200	0.200	0.194	0.007	LE	-0.346	***
Day	Forest-Savanna	Primary_LE_GPP	20927	0.115	0.115	0.115	0.000	LE	-0.397	***
Day	Forest-Savanna	Primary_LE_GPP_plus_DEM	20927	0.194	0.193	0.194	0.000	LE	-0.351	***
Day	Forest-Savanna	PsnNet_for_GPP	20927	0.116	0.116	0.115	0.001	LE	-0.374	***
Day	Forest-Savanna	PsnNet_for_GPP_plus_DEM	20927	0.194	0.194	0.194	0.001	LE	-0.342	***
Day	Forest-Grass	ET_NPP	684	0.306	0.302	0.272	0.035	Albedo	0.538	***
Day	Forest-Grass	ET_NPP_plus_DEM	684	0.317	0.312	0.284	0.033	Albedo	0.568	***
Day	Forest-Grass	ET_PsnNet	684	0.310	0.306	0.272	0.039	Albedo	0.530	***
Day	Forest-Grass	ET_PsnNet_plus_DEM	684	0.320	0.315	0.284	0.037	Albedo	0.560	***

Day	Forest-Grass	ET_for_LE	684	0.271	0.266	0.272	-0.001	Albedo	0.500	***
Day	Forest-Grass	ET_for_LE_plus_DEM	684	0.283	0.277	0.284	-0.001	Albedo	0.533	***
Day	Forest-Grass	NPP_for_GPP	684	0.307	0.303	0.272	0.036	Albedo	0.538	***
Day	Forest-Grass	NPP_for_GPP_plus_DEM	684	0.318	0.312	0.284	0.034	Albedo	0.568	***
Day	Forest-Grass	Primary_LE_GPP	684	0.272	0.267	0.272	0.000	Albedo	0.501	***
Day	Forest-Grass	Primary_LE_GPP_plus_DEM	684	0.284	0.278	0.284	0.000	Albedo	0.534	***
Day	Forest-Grass	PsnNet_for_GPP	684	0.311	0.307	0.272	0.040	Albedo	0.530	***
Day	Forest-Grass	PsnNet_for_GPP_plus_DEM	684	0.321	0.316	0.284	0.038	Albedo	0.560	***
Day	Forest-Crop	ET_NPP	4825	0.256	0.255	0.257	-0.001	Albedo	0.481	***
Day	Forest-Crop	ET_NPP_plus_DEM	4825	0.306	0.305	0.306	0.000	Albedo	0.498	***
Day	Forest-Crop	ET_PsnNet	4825	0.258	0.258	0.257	0.001	Albedo	0.477	***
Day	Forest-Crop	ET_PsnNet_plus_DEM	4825	0.309	0.308	0.306	0.002	Albedo	0.493	***
Day	Forest-Crop	ET_for_LE	4825	0.256	0.255	0.257	-0.001	Albedo	0.481	***
Day	Forest-Crop	ET_for_LE_plus_DEM	4825	0.306	0.305	0.306	-0.001	Albedo	0.498	***
Day	Forest-Crop	NPP_for_GPP	4825	0.257	0.256	0.257	0.000	Albedo	0.481	***
Day	Forest-Crop	NPP_for_GPP_plus_DEM	4825	0.306	0.306	0.306	0.000	Albedo	0.498	***
Day	Forest-Crop	Primary_LE_GPP	4825	0.257	0.256	0.257	0.000	Albedo	0.482	***
Day	Forest-Crop	Primary_LE_GPP_plus_DEM	4825	0.306	0.305	0.306	0.000	Albedo	0.498	***
Day	Forest-Crop	PsnNet_for_GPP	4825	0.260	0.259	0.257	0.003	Albedo	0.477	***
Day	Forest-Crop	PsnNet_for_GPP_plus_DEM	4825	0.310	0.309	0.306	0.003	Albedo	0.493	***
Day	Shrub-Grass	ET_NPP	64	0.789	0.775	0.785	0.004	Albedo	0.785	***
Day	Shrub-Grass	ET_NPP_plus_DEM	64	0.821	0.806	0.808	0.013	LAI	-0.946	ns
Day	Shrub-Grass	ET_PsnNet	64	0.783	0.768	0.785	-0.002	Albedo	0.829	***
Day	Shrub-Grass	ET_PsnNet_plus_DEM	64	0.807	0.790	0.808	-0.001	LAI	-0.770	ns
Day	Shrub-Grass	ET_for_LE	64	0.783	0.769	0.785	-0.002	Albedo	0.819	***
Day	Shrub-Grass	ET_for_LE_plus_DEM	64	0.806	0.789	0.808	-0.002	LAI	-0.825	ns
Day	Shrub-Grass	NPP_for_GPP	64	0.791	0.777	0.785	0.006	Albedo	0.782	***

Day	Shrub-Grass	NPP_for_GPP_plus_DEM	64	0.823	0.808	0.808	0.015	LAI	-0.961	*
Day	Shrub-Grass	Primary_LE_GPP	64	0.785	0.770	0.785	0.000	Albedo	0.813	***
Day	Shrub-Grass	Primary_LE_GPP_plus_DEM	64	0.808	0.791	0.808	0.000	LAI	-0.866	ns
Day	Shrub-Grass	PsnNet_for_GPP	64	0.785	0.770	0.785	0.000	Albedo	0.823	***
Day	Shrub-Grass	PsnNet_for_GPP_plus_DEM	64	0.809	0.792	0.808	0.001	LAI	-0.803	ns
Day	Shrub-Crop	ET_NPP	2564	0.539	0.539	0.529	0.010	Albedo	0.364	***
Day	Shrub-Crop	ET_NPP_plus_DEM	2564	0.545	0.544	0.537	0.008	Albedo	0.390	***
Day	Shrub-Crop	ET_PsnNet	2564	0.530	0.529	0.529	0.000	LAI	-0.583	**
Day	Shrub-Crop	ET_PsnNet_plus_DEM	2564	0.540	0.539	0.537	0.002	LAI	-0.555	**
Day	Shrub-Crop	ET_for_LE	2564	0.529	0.529	0.529	0.000	LAI	-0.511	**
Day	Shrub-Crop	ET_for_LE_plus_DEM	2564	0.537	0.536	0.537	0.000	LAI	-0.466	**
Day	Shrub-Crop	NPP_for_GPP	2564	0.539	0.539	0.529	0.010	Albedo	0.365	***
Day	Shrub-Crop	NPP_for_GPP_plus_DEM	2564	0.545	0.545	0.537	0.008	Albedo	0.391	***
Day	Shrub-Crop	Primary_LE_GPP	2564	0.529	0.529	0.529	0.000	LAI	-0.494	**
Day	Shrub-Crop	Primary_LE_GPP_plus_DEM	2564	0.537	0.537	0.537	0.000	LAI	-0.442	**
Day	Shrub-Crop	PsnNet_for_GPP	2564	0.530	0.529	0.529	0.000	LAI	-0.568	**
Day	Shrub-Crop	PsnNet_for_GPP_plus_DEM	2564	0.539	0.539	0.537	0.002	LAI	-0.532	**
Day	Shrub-Urban	ET_NPP	74	0.415	0.381	0.463	-0.048	LAI	-0.655	*
Day	Shrub-Urban	ET_NPP_plus_DEM	74	0.433	0.391	0.476	-0.044	LAI	-0.690	*
Day	Shrub-Urban	ET_PsnNet	74	0.449	0.417	0.463	-0.014	LAI	-0.776	*
Day	Shrub-Urban	ET_PsnNet_plus_DEM	74	0.464	0.424	0.476	-0.012	LAI	-0.809	*
Day	Shrub-Urban	ET_for_LE	74	0.463	0.432	0.463	0.000	GPP	-0.941	***
Day	Shrub-Urban	ET_for_LE_plus_DEM	74	0.477	0.438	0.476	0.000	GPP	-0.966	***
Day	Shrub-Urban	NPP_for_GPP	74	0.415	0.381	0.463	-0.048	LAI	-0.659	*
Day	Shrub-Urban	NPP_for_GPP_plus_DEM	74	0.433	0.391	0.476	-0.044	LAI	-0.694	*
Day	Shrub-Urban	Primary_LE_GPP	74	0.463	0.432	0.463	0.000	GPP	-0.940	***

Day	Shrub-Urban	Primary_LE_GPP_plus_DEM	74	0.476	0.438	0.476	0.000	GPP	-0.964	***
Day	Shrub-Urban	PsnNet_for_GPP	74	0.449	0.417	0.463	-0.014	LAI	-0.779	*
Day	Shrub-Urban	PsnNet_for_GPP_plus_DEM	74	0.464	0.424	0.476	-0.013	LAI	-0.813	*
Day	Shrub-Barren	ET_NPP	53	0.274	0.214	0.205	0.070	ET	0.422	ns
Day	Shrub-Barren	ET_NPP_plus_DEM	53	0.327	0.256	0.225	0.102	NPP	-0.564	*
Day	Shrub-Barren	ET_PsnNet	53	0.248	0.186	0.205	0.044	ET	0.451	ns
Day	Shrub-Barren	ET_PsnNet_plus_DEM	53	0.280	0.204	0.225	0.055	ET	0.492	ns
Day	Shrub-Barren	ET_for_LE	53	0.204	0.138	0.205	-0.001	GPP	-0.411	ns
Day	Shrub-Barren	ET_for_LE_plus_DEM	53	0.225	0.142	0.225	-0.001	GPP	-0.550	ns
Day	Shrub-Barren	NPP_for_GPP	53	0.275	0.214	0.205	0.070	LE	0.424	ns
Day	Shrub-Barren	NPP_for_GPP_plus_DEM	53	0.328	0.256	0.225	0.102	NPP	-0.564	*
Day	Shrub-Barren	Primary_LE_GPP	53	0.205	0.138	0.205	0.000	GPP	-0.411	ns
Day	Shrub-Barren	Primary_LE_GPP_plus_DEM	53	0.225	0.143	0.225	0.000	GPP	-0.550	ns
Day	Shrub-Barren	PsnNet_for_GPP	53	0.249	0.186	0.205	0.044	LE	0.453	ns
Day	Shrub-Barren	PsnNet_for_GPP_plus_DEM	53	0.281	0.205	0.225	0.056	LE	0.494	ns
Day	Savanna-Grass	ET_NPP	1320	0.171	0.169	0.165	0.006	ET	-0.249	**
Day	Savanna-Grass	ET_NPP_plus_DEM	1320	0.173	0.170	0.168	0.005	ET	-0.262	***
Day	Savanna-Grass	ET_PsnNet	1320	0.171	0.168	0.165	0.005	ET	-0.262	***
Day	Savanna-Grass	ET_PsnNet_plus_DEM	1320	0.173	0.170	0.168	0.005	ET	-0.274	***
Day	Savanna-Grass	ET_for_LE	1320	0.165	0.162	0.165	0.000	ET	-0.281	***
Day	Savanna-Grass	ET_for_LE_plus_DEM	1320	0.167	0.164	0.168	0.000	ET	-0.285	***
Day	Savanna-Grass	NPP_for_GPP	1320	0.171	0.169	0.165	0.006	LE	-0.250	**
Day	Savanna-Grass	NPP_for_GPP_plus_DEM	1320	0.174	0.170	0.168	0.006	LE	-0.264	***
Day	Savanna-Grass	Primary_LE_GPP	1320	0.165	0.163	0.165	0.000	LE	-0.284	***
Day	Savanna-Grass	Primary_LE_GPP_plus_DEM	1320	0.168	0.165	0.168	0.000	LE	-0.288	***
Day	Savanna-Grass	PsnNet_for_GPP	1320	0.171	0.169	0.165	0.006	LE	-0.264	***

Day	Savanna-Grass	PsnNet_for_GPP_plus_DEM	1320	0.173	0.170	0.168	0.005	LE	-0.275	***
Day	Savanna-Crop	ET_NPP	4124	0.520	0.520	0.514	0.006	Albedo	0.450	***
Day	Savanna-Crop	ET_NPP_plus_DEM	4124	0.530	0.530	0.524	0.006	Albedo	0.443	***
Day	Savanna-Crop	ET_PsnNet	4124	0.519	0.519	0.514	0.005	Albedo	0.441	***
Day	Savanna-Crop	ET_PsnNet_plus_DEM	4124	0.531	0.530	0.524	0.006	Albedo	0.434	***
Day	Savanna-Crop	ET_for_LE	4124	0.514	0.514	0.514	0.000	Albedo	0.440	***
Day	Savanna-Crop	ET_for_LE_plus_DEM	4124	0.525	0.524	0.524	0.000	Albedo	0.434	***
Day	Savanna-Crop	NPP_for_GPP	4124	0.520	0.520	0.514	0.006	Albedo	0.450	***
Day	Savanna-Crop	NPP_for_GPP_plus_DEM	4124	0.530	0.530	0.524	0.006	Albedo	0.442	***
Day	Savanna-Crop	Primary_LE_GPP	4124	0.514	0.514	0.514	0.000	Albedo	0.440	***
Day	Savanna-Crop	Primary_LE_GPP_plus_DEM	4124	0.524	0.524	0.524	0.000	Albedo	0.433	***
Day	Savanna-Crop	PsnNet_for_GPP	4124	0.519	0.519	0.514	0.005	Albedo	0.440	***
Day	Savanna-Crop	PsnNet_for_GPP_plus_DEM	4124	0.531	0.530	0.524	0.006	Albedo	0.433	***
Day	Savanna-Urban	ET_NPP	141	0.271	0.250	0.265	0.006	ET	-0.441	*
Day	Savanna-Urban	ET_NPP_plus_DEM	141	0.277	0.250	0.275	0.002	ET	-0.448	*
Day	Savanna-Urban	ET_PsnNet	141	0.266	0.245	0.265	0.002	ET	-0.414	*
Day	Savanna-Urban	ET_PsnNet_plus_DEM	141	0.274	0.247	0.275	-0.001	ET	-0.421	*
Day	Savanna-Urban	ET_for_LE	141	0.263	0.241	0.265	-0.002	ET	-0.379	ns
Day	Savanna-Urban	ET_for_LE_plus_DEM	141	0.272	0.246	0.275	-0.002	Albedo	0.386	***
Day	Savanna-Urban	NPP_for_GPP	141	0.274	0.253	0.265	0.009	LE	-0.464	**
Day	Savanna-Urban	NPP_for_GPP_plus_DEM	141	0.280	0.253	0.275	0.005	LE	-0.472	**
Day	Savanna-Urban	Primary_LE_GPP	141	0.265	0.243	0.265	0.000	LE	-0.410	ns
Day	Savanna-Urban	Primary_LE_GPP_plus_DEM	141	0.275	0.248	0.275	0.000	LE	-0.410	ns
Day	Savanna-Urban	PsnNet_for_GPP	141	0.269	0.248	0.265	0.004	LE	-0.440	*
Day	Savanna-Urban	PsnNet_for_GPP_plus_DEM	141	0.276	0.250	0.275	0.002	LE	-0.447	*
Day	Grass-Crop	ET_NPP	13616	0.215	0.215	0.215	-0.001	LAI	-0.247	***
Day	Grass-Crop	ET_NPP_plus_DEM	13616	0.253	0.253	0.254	0.000	LAI	-0.348	***

Day	Grass-Crop	ET_PsnNet	13616	0.221	0.221	0.215	0.006	LAI	-0.242	***
Day	Grass-Crop	ET_PsnNet_plus_DEM	13616	0.257	0.257	0.254	0.004	LAI	-0.349	***
Day	Grass-Crop	ET_for_LE	13616	0.216	0.216	0.215	0.001	LAI	-0.283	***
Day	Grass-Crop	ET_for_LE_plus_DEM	13616	0.254	0.253	0.254	0.000	LAI	-0.372	***
Day	Grass-Crop	NPP_for_GPP	13616	0.214	0.214	0.215	-0.001	LAI	-0.266	***
Day	Grass-Crop	NPP_for_GPP_plus_DEM	13616	0.254	0.253	0.254	0.000	LAI	-0.369	***
Day	Grass-Crop	Primary_LE_GPP	13616	0.215	0.215	0.215	0.000	LAI	-0.299	***
Day	Grass-Crop	Primary_LE_GPP_plus_DEM	13616	0.254	0.253	0.254	0.000	LAI	-0.389	***
Day	Grass-Crop	PsnNet_for_GPP	13616	0.220	0.220	0.215	0.005	LAI	-0.260	***
Day	Grass-Crop	PsnNet_for_GPP_plus_DEM	13616	0.257	0.257	0.254	0.004	LAI	-0.369	***
Day	Grass-Urban	ET_NPP	417	0.467	0.461	0.459	0.008	Albedo	0.436	***
Day	Grass-Urban	ET_NPP_plus_DEM	417	0.467	0.460	0.459	0.007	Albedo	0.436	***
Day	Grass-Urban	ET_PsnNet	422	0.470	0.465	0.459	0.011	Albedo	0.436	***
Day	Grass-Urban	ET_PsnNet_plus_DEM	422	0.470	0.464	0.459	0.011	Albedo	0.436	***
Day	Grass-Urban	ET_for_LE	422	0.460	0.455	0.459	0.001	Albedo	0.438	***
Day	Grass-Urban	ET_for_LE_plus_DEM	422	0.460	0.454	0.459	0.001	Albedo	0.437	***
Day	Grass-Urban	NPP_for_GPP	417	0.465	0.460	0.459	0.006	Albedo	0.437	***
Day	Grass-Urban	NPP_for_GPP_plus_DEM	417	0.466	0.459	0.459	0.006	Albedo	0.437	***
Day	Grass-Urban	Primary_LE_GPP	422	0.459	0.454	0.459	0.000	Albedo	0.439	***
Day	Grass-Urban	Primary_LE_GPP_plus_DEM	422	0.459	0.453	0.459	0.000	Albedo	0.438	***
Day	Grass-Urban	PsnNet_for_GPP	422	0.469	0.464	0.459	0.010	Albedo	0.437	***
Day	Grass-Urban	PsnNet_for_GPP_plus_DEM	422	0.469	0.463	0.459	0.010	Albedo	0.437	***
Day	Grass-Barren	ET_NPP	650	0.286	0.281	0.279	0.007	LAI	-0.503	***
Day	Grass-Barren	ET_NPP_plus_DEM	650	0.294	0.288	0.286	0.007	LAI	-0.507	***
Day	Grass-Barren	ET_PsnNet	650	0.309	0.304	0.279	0.029	LAI	-0.551	***
Day	Grass-Barren	ET_PsnNet_plus_DEM	650	0.315	0.310	0.286	0.029	LAI	-0.551	***
Day	Grass-Barren	ET_for_LE	650	0.279	0.275	0.279	0.000	LAI	-0.466	***

Day	Grass-Barren	ET_for_LE_plus_DEM	650	0.286	0.281	0.286	0.000	LAI	-0.467	***
Day	Grass-Barren	NPP_for_GPP	650	0.286	0.281	0.279	0.006	LAI	-0.503	***
Day	Grass-Barren	NPP_for_GPP_plus_DEM	650	0.293	0.288	0.286	0.007	LAI	-0.508	***
Day	Grass-Barren	Primary_LE_GPP	650	0.279	0.275	0.279	0.000	LAI	-0.467	***
Day	Grass-Barren	Primary_LE_GPP_plus_DEM	650	0.286	0.280	0.286	0.000	LAI	-0.468	***
Day	Grass-Barren	PsnNet_for_GPP	650	0.309	0.304	0.279	0.029	LAI	-0.551	***
Day	Grass-Barren	PsnNet_for_GPP_plus_DEM	650	0.315	0.310	0.286	0.029	LAI	-0.551	***
Day	Crop-Urban	ET_NPP	42240	0.262	0.262	0.266	-0.004	ET	-0.457	***
Day	Crop-Urban	ET_NPP_plus_DEM	42240	0.264	0.264	0.268	-0.004	ET	-0.444	***
Day	Crop-Urban	ET_PsnNet	42243	0.261	0.261	0.266	-0.004	ET	-0.448	***
Day	Crop-Urban	ET_PsnNet_plus_DEM	42243	0.264	0.264	0.268	-0.004	ET	-0.435	***
Day	Crop-Urban	ET_for_LE	42243	0.268	0.268	0.266	0.003	ET	-0.423	***
Day	Crop-Urban	ET_for_LE_plus_DEM	42243	0.270	0.270	0.268	0.002	ET	-0.411	***
Day	Crop-Urban	NPP_for_GPP	42240	0.259	0.259	0.266	-0.007	LE	-0.429	***
Day	Crop-Urban	NPP_for_GPP_plus_DEM	42240	0.261	0.261	0.268	-0.006	LE	-0.416	***
Day	Crop-Urban	Primary_LE_GPP	42243	0.266	0.266	0.266	0.000	LE	-0.395	***
Day	Crop-Urban	Primary_LE_GPP_plus_DEM	42243	0.268	0.268	0.268	0.000	LE	-0.383	***
Day	Crop-Urban	PsnNet_for_GPP	42243	0.259	0.259	0.266	-0.007	LE	-0.421	***
Day	Crop-Urban	PsnNet_for_GPP_plus_DEM	42243	0.261	0.261	0.268	-0.007	LE	-0.407	***
Day	Crop-Barren	ET_NPP	100	0.254	0.222	0.281	-0.028	Albedo	0.513	***
Day	Crop-Barren	ET_NPP_plus_DEM	100	0.273	0.234	0.308	-0.035	Albedo	0.508	***
Day	Crop-Barren	ET_PsnNet	102	0.283	0.253	0.281	0.001	Albedo	0.526	***
Day	Crop-Barren	ET_PsnNet_plus_DEM	102	0.305	0.269	0.308	-0.003	Albedo	0.523	***
Day	Crop-Barren	ET_for_LE	102	0.282	0.252	0.281	0.000	Albedo	0.556	***
Day	Crop-Barren	ET_for_LE_plus_DEM	102	0.308	0.272	0.308	0.000	Albedo	0.559	***
Day	Crop-Barren	NPP_for_GPP	100	0.254	0.222	0.281	-0.028	Albedo	0.512	***
Day	Crop-Barren	NPP_for_GPP_plus_DEM	100	0.273	0.234	0.308	-0.035	Albedo	0.507	***

Day	Crop-Barren	Primary_LE_GPP	102	0.281	0.252	0.281	0.000	Albedo	0.555	***
Day	Crop-Barren	Primary_LE_GPP_plus_DEM	102	0.308	0.272	0.308	0.000	Albedo	0.557	***
Day	Crop-Barren	PsnNet_for_GPP	102	0.283	0.253	0.281	0.002	Albedo	0.525	***
Day	Crop-Barren	PsnNet_for_GPP_plus_DEM	102	0.306	0.269	0.308	-0.002	Albedo	0.522	***
Day	Urban-Barren	ET_NPP	106	0.772	0.763	0.772	0.000	ET	0.607	**
Day	Urban-Barren	ET_NPP_plus_DEM	106	0.774	0.763	0.773	0.001	ET	0.627	**
Day	Urban-Barren	ET_PsnNet	106	0.772	0.763	0.772	0.000	Albedo	0.585	***
Day	Urban-Barren	ET_PsnNet_plus_DEM	106	0.773	0.762	0.773	0.000	Albedo	0.592	***
Day	Urban-Barren	ET_for_LE	106	0.773	0.763	0.772	0.001	Albedo	0.586	***
Day	Urban-Barren	ET_for_LE_plus_DEM	106	0.774	0.763	0.773	0.001	Albedo	0.593	***
Day	Urban-Barren	NPP_for_GPP	106	0.772	0.763	0.772	0.000	LE	0.613	**
Day	Urban-Barren	NPP_for_GPP_plus_DEM	106	0.774	0.762	0.773	0.000	LE	0.633	**
Day	Urban-Barren	Primary_LE_GPP	106	0.772	0.763	0.772	0.000	Albedo	0.587	***
Day	Urban-Barren	Primary_LE_GPP_plus_DEM	106	0.773	0.762	0.773	0.000	Albedo	0.594	***
Day	Urban-Barren	PsnNet_for_GPP	106	0.771	0.762	0.772	-0.001	Albedo	0.586	***
Day	Urban-Barren	PsnNet_for_GPP_plus_DEM	106	0.773	0.762	0.773	0.000	Albedo	0.593	***
Night	Forest-Savanna	ET_NPP	20927	0.012	0.012	0.012	0.000	ET	0.091	***
Night	Forest-Savanna	ET_NPP_plus_DEM	20927	0.015	0.015	0.015	0.000	ET	0.085	***
Night	Forest-Savanna	ET_PsnNet	20927	0.012	0.012	0.012	0.000	ET	0.091	***
Night	Forest-Savanna	ET_PsnNet_plus_DEM	20927	0.015	0.015	0.015	0.000	ET	0.085	***
Night	Forest-Savanna	ET_for_LE	20927	0.012	0.011	0.012	0.000	ET	0.086	***
Night	Forest-Savanna	ET_for_LE_plus_DEM	20927	0.015	0.015	0.015	0.000	ET	0.076	***
Night	Forest-Savanna	NPP_for_GPP	20927	0.012	0.012	0.012	0.000	LE	0.094	***

Night	Forest-Savanna	NPP_for_GPP_plus_DEM	20927	0.016	0.015	0.015	0.000	LE	0.088	***
Night	Forest-Savanna	Primary_LE_GPP	20927	0.012	0.012	0.012	0.000	LE	0.090	***
Night	Forest-Savanna	Primary_LE_GPP_plus_DEM	20927	0.015	0.015	0.015	0.000	LE	0.080	***
Night	Forest-Savanna	PsnNet_for_GPP	20927	0.012	0.012	0.012	0.000	LE	0.095	***
Night	Forest-Savanna	PsnNet_for_GPP_plus_DEM	20927	0.015	0.015	0.015	0.000	LE	0.089	***
Night	Forest-Grass	ET_NPP	684	0.041	0.036	0.041	0.000	Albedo	-0.202	***
Night	Forest-Grass	ET_NPP_plus_DEM	684	0.059	0.052	0.059	-0.001	Albedo	-0.242	***
Night	Forest-Grass	ET_PsnNet	684	0.046	0.040	0.041	0.004	Albedo	-0.202	***
Night	Forest-Grass	ET_PsnNet_plus_DEM	684	0.062	0.056	0.059	0.003	Albedo	-0.241	***
Night	Forest-Grass	ET_for_LE	684	0.041	0.036	0.041	0.000	Albedo	-0.190	***
Night	Forest-Grass	ET_for_LE_plus_DEM	684	0.059	0.052	0.059	0.000	Albedo	-0.230	***
Night	Forest-Grass	NPP_for_GPP	684	0.041	0.036	0.041	0.000	Albedo	-0.202	***
Night	Forest-Grass	NPP_for_GPP_plus_DEM	684	0.059	0.052	0.059	-0.001	Albedo	-0.242	***
Night	Forest-Grass	Primary_LE_GPP	684	0.041	0.036	0.041	0.000	Albedo	-0.190	***
Night	Forest-Grass	Primary_LE_GPP_plus_DEM	684	0.059	0.052	0.059	0.000	Albedo	-0.230	***
Night	Forest-Grass	PsnNet_for_GPP	684	0.046	0.040	0.041	0.004	Albedo	-0.202	***
Night	Forest-Grass	PsnNet_for_GPP_plus_DEM	684	0.062	0.056	0.059	0.003	Albedo	-0.241	***
Night	Forest-Crop	ET_NPP	4825	0.083	0.082	0.088	-0.006	ET	-0.301	***
Night	Forest-Crop	ET_NPP_plus_DEM	4825	0.219	0.218	0.222	-0.003	ET	-0.422	***
Night	Forest-Crop	ET_PsnNet	4825	0.084	0.083	0.088	-0.004	ET	-0.337	***
Night	Forest-Crop	ET_PsnNet_plus_DEM	4825	0.219	0.218	0.222	-0.004	ET	-0.431	***
Night	Forest-Crop	ET_for_LE	4825	0.089	0.089	0.088	0.001	ET	-0.446	***
Night	Forest-Crop	ET_for_LE_plus_DEM	4825	0.223	0.222	0.222	0.001	ET	-0.531	***
Night	Forest-Crop	NPP_for_GPP	4825	0.082	0.081	0.088	-0.006	LE	-0.297	***

Night	Forest-Crop	NPP_for_GPP_plus_DEM	4825	0.219	0.218	0.222	-0.004	LE	-0.419	***
Night	Forest-Crop	Primary_LE_GPP	4825	0.088	0.087	0.088	0.000	LE	-0.438	***
Night	Forest-Crop	Primary_LE_GPP_plus_DEM	4825	0.222	0.221	0.222	0.000	LE	-0.526	***
Night	Forest-Crop	PsnNet_for_GPP	4825	0.083	0.082	0.088	-0.005	LE	-0.331	***
Night	Forest-Crop	PsnNet_for_GPP_plus_DEM	4825	0.218	0.217	0.222	-0.004	LE	-0.428	***
Night	Shrub-Grass	ET_NPP	64	0.503	0.470	0.512	-0.008	Albedo	-0.533	***
Night	Shrub-Grass	ET_NPP_plus_DEM	64	0.669	0.641	0.683	-0.014	Albedo	-1.185	***
Night	Shrub-Grass	ET_PsnNet	64	0.518	0.485	0.512	0.006	LAI	0.516	ns
Night	Shrub-Grass	ET_PsnNet_plus_DEM	64	0.677	0.650	0.683	-0.006	Albedo	-1.094	***
Night	Shrub-Grass	ET_for_LE	64	0.511	0.478	0.512	-0.001	LAI	0.852	ns
Night	Shrub-Grass	ET_for_LE_plus_DEM	64	0.683	0.656	0.683	0.000	Albedo	-1.070	***
Night	Shrub-Grass	NPP_for_GPP	64	0.504	0.470	0.512	-0.008	Albedo	-0.532	***
Night	Shrub-Grass	NPP_for_GPP_plus_DEM	64	0.669	0.641	0.683	-0.014	Albedo	-1.183	***
Night	Shrub-Grass	Primary_LE_GPP	64	0.512	0.479	0.512	0.000	LAI	0.866	ns
Night	Shrub-Grass	Primary_LE_GPP_plus_DEM	64	0.683	0.656	0.683	0.000	Albedo	-1.068	***
Night	Shrub-Grass	PsnNet_for_GPP	64	0.518	0.486	0.512	0.006	LE	-0.518	ns
Night	Shrub-Grass	PsnNet_for_GPP_plus_DEM	64	0.677	0.650	0.683	-0.006	Albedo	-1.092	***
Night	Shrub-Crop	ET_NPP	2564	0.414	0.413	0.398	0.015	Albedo	-0.758	***
Night	Shrub-Crop	ET_NPP_plus_DEM	2564	0.429	0.428	0.410	0.019	Albedo	-0.717	***
Night	Shrub-Crop	ET_PsnNet	2564	0.361	0.360	0.398	-0.037	Albedo	-0.701	***
Night	Shrub-Crop	ET_PsnNet_plus_DEM	2564	0.370	0.369	0.410	-0.040	Albedo	-0.668	***
Night	Shrub-Crop	ET_for_LE	2564	0.398	0.397	0.398	0.000	Albedo	-0.789	***
Night	Shrub-Crop	ET_for_LE_plus_DEM	2564	0.410	0.409	0.410	0.000	Albedo	-0.754	***
Night	Shrub-Crop	NPP_for_GPP	2564	0.414	0.413	0.398	0.016	Albedo	-0.758	***
Night	Shrub-Crop	NPP_for_GPP_plus_DEM	2564	0.429	0.428	0.410	0.019	Albedo	-0.717	***
Night	Shrub-Crop	Primary_LE_GPP	2564	0.398	0.397	0.398	0.000	Albedo	-0.789	***

Night	Shrub-Crop	Primary_LE_GPP_plus_DEM	2564	0.410	0.409	0.410	0.000	Albedo	-0.754	***
Night	Shrub-Crop	PsnNet_for_GPP	2564	0.362	0.361	0.398	-0.037	Albedo	-0.702	***
Night	Shrub-Crop	PsnNet_for_GPP_plus_DEM	2564	0.370	0.369	0.410	-0.040	Albedo	-0.669	***
Night	Shrub-Urban	ET_NPP	74	0.297	0.256	0.280	0.017	Albedo	-0.491	***
Night	Shrub-Urban	ET_NPP_plus_DEM	74	0.298	0.247	0.283	0.015	Albedo	-0.468	***
Night	Shrub-Urban	ET_PsnNet	74	0.278	0.236	0.280	-0.002	Albedo	-0.506	***
Night	Shrub-Urban	ET_PsnNet_plus_DEM	74	0.281	0.228	0.283	-0.002	Albedo	-0.474	**
Night	Shrub-Urban	ET_for_LE	74	0.280	0.238	0.280	0.000	Albedo	-0.504	***
Night	Shrub-Urban	ET_for_LE_plus_DEM	74	0.283	0.230	0.283	0.000	Albedo	-0.472	**
Night	Shrub-Urban	NPP_for_GPP	74	0.296	0.256	0.280	0.017	Albedo	-0.491	***
Night	Shrub-Urban	NPP_for_GPP_plus_DEM	74	0.298	0.246	0.283	0.015	Albedo	-0.468	***
Night	Shrub-Urban	Primary_LE_GPP	74	0.280	0.238	0.280	0.000	Albedo	-0.504	***
Night	Shrub-Urban	Primary_LE_GPP_plus_DEM	74	0.283	0.230	0.283	0.000	Albedo	-0.472	**
Night	Shrub-Urban	PsnNet_for_GPP	74	0.278	0.236	0.280	-0.002	Albedo	-0.506	***
Night	Shrub-Urban	PsnNet_for_GPP_plus_DEM	74	0.281	0.228	0.283	-0.002	Albedo	-0.474	**
Night	Shrub-Barren	ET_NPP	53	0.303	0.245	0.369	-0.066	NPP	0.451	*
Night	Shrub-Barren	ET_NPP_plus_DEM	53	0.306	0.232	0.370	-0.064	NPP	0.415	ns
Night	Shrub-Barren	ET_PsnNet	53	0.327	0.271	0.369	-0.042	PsnNet	0.504	*
Night	Shrub-Barren	ET_PsnNet_plus_DEM	53	0.331	0.260	0.370	-0.039	PsnNet	0.467	ns
Night	Shrub-Barren	ET_for_LE	53	0.370	0.317	0.369	0.001	GPP	0.875	**
Night	Shrub-Barren	ET_for_LE_plus_DEM	53	0.371	0.304	0.370	0.001	GPP	0.846	*
Night	Shrub-Barren	NPP_for_GPP	53	0.302	0.244	0.369	-0.067	NPP	0.451	*
Night	Shrub-Barren	NPP_for_GPP_plus_DEM	53	0.305	0.231	0.370	-0.065	NPP	0.415	ns
Night	Shrub-Barren	Primary_LE_GPP	53	0.369	0.316	0.369	0.000	GPP	0.874	**
Night	Shrub-Barren	Primary_LE_GPP_plus_DEM	53	0.370	0.303	0.370	0.000	GPP	0.845	*
Night	Shrub-Barren	PsnNet_for_GPP	53	0.326	0.270	0.369	-0.043	PsnNet	0.503	*

Night	Shrub-Barren	PsnNet_for_GPP_plus_DEM	53	0.330	0.259	0.370	-0.040	PsnNet	0.466	ns
Night	Savanna-Grass	ET_NPP	1320	0.250	0.248	0.256	-0.006	Albedo	-0.411	***
Night	Savanna-Grass	ET_NPP_plus_DEM	1320	0.254	0.251	0.258	-0.004	Albedo	-0.410	***
Night	Savanna-Grass	ET_PsnNet	1320	0.253	0.250	0.256	-0.003	Albedo	-0.405	***
Night	Savanna-Grass	ET_PsnNet_plus_DEM	1320	0.256	0.253	0.258	-0.002	Albedo	-0.404	***
Night	Savanna-Grass	ET_for_LE	1320	0.256	0.253	0.256	0.000	Albedo	-0.397	***
Night	Savanna-Grass	ET_for_LE_plus_DEM	1320	0.258	0.255	0.258	0.000	Albedo	-0.397	***
Night	Savanna-Grass	NPP_for_GPP	1320	0.250	0.248	0.256	-0.005	Albedo	-0.411	***
Night	Savanna-Grass	NPP_for_GPP_plus_DEM	1320	0.254	0.251	0.258	-0.004	Albedo	-0.410	***
Night	Savanna-Grass	Primary_LE_GPP	1320	0.256	0.253	0.256	0.000	Albedo	-0.397	***
Night	Savanna-Grass	Primary_LE_GPP_plus_DEM	1320	0.258	0.255	0.258	0.000	Albedo	-0.397	***
Night	Savanna-Grass	PsnNet_for_GPP	1320	0.253	0.250	0.256	-0.003	Albedo	-0.405	***
Night	Savanna-Grass	PsnNet_for_GPP_plus_DEM	1320	0.256	0.253	0.258	-0.002	Albedo	-0.404	***
Night	Savanna-Crop	ET_NPP	4124	0.082	0.081	0.087	-0.005	ET	-0.265	***
Night	Savanna-Crop	ET_NPP_plus_DEM	4124	0.133	0.132	0.136	-0.004	ET	-0.325	***
Night	Savanna-Crop	ET_PsnNet	4124	0.081	0.080	0.087	-0.006	ET	-0.280	***
Night	Savanna-Crop	ET_PsnNet_plus_DEM	4124	0.131	0.130	0.136	-0.005	ET	-0.291	***
Night	Savanna-Crop	ET_for_LE	4124	0.087	0.086	0.087	0.000	ET	-0.529	***
Night	Savanna-Crop	ET_for_LE_plus_DEM	4124	0.136	0.135	0.136	0.000	ET	-0.548	***
Night	Savanna-Crop	NPP_for_GPP	4124	0.082	0.081	0.087	-0.005	LE	-0.266	***
Night	Savanna-Crop	NPP_for_GPP_plus_DEM	4124	0.133	0.132	0.136	-0.004	LE	-0.327	***
Night	Savanna-Crop	Primary_LE_GPP	4124	0.087	0.086	0.087	0.000	LE	-0.532	***
Night	Savanna-Crop	Primary_LE_GPP_plus_DEM	4124	0.136	0.135	0.136	0.000	LE	-0.555	***
Night	Savanna-Crop	PsnNet_for_GPP	4124	0.081	0.080	0.087	-0.006	LE	-0.281	***
Night	Savanna-Crop	PsnNet_for_GPP_plus_DEM	4124	0.131	0.130	0.136	-0.005	LE	-0.293	***
Night	Savanna-Urban	ET_NPP	141	0.330	0.310	0.351	-0.021	LAI	-0.443	**
Night	Savanna-Urban	ET_NPP_plus_DEM	141	0.330	0.305	0.351	-0.021	Albedo	-0.446	***

Night	Savanna-Urban	ET_PsnNet	141	0.375	0.357	0.351	0.024	PsnNet	0.441	***
Night	Savanna-Urban	ET_PsnNet_plus_DEM	141	0.376	0.353	0.351	0.025	PsnNet	0.459	***
Night	Savanna-Urban	ET_for_LE	141	0.352	0.333	0.351	0.001	GPP	0.717	***
Night	Savanna-Urban	ET_for_LE_plus_DEM	141	0.352	0.328	0.351	0.001	GPP	0.717	***
Night	Savanna-Urban	NPP_for_GPP	141	0.329	0.309	0.351	-0.022	LAI	-0.448	**
Night	Savanna-Urban	NPP_for_GPP_plus_DEM	141	0.329	0.305	0.351	-0.021	LAI	-0.448	**
Night	Savanna-Urban	Primary_LE_GPP	141	0.351	0.332	0.351	0.000	GPP	0.712	***
Night	Savanna-Urban	Primary_LE_GPP_plus_DEM	141	0.351	0.327	0.351	0.000	GPP	0.712	***
Night	Savanna-Urban	PsnNet_for_GPP	141	0.375	0.357	0.351	0.024	PsnNet	0.444	***
Night	Savanna-Urban	PsnNet_for_GPP_plus_DEM	141	0.376	0.353	0.351	0.025	PsnNet	0.462	***
Night	Grass-Crop	ET_NPP	13616	0.091	0.090	0.092	-0.001	ET	-0.641	***
Night	Grass-Crop	ET_NPP_plus_DEM	13616	0.206	0.206	0.204	0.002	ET	-0.468	***
Night	Grass-Crop	ET_PsnNet	13616	0.095	0.095	0.092	0.003	ET	-0.586	***
Night	Grass-Crop	ET_PsnNet_plus_DEM	13616	0.212	0.212	0.204	0.008	ET	-0.399	***
Night	Grass-Crop	ET_for_LE	13616	0.090	0.090	0.092	-0.002	ET	-0.658	***
Night	Grass-Crop	ET_for_LE_plus_DEM	13616	0.203	0.203	0.204	-0.001	ET	-0.457	***
Night	Grass-Crop	NPP_for_GPP	13616	0.092	0.092	0.092	0.000	LE	-0.654	***
Night	Grass-Crop	NPP_for_GPP_plus_DEM	13616	0.207	0.207	0.204	0.003	LE	-0.480	***
Night	Grass-Crop	Primary_LE_GPP	13616	0.092	0.092	0.092	0.000	LE	-0.672	***
Night	Grass-Crop	Primary_LE_GPP_plus_DEM	13616	0.204	0.204	0.204	0.000	LE	-0.471	***
Night	Grass-Crop	PsnNet_for_GPP	13616	0.096	0.096	0.092	0.005	LE	-0.600	***
Night	Grass-Crop	PsnNet_for_GPP_plus_DEM	13616	0.213	0.213	0.204	0.009	LE	-0.410	***
Night	Grass-Urban	ET_NPP	417	0.146	0.137	0.135	0.011	LAI	-0.184	ns
Night	Grass-Urban	ET_NPP_plus_DEM	417	0.163	0.153	0.149	0.014	LAI	-0.175	ns
Night	Grass-Urban	ET_PsnNet	422	0.143	0.135	0.135	0.009	PsnNet	-0.178	ns
Night	Grass-Urban	ET_PsnNet_plus_DEM	422	0.163	0.153	0.149	0.013	PsnNet	-0.254	*
Night	Grass-Urban	ET_for_LE	422	0.135	0.126	0.135	0.000	LAI	-0.171	ns

Night	Grass-Urban	ET_for_LE_plus_DEM	422	0.149	0.139	0.149	0.000	GPP	-0.237	ns
Night	Grass-Urban	NPP_for_GPP	417	0.146	0.138	0.135	0.011	LAI	-0.178	ns
Night	Grass-Urban	NPP_for_GPP_plus_DEM	417	0.164	0.154	0.149	0.014	LAI	-0.168	ns
Night	Grass-Urban	Primary_LE_GPP	422	0.135	0.126	0.135	0.000	LAI	-0.166	ns
Night	Grass-Urban	Primary_LE_GPP_plus_DEM	422	0.149	0.139	0.149	0.000	GPP	-0.233	ns
Night	Grass-Urban	PsnNet_for_GPP	422	0.144	0.135	0.135	0.009	PsnNet	-0.176	ns
Night	Grass-Urban	PsnNet_for_GPP_plus_DEM	422	0.163	0.153	0.149	0.013	PsnNet	-0.252	*
Night	Grass-Barren	ET_NPP	650	0.260	0.255	0.273	-0.013	Albedo	-0.504	***
Night	Grass-Barren	ET_NPP_plus_DEM	650	0.266	0.261	0.279	-0.013	Albedo	-0.491	***
Night	Grass-Barren	ET_PsnNet	650	0.292	0.288	0.273	0.019	Albedo	-0.442	***
Night	Grass-Barren	ET_PsnNet_plus_DEM	650	0.298	0.292	0.279	0.019	Albedo	-0.429	***
Night	Grass-Barren	ET_for_LE	650	0.273	0.269	0.273	0.000	Albedo	-0.477	***
Night	Grass-Barren	ET_for_LE_plus_DEM	650	0.279	0.274	0.279	0.000	Albedo	-0.463	***
Night	Grass-Barren	NPP_for_GPP	650	0.260	0.255	0.273	-0.014	Albedo	-0.504	***
Night	Grass-Barren	NPP_for_GPP_plus_DEM	650	0.266	0.260	0.279	-0.013	Albedo	-0.491	***
Night	Grass-Barren	Primary_LE_GPP	650	0.273	0.269	0.273	0.000	Albedo	-0.477	***
Night	Grass-Barren	Primary_LE_GPP_plus_DEM	650	0.279	0.274	0.279	0.000	Albedo	-0.463	***
Night	Grass-Barren	PsnNet_for_GPP	650	0.292	0.288	0.273	0.019	Albedo	-0.442	***
Night	Grass-Barren	PsnNet_for_GPP_plus_DEM	650	0.298	0.292	0.279	0.019	Albedo	-0.429	***
Night	Crop-Urban	ET_NPP	42240	0.092	0.092	0.090	0.003	LAI	-0.416	***
Night	Crop-Urban	ET_NPP_plus_DEM	42240	0.128	0.128	0.125	0.003	LAI	-0.465	***
Night	Crop-Urban	ET_PsnNet	42243	0.090	0.090	0.090	0.001	LAI	-0.441	***
Night	Crop-Urban	ET_PsnNet_plus_DEM	42243	0.126	0.126	0.125	0.001	LAI	-0.491	***
Night	Crop-Urban	ET_for_LE	42243	0.090	0.090	0.090	0.000	LAI	-0.427	***
Night	Crop-Urban	ET_for_LE_plus_DEM	42243	0.126	0.125	0.125	0.000	LAI	-0.485	***
Night	Crop-Urban	NPP_for_GPP	42240	0.092	0.092	0.090	0.002	LAI	-0.409	***
Night	Crop-Urban	NPP_for_GPP_plus_DEM	42240	0.127	0.127	0.125	0.002	LAI	-0.458	***

Night	Crop-Urban	Primary_LE_GPP	42243	0.090	0.090	0.090	0.000	LAI	-0.421	***
Night	Crop-Urban	Primary_LE_GPP_plus_DEM	42243	0.125	0.125	0.125	0.000	LAI	-0.479	***
Night	Crop-Urban	PsnNet_for_GPP	42243	0.090	0.090	0.090	0.000	LAI	-0.435	***
Night	Crop-Urban	PsnNet_for_GPP_plus_DEM	42243	0.125	0.125	0.125	0.000	LAI	-0.485	***
Night	Crop-Barren	ET_NPP	100	0.405	0.380	0.391	0.014	Albedo	-0.665	***
Night	Crop-Barren	ET_NPP_plus_DEM	100	0.425	0.394	0.405	0.020	Albedo	-0.670	***
Night	Crop-Barren	ET_PsnNet	102	0.397	0.373	0.391	0.006	Albedo	-0.649	***
Night	Crop-Barren	ET_PsnNet_plus_DEM	102	0.412	0.381	0.405	0.007	Albedo	-0.651	***
Night	Crop-Barren	ET_for_LE	102	0.392	0.367	0.391	0.001	Albedo	-0.667	***
Night	Crop-Barren	ET_for_LE_plus_DEM	102	0.405	0.374	0.405	0.001	Albedo	-0.665	***
Night	Crop-Barren	NPP_for_GPP	100	0.404	0.379	0.391	0.013	Albedo	-0.665	***
Night	Crop-Barren	NPP_for_GPP_plus_DEM	100	0.424	0.393	0.405	0.019	Albedo	-0.671	***
Night	Crop-Barren	Primary_LE_GPP	102	0.391	0.366	0.391	0.000	Albedo	-0.668	***
Night	Crop-Barren	Primary_LE_GPP_plus_DEM	102	0.405	0.374	0.405	0.000	Albedo	-0.667	***
Night	Crop-Barren	PsnNet_for_GPP	102	0.397	0.372	0.391	0.006	Albedo	-0.650	***
Night	Crop-Barren	PsnNet_for_GPP_plus_DEM	102	0.411	0.381	0.405	0.007	Albedo	-0.653	***
Night	Urban-Barren	ET_NPP	106	0.738	0.727	0.763	-0.025	ET	-0.945	**
Night	Urban-Barren	ET_NPP_plus_DEM	106	0.738	0.725	0.764	-0.026	ET	-0.957	***
Night	Urban-Barren	ET_PsnNet	106	0.758	0.748	0.763	-0.005	LAI	1.143	***
Night	Urban-Barren	ET_PsnNet_plus_DEM	106	0.760	0.748	0.764	-0.005	LAI	1.140	***
Night	Urban-Barren	ET_for_LE	106	0.763	0.754	0.763	0.000	LAI	1.961	***
Night	Urban-Barren	ET_for_LE_plus_DEM	106	0.764	0.753	0.764	0.000	LAI	1.952	***
Night	Urban-Barren	NPP_for_GPP	106	0.738	0.727	0.763	-0.025	LE	-0.960	**
Night	Urban-Barren	NPP_for_GPP_plus_DEM	106	0.738	0.725	0.764	-0.026	LE	-0.972	***
Night	Urban-Barren	Primary_LE_GPP	106	0.763	0.754	0.763	0.000	LAI	1.962	***
Night	Urban-Barren	Primary_LE_GPP_plus_DEM	106	0.764	0.752	0.764	0.000	LAI	1.954	***

Night	Urban-Barren	PsnNet_for_GPP	106	0.758	0.748	0.763	-0.005	LAI	1.150	***
Night	Urban-Barren	PsnNet_for_GPP_plus_DEM	106	0.759	0.747	0.764	-0.005	LAI	1.148	***

Table S27. Cross-method consensus importance of biophysical predictors for daytime and nighttime land-cover thermal contrasts. Dominant consensus predictor, mean normalized consensus importance, standard deviation of normalized importance across methods, and number of contributing methods for each eligible land-cover contrast. Consensus importance integrates absolute standardized MLR coefficients, partial R^2, Random Forest permutation importance, XGBoost permutation importance, and normalized mean absolute XGBoost SHAP importance.

Response	Pair Name	Consensus Predictor	Consensus Importance	Consensus SD	N Methods
Day	Forest-Savanna	Albedo	0.344016	0.116918	5
Day	Forest-Grass	Albedo	0.543495	0.130944	5
Day	Forest-Crop	Albedo	0.492413	0.199190	5
Day	Shrub-Grass	Albedo	0.815426	0.233096	5
Day	Shrub-Crop	Albedo	0.393768	0.270038	5
Day	Shrub-Urban	GPP	0.507970	0.132136	5
Day	Shrub-Barren	LE	0.320079	0.122473	5
Day	Savanna-Grass	LAI	0.325878	0.074381	5
Day	Savanna-Crop	Albedo	0.435240	0.170072	5
Day	Savanna-Urban	Albedo	0.470517	0.206494	5
Day	Grass-Crop	Albedo	0.400141	0.192242	5
Day	Grass-Urban	Albedo	0.621974	0.179949	5
Day	Grass-Barren	Albedo	0.462979	0.079278	5
Day	Crop-Urban	LE	0.535644	0.070595	5
Day	Crop-Barren	Albedo	0.741814	0.174847	5
Day	Urban-Barren	Albedo	0.451585	0.176078	5
Night	Forest-Savanna	LE	0.338953	0.179155	5
Night	Forest-Grass	Albedo	0.580275	0.152825	5
Night	Forest-Crop	LE	0.422110	0.076755	5
Night	Shrub-Grass	Albedo	0.606543	0.313416	5
Night	Shrub-Crop	Albedo	0.580591	0.140040	5
Night	Shrub-Urban	Albedo	0.743716	0.246358	5
Night	Shrub-Barren	Albedo	0.379699	0.293035	5
Night	Savanna-Grass	Albedo	0.561280	0.193628	5
Night	Savanna-Crop	LE	0.333063	0.114790	5
Night	Savanna-Urban	Albedo	0.441406	0.130147	5
Night	Grass-Crop	LE	0.520773	0.125015	5
Night	Grass-Urban	GPP	0.385079	0.074336	5
Night	Grass-Barren	Albedo	0.602063	0.116046	5
Night	Crop-Urban	LAI	0.440831	0.072236	5
Night	Crop-Barren	Albedo	0.707648	0.207044	5
Night	Urban-Barren	LE	0.442520	0.184168	5

Table S28. Spatial-block configurations used to evaluate geographical robustness of machine-learning models. Spatial-block width, approximate north-south dimension, grid-origin offset, number of occupied blocks, median and 90th-percentile number of observations per block, and maximum observations per block for the 0.5°, 1°, 2°, 5°, and 10° blocking schemes.

Block size (°)	Approx. N-S size (km)	Origin fraction	No. blocks	Median observations/block	P90 observations/block	Maximum observations/block
0.5	55.5	0.0	988	47.0	230.0	1,034
0.5	55.5	0.5	982	47.0	234.7	1,341
1	111	0.0	314	173.0	744.5	2,909
1	111	0.5	322	149.0	687.3	2,344
2	222	0.0	99	615.0	2,085.2	6,653
2	222	0.5	94	665.5	2,298.8	4,668
5	555	0.0	25	1,319.0	8,977.2	16,736
5	555	0.5	24	2,369.5	11,379.4	16,498
10	1,110	0.0	9	4,912.0	23,976.6	33,887
10	1,110	0.5	11	4,199.0	25,081.0	35,104

Table S29. Random Forest predictive sensitivity to spatially blocked cross-validation. Median held-out spatial R^2 and RMSE across eligible land-cover contrasts for each spatial-block size, together with the number of evaluated contrasts and median change in R^2 relative to the 0.5° blocking configuration.

Response	Block (°)	Approx. km	N Pairss	Median spatial R^2	Median spatial RMSE	Median ΔR^2 vs 0.5°
Day	0.5	55.5	16	0.197	0.987	0.000
Day	1	111	16	0.082	1.103	-0.041
Day	2	222	16	0.128	1.100	-0.109
Day	5	555	16	-0.118	1.227	-0.112
Day	10	1,110	13	-0.215	1.337	-0.159
Night	0.5	55.5	16	0.041	0.608	0.000
Night	1	111	16	0.032	0.610	-0.007
Night	2	222	16	-0.006	0.640	-0.064
Night	5	555	16	-0.189	0.677	-0.212
Night	10	1,110	13	-0.125	0.669	-0.231

Table S30. XGBoost predictive sensitivity to spatially blocked cross-validation. Median held-out spatial R^2 and RMSE across eligible land-cover contrasts for each spatial-block size, together with the number of evaluated contrasts and median change in R^2 relative to the 0.5° blocking configuration.

Response	Block (°)	Approx. km	N Pairss	Median spatial R^2	Median spatial RMSE	Median ΔR^2 vs 0.5°
Day	0.5	55.5	16	0.199	1.168	0.000

Response	Block (°)	Approx. km	N Pairss	Median spatial R^2	Median spatial RMSE	Median ΔR^2 vs 0.5°
Day	1	111	16	0.034	1.171	-0.072
Day	2	222	16	0.103	1.075	-0.125
Day	5	555	16	-0.064	1.290	-0.225
Day	10	1,110	13	-0.187	1.371	-0.208
Night	0.5	55.5	16	0.001	0.658	0.000
Night	1	111	16	0.021	0.648	-0.017
Night	2	222	16	0.001	0.653	-0.012
Night	5	555	16	-0.183	0.636	-0.161
Night	10	1,110	13	-0.154	0.653	-0.264

Table S31. Random Forest performance under random versus spatially blocked cross-validation. Comparison of median R^2 and RMSE from repeated random nested cross-validation with corresponding spatially blocked estimates across increasing block sizes, together with changes in R^2 and RMSE.

Response	Block	Random-CV R^2	Spatial-CV R^2	ΔR^2	Random-CV RMSE	Spatial-CV RMSE	ΔRMSE
Day	0.5°	0.475	0.197	-0.319	0.863	0.987	+0.098
Day	1°	0.475	0.082	-0.433	0.863	1.103	+0.140
Day	2°	0.475	0.128	-0.407	0.863	1.100	+0.153
Day	5°	0.475	-0.118	-0.536	0.863	1.227	+0.347
Day	10°	0.487	-0.215	-0.595	0.916	1.337	+0.357
Night	0.5°	0.295	0.041	-0.239	0.573	0.608	+0.059
Night	1°	0.295	0.032	-0.225	0.573	0.610	+0.067
Night	2°	0.295	-0.006	-0.289	0.573	0.640	+0.077
Night	5°	0.295	-0.189	-0.486	0.573	0.677	+0.067
Night	10°	0.307	-0.125	-0.325	0.568	0.669	+0.086

Table S32. XGBoost performance under random versus spatially blocked cross-validation. Comparison of median R^2 and RMSE from repeated random nested cross-validation with corresponding spatially blocked estimates across increasing block sizes, together with changes in R^2 and RMSE.

Response	Block	Random-CV R^2	Spatial-CV R^2	ΔR^2	Random-CV RMSE	Spatial-CV RMSE	ΔRMSE
Day	0.5°	0.453	0.199	-0.271	0.870	1.168	+0.123
Day	1°	0.453	0.034	-0.461	0.870	1.171	+0.191
Day	2°	0.453	0.103	-0.457	0.870	1.075	+0.201
Day	5°	0.453	-0.064	-0.559	0.870	1.290	+0.397
Day	10°	0.456	-0.187	-0.648	0.930	1.371	+0.354
Night	0.5°	0.272	0.001	-0.237	0.573	0.658	+0.083
Night	1°	0.272	0.021	-0.212	0.573	0.648	+0.063
Night	2°	0.272	0.001	-0.273	0.573	0.653	+0.071
Night	5°	0.272	-0.183	-0.508	0.573	0.636	+0.063

Response	Block	Random-CV R^2	Spatial-CV R^2	ΔR^2	Random-CV RMSE	Spatial-CV RMSE	ΔRMSE
Night	10°	0.269	-0.154	-0.430	0.575	0.653	+0.090

Table S33. Satellite-derived and ancillary datasets used in the study. MODIS land cover, daytime and nighttime land-surface temperature, surface albedo, vegetation structure, surface-energy and evapotranspiration variables, vegetation productivity, and elevation datasets used in the analysis, together with their temporal coverage and native temporal and spatial resolutions.

Category	Dataset	Abbreviation	Time - period	Temporal Resolution	Spatial Resolution
Land Use/Land Cover	Land Use/Land Cover (MCD12Q1.061)	LC	2001-2022	Yearly	500 m
Main Variable	Land Surface Temperature (Daytime & Nighttime) (MYD11A2.061)	LST Day & LST Night (Kelvin)	2003-2022	8 Days	1 km
Biogeophysical Factors	Albedo (MCD43A3.061)	Albedo		Daily	500 m
	Leaf Area Index (MYD15A2H.061)	LAI (m^2/m^2)		8 Days	
	Photosynethetic Fraction (MYD15A2H.061)	Fpar			
	Latent Heat Flux & Potential Latent Heat Flux (MYD16A2GF.061)	LE & PLE (MJ/m^2/day)			
	Evapotranspiration & Potential Evapotranspiration (MYD16A2GF.061)	ET & PET (kg/m^2/8day)			
Biogeochemical Factors	Net Photosynthesis (Gpp-maint resp) (MYD17A2HGF.061)	PsnNet(kgC/m^2)			
	Gross Primary Productivity (MYD17A2HGF.061)	GPP (kgC/m^2)	2003-2021		
	Net Primary Productivity (MYD17A3HGF.061)	NPP (kgC/m^2/yr)	2003-2022	Yearly	
Digital Elevation Data (DEM)	Shuttle Radar Topography Mission (SRTM) DEM	DEM (meters)	Static		90m

Table S34. Geographic extents of the biogeographic zones used for data extraction and analysis. Southern and northern latitude and western and eastern

longitude bounds defining the rectangular extraction domain for each biogeographic zone.

Biogeographic zone	Southern latitude (°N)	Northern latitude (°N)	Western longitude (°E)	Eastern longitude (°E)
Islands	6.260338	14.183384	91.710289	94.775809
Coasts	7.577404	24.482175	67.606065	89.606108
Western Ghats (WG2)	7.587906	21.815874	72.195908	78.071426
Deccan Peninsula	7.601849	26.450308	72.999962	88.269234
Gangetic Plains (GPs)	19.829428	31.065619	76.597771	90.382751
Semi-arid	20.229284	34.258152	68.627480	80.703857
North-east	21.440905	28.473402	89.188698	96.521045
Deserts	22.283775	30.697874	68.013077	76.356621
Himalayas	26.090929	35.627342	72.890808	97.915340
Trans-Himalaya	26.879613	37.573669	72.029427	89.393761

Table S35. Data retention following MODIS quality screening across biogeographic zones. Percentage of grid cells retained and removed for each land-surface temperature, vegetation, productivity, evapotranspiration and surface-energy variable following product-specific quality filtering.

Biogeographic Zone	Variable	Retained Cells (%)	Removed Cells (%)
Deserts	ET	79.3957	20.6043
	PET	79.3957	20.6043
	PLE	79.3957	20.6043
	LE	79.3957	20.6043
	Fpar	79.3726	20.6274
	Lai	79.3726	20.6274
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	79.4296	20.5704
	PsnNet	79.4296	20.5704
	Npp	41.5579	58.4421
	albedo	77.0476	22.9524
Himalayas	ET	67.9216	32.0784
	PET	67.9216	32.0784
	PLE	67.9216	32.0784
	LE	67.9216	32.0784
	Fpar	67.8837	32.1163
	Lai	67.8837	32.1163
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	67.9143	32.0857
	PsnNet	67.9143	32.0857
	Npp	44.6923	55.3077

Biogeographic Zone	Variable	Retained Cells (%)	Removed Cells (%)
	albedo	49.0128	50.9872
North-East	ET	58.3816	41.6184
	PET	58.3816	41.6184
	PLE	58.3816	41.6184
	LE	58.3816	41.6184
	Fpar	58.2819	41.7181
	Lai	58.2819	41.7181
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	58.3425	41.6575
	PsnNet	58.3425	41.6575
	Npp	38.4485	61.5515
	albedo	35.0726	64.9274
Trans-himalaya	ET	72.2415	27.7585
	PET	72.2415	27.7585
	PLE	72.2415	27.7585
	LE	72.2415	27.7585
	Fpar	72.2104	27.7896
	Lai	72.2104	27.7896
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	72.2635	27.7365
	PsnNet	72.2635	27.7365
	Npp	45.6487	54.3513
	albedo	50.5828	49.4172
Deccan Peninsula	ET	66.5948	33.4052
	PET	66.5948	33.4052
	PLE	66.5948	33.4052
	LE	66.5948	33.4052
	Fpar	66.5484	33.4516
	Lai	66.5484	33.4516
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	66.6539	33.3461
	PsnNet	66.6539	33.3461
	Npp	62.7560	37.2440
	albedo	60.3811	39.6189
Gangetic Plains (GPs)	ET	66.7190	33.2810
	PET	66.7190	33.2810
	PLE	66.7190	33.2810
	LE	66.7190	33.2810

Biogeographic Zone	Variable	Retained Cells (%)	Removed Cells (%)
	Fpar	66.6401	33.3599
	Lai	66.6401	33.3599
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	66.7072	33.2928
	PsnNet	66.7072	33.2928
	Npp	56.3426	43.6574
	albedo	57.6155	42.3845
Islands	ET	54.4644	45.5356
	PET	54.4644	45.5356
	PLE	54.4644	45.5356
	LE	54.4644	45.5356
	Fpar	54.7147	45.2853
	Lai	54.7147	45.2853
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	54.8380	45.1620
	PsnNet	54.8380	45.1620
	Npp	46.1361	53.8639
	albedo	17.1344	82.8656
Semi-arid	ET	75.5479	24.4521
	PET	75.5479	24.4521
	PLE	75.5479	24.4521
	LE	75.5479	24.4521
	Fpar	75.5207	24.4793
	Lai	75.5207	24.4793
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	75.5685	24.4315
	PsnNet	75.5685	24.4315
	Npp	53.0459	46.9541
	albedo	68.2122	31.7878
Western Ghats (WG2)	ET	66.7615	33.2385
	PET	66.7615	33.2385
	PLE	66.7615	33.2385
	LE	66.7615	33.2385
	Fpar	66.7254	33.2746
	Lai	66.7254	33.2746
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	66.8527	33.1473

Biogeographic Zone	Variable	Retained Cells (%)	Removed Cells (%)
	PsnNet	66.8527	33.1473
	Npp	67.8574	32.1426
	albedo	62.1152	37.8848
Coasts	ET	67.1649	32.8351
	PET	67.1649	32.8351
	PLE	67.1649	32.8351
	LE	67.1649	32.8351
	Fpar	67.1031	32.8969
	Lai	67.1031	32.8969
	LST_Day	100.0000	0.0000
	LST_Night	100.0000	0.0000
	Gpp	67.2129	32.7871
	PsnNet	67.2129	32.7871
	Npp	65.5279	34.4721
	albedo	61.3214	38.6786

Table S36. Relative contribution of biogeographic zones to the India-wide matched land-cover-pair sample. Percentage of retained observations contributed by each biogeographic zone for each land-cover contrast. Percentages quantify the geographical composition of the pooled India-wide sample and were not used as equal weighting factors in the national estimates.

LC Pairs	Coasts	Deserts	Himalayas	North-East	Trans-Himalaya	Deccan Peninsula	GPs	Islands	Semi-Arid	WG
Forest-Savanna	0.00	0.00	9.26	16.85	0.00	49.05	4.65	0.00	0.03	20.16
Forest-Grass	0.00	0.00	11.52	5.25	0.00	83.24	0.00	0.00	0.00	0.00
Forest-Crop	0.00	0.00	1.16	13.37	0.00	45.43	36.12	0.00	0.17	3.75
Forest-Urban	13.25	0.00	20.48	14.46	0.00	0.00	50.60	0.00	0.00	1.20
Shrub-Grass	0.00	76.92	0.00	0.00	13.85	0.00	0.00	0.00	9.23	0.00
Shrub-Crop	0.00	92.56	0.00	0.00	0.00	0.72	0.00	0.00	6.72	0.00
Shrub-Urban	0.00	96.96	0.00	0.00	0.00	0.00	0.00	0.00	3.04	0.00
Shrub-Barren	0.00	91.02	0.00	0.00	0.00	0.00	0.00	0.00	8.98	0.00
Savanna-Grass	0.15	0.00	5.23	2.05	0.00	75.15	0.00	0.00	0.00	17.42
Savanna-Crop	0.70	0.00	2.06	5.58	0.00	69.96	14.14	0.00	6.91	0.65
Savanna-Urban	11.74	0.00	3.12	13.61	0.00	3.12	38.95	0.00	14.73	14.73
Savanna-Barren	0.00	0.00	6.67	93.33	0.00	0.00	0.00	0.00	0.00	0.00

LC Pairs	Coasts	Deserts	Himalayas	North-East	Trans-Himalaya	Deccan Peninsula	GPs	Islands	Semi-Arid	WG
Grass-Crop	1.57	0.07	0.42	0.00	0.03	73.13	1.65	0.00	22.95	0.18
Grass-Urban	0.24	4.39	0.49	0.00	0.89	55.85	0.16	0.00	37.48	0.49
Grass-Barren	0.31	0.05	10.83	0.00	85.81	0.44	0.00	0.00	2.55	0.00
Crop-Urban	1.55	0.58	0.18	0.39	0.00	41.62	24.82	0.00	30.14	0.72
Crop-Barren	5.32	0.00	0.00	1.06	11.17	68.62	12.77	0.00	1.06	0.00
Urban-Barren	0.62	17.39	0.00	0.62	2.48	0.00	2.48	0.00	76.40	0.00

Table S37. Hyperparameter search spaces for Random Forest and XGBoost models. Candidate hyperparameter values evaluated during randomized inner cross-validation for pair-specific daytime and nighttime ΔLST models.

Model	Hyperparameter	Search space
RF	n_estimators	300, 500, 700, 1000
RF	max_depth	None, 5, 8, 12, 16, 24
RF	max_features	sqrt, 0.50, 0.75, 1.00
RF	min_samples_split	2, 5, 10, 20
RF	min_samples_leaf	1, 2, 4, 8, 12
RF	bootstrap	True
XGB	n_estimators	200, 300, 400, 600, 800, 1000
XGB	max_depth	2, 3, 4, 5, 6
XGB	learning_rate	.01, .02, .03, .05, .08, .10
XGB	subsample	.60, .75, .90, 1.00
XGB	colsample_bytree	.60, .75, .90, 1.00
XGB	min_child_weight	1, 3, 5, 10
XGB	gamma	0, .05, .10, .20, .50
XGB	reg_alpha	0, .01, .10, .50, 1.00
XGB	reg_lambda	.50, 1, 2, 5, 10

Table S38. Optimized Random Forest hyperparameters for pair-specific daytime and nighttime ΔLST models. Final hyperparameter settings selected within the inner cross-validation procedure for each eligible land-cover contrast, together with the corresponding cross-validation RMSE.

Period	Pairs	N	Trees	Max depth	Max features	Min leaf	Min split	Final CV RMSE
Day	Forest-Savanna	20,927	700	24	0.50	1	10	0.713
Day	Forest-Grass	684	700	12	1.00	1	2	1.095
Day	Forest-Crop	4,825	300	24	sqrt	1	5	0.681
Day	Shrub-Grass	64	500	12	0.75	1	5	0.582

Period	Pairs	N	Trees	Max depth	Max features	Min leaf	Min split	Final CV RMSE
Day	Shrub-Crop	2,564	1000	16	sqrt	4	10	0.783
Day	Shrub-Urban	74	1000	8	0.75	1	2	0.626
Day	Shrub-Barren	53	700	16	0.50	1	2	0.932
Day	Savanna-Grass	1,320	300	16	0.50	1	5	0.903
Day	Savanna-Crop	4,124	700	16	sqrt	1	10	0.663
Day	Savanna-Urban	141	500	5	0.50	2	2	1.096
Day	Grass-Crop	13,616	700	None	sqrt	1	10	1.133
Day	Grass-Urban	422	1000	None	0.50	2	5	1.210
Day	Grass-Barren	650	700	16	0.50	1	5	2.323
Day	Crop-Urban	42,243	1000	16	sqrt	1	20	0.906
Day	Crop-Barren	102	500	16	0.75	4	10	0.938
Day	Urban-Barren	106	300	16	sqrt	1	5	0.669
Night	Forest-Savanna	20,927	300	16	0.50	1	2	0.600
Night	Forest-Grass	684	700	12	0.75	1	2	0.713
Night	Forest-Crop	4,825	500	24	0.75	2	5	0.441
Night	Shrub-Grass	64	300	5	sqrt	1	5	0.755
Night	Shrub-Crop	2,564	700	8	0.50	2	2	0.317
Night	Shrub-Urban	74	500	16	0.75	12	2	0.603
Night	Shrub-Barren	53	700	24	1.00	8	5	0.513
Night	Savanna-Grass	1,320	500	8	0.50	4	5	0.551
Night	Savanna-Crop	4,124	1000	16	0.50	1	5	0.384
Night	Savanna-Urban	141	300	5	0.50	12	2	0.428
Night	Grass-Crop	13,616	1000	None	0.50	4	2	0.670
Night	Grass-Urban	422	500	16	0.50	1	5	0.613
Night	Grass-Barren	650	500	16	sqrt	1	5	1.307
Night	Crop-Urban	42,243	500	16	0.50	1	20	0.569
Night	Crop-Barren	102	1000	16	sqrt	1	5	0.515
Night	Urban-Barren	106	500	16	sqrt	2	5	0.417

Table S39. Optimized XGBoost hyperparameters for pair-specific daytime and nighttime ΔLST models. Final boosting parameters selected within the inner cross-validation procedure for each eligible land-cover contrast.

Period	Pairs	Trees	Depth	Learning rate	Subsample	Colsample	Min child wt.	Gamma	α	λ
Day	Forest-Savanna	300	6	.03	.90	.75	3	.05	0	5

Period	Pairs	Trees	Depth	Learning rate	Subsample	Colsample	Min child wt.	Gamma	α	λ
Day	Forest-Grass	200	5	.05	.60	1.00	5	.10	.01	10
Day	Forest-Crop	800	5	.01	.60	1.00	1	.10	.10	2
Day	Shrub-Grass	300	2	.10	.90	.90	3	.20	.50	2
Day	Shrub-Crop	800	6	.01	.60	.90	1	0	.01	5
Day	Shrub-Urban	400	5	.10	.75	1.00	3	.05	.10	5
Day	Shrub-Barren	1000	4	.10	.90	.60	5	.20	.01	.5
Day	Savanna-Grass	800	6	.03	.90	1.00	3	.20	.01	1
Day	Savanna-Crop	1000	5	.01	.60	1.00	5	.05	.50	1
Day	Savanna-Urban	200	5	.08	1.00	1.00	5	.50	.01	5
Day	Grass-Crop	600	6	.02	.75	1.00	1	0	.50	5
Day	Grass-Urban	200	5	.08	1.00	.60	3	.20	0	2
Day	Grass-Barren	200	5	.05	.60	.75	1	.10	.50	2
Day	Crop-Urban	600	6	.05	.75	1.00	5	.20	.01	5
Day	Crop-Barren	200	5	.03	.60	.90	10	.05	.01	1
Day	Urban-Barren	600	3	.05	1.00	1.00	10	.50	.01	.5
Night	Forest-Savanna	300	6	.05	.60	.90	10	.05	.10	1
Night	Forest-Grass	300	5	.03	1.00	1.00	1	.20	.01	5
Night	Forest-Crop	600	6	.02	.90	.90	10	.10	.01	.5
Night	Shrub-Grass	800	5	.10	.60	.75	3	.05	.10	1
Night	Shrub-Crop	600	6	.01	1.00	.90	1	.05	.50	1
Night	Shrub-Urban	200	4	.01	.60	.60	1	0	1.00	10
Night	Shrub-Barren	600	5	.01	.75	.75	10	.20	.50	.5
Night	Savanna-Grass	1000	5	.01	1.00	.90	1	.20	.01	10
Night	Savanna-Crop	1000	6	.02	.75	.75	1	.20	.01	.5
Night	Savanna-Urban	200	5	.03	.60	.75	10	.10	.50	10
Night	Grass-Crop	200	6	.08	.75	1.00	3	.05	.50	2
Night	Grass-Urban	600	5	.02	1.00	.90	5	.20	0	1
Night	Grass-Barren	1000	2	.01	1.00	.90	1	.50	.50	5
Night	Crop-Urban	300	6	.03	.60	.75	1	.20	0	1
Night	Crop-Barren	1000	6	.03	.75	.75	10	.50	0	.5
Night	Urban-Barren	800	2	.05	.60	.90	1	.10	.10	.5