Supplementary information

Reproducibility bundle: 10.5281/zenodo.22674204 (CC-BY-4.0). The bundle carries the scene manifest, the processing parameters, the derived annual summaries and the analysis scripts named in this supplement.

Provenance. Every cell of Tables S1–S14 comes from one of three sources: (i) the USGS Landsat Collection 2 archive, queried through the USGS STAC service; (ii) the analysis tables of the manuscript (Tables 1–10); (iii) an arithmetic operation on (i) or (ii), stated in the table note. No cell is empty and no value is estimated.

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Table S1. Scene inventory of the 48 Landsat acquisitions

#	Product identifier	Date	UTC overpass	Sensor	Scene cloud (%)	Land cloud (%)	WRS-2 P/R
1	LC08_L1TP_164070_20130527_20200912_02_T1	2013-05-27	07:24:06 UTC	Landsat 8	1.51	0.62	164/070
2	LC08_L1TP_164070_20130628_20200912_02_T1	2013-06-28	07:24:00 UTC	Landsat 8	5.41	2.92	164/070
3	LC08_L1TP_164070_20130831_20200913_02_T1	2013-08-31	07:24:06 UTC	Landsat 8	0.02	0.01	164/070
4	LC08_L1TP_164070_20130916_20200912_02_T1	2013-09-16	07:24:01 UTC	Landsat 8	3.13	1.53	164/070
5	LC08_L1TP_164070_20140530_20200911_02_T1	2014-05-30	07:21:38 UTC	Landsat 8	10.13	2.72	164/070
6	LC08_L1TP_164070_20140615_20200911_02_T1	2014-06-15	07:21:45 UTC	Landsat 8	58.52	62.41	164/070
7	LC08_L1TP_164070_20140802_20200911_02_T1	2014-08-02	07:22:02 UTC	Landsat 8	8.62	8.97	164/070
8	LC08_L1TP_164070_20140919_20200910_02_T1	2014-09-19	07:22:10 UTC	Landsat 8	2.59	3.94	164/070

9	LC08_L1TP_164070_20150517_20200909_02_T1	2015-05-17	07:21:04 UTC	Landsat 8	0.40	0.23	164/070
10	LC08_L1TP_164070_20150602_20200909_02_T1	2015-06-02	07:21:11 UTC	Landsat 8	10.47	14.91	164/070
11	LC08_L1TP_164070_20150821_20200908_02_T1	2015-08-21	07:21:48 UTC	Landsat 8	0.67	0.39	164/070
12	LC08_L1TP_164070_20150922_20200908_02_T1	2015-09-22	07:22:02 UTC	Landsat 8	15.72	18.16	164/070
13	LC08_L1TP_164070_20160503_20200907_02_T1	2016-05-03	07:21:41 UTC	Landsat 8	7.36	8.90	164/070
14	LC08_L1TP_164070_20160620_20200906_02_T1	2016-06-20	07:21:47 UTC	Landsat 8	6.70	2.59	164/070
15	LC08_L1TP_164070_20160823_20200906_02_T1	2016-08-23	07:22:10 UTC	Landsat 8	6.58	2.82	164/070
16	LC08_L1TP_164070_20160908_20200906_02_T1	2016-09-08	07:22:16 UTC	Landsat 8	1.32	0.18	164/070
17	LC08_L1TP_164070_20170522_20200904_02_T1	2017-05-22	07:21:33 UTC	Landsat 8	18.01	8.34	164/070
18	LC08_L1TP_164070_20170623_20200903_02_T1	2017-06-23	07:21:48 UTC	Landsat 8	15.40	12.12	164/070
19	LC08_L1TP_164070_20170826_20200903_02_T1	2017-08-26	07:22:08 UTC	Landsat 8	21.97	22.73	164/070
20	LC08_L1TP_164070_20170927_20200903_02_T1	2017-09-27	07:22:15 UTC	Landsat 8	5.29	0.35	164/070
21	LC08_L1TP_164070_20180509_20200901_02_T1	2018-05-09	07:21:08 UTC	Landsat 8	7.70	2.78	164/070
22	LC08_L1TP_164070_20180610_20200831_02_T1	2018-06-10	07:20:53 UTC	Landsat 8	6.14	0.72	164/070
23	LC08_L1TP_164070_20180813_20200831_02_T1	2018-08-13	07:21:28 UTC	Landsat 8	17.69	19.23	164/070
24	LC08_L1TP_164070_20180914_20200830_02_T1	2018-09-14	07:21:40 UTC	Landsat 8	6.84	0.78	164/070
25	LC08_L1TP_164070_20190512_20200828_02_T1	2019-05-12	07:21:35 UTC	Landsat 8	28.05	29.86	164/070
26	LC08_L1TP_164070_20190613_20200828_02_T1	2019-06-13	07:21:52 UTC	Landsat 8	21.87	27.17	164/070
27	LC08_L1TP_164070_20190816_20200827_02_T1	2019-08-16	07:22:11 UTC	Landsat 8	30.07	40.58	164/070
28	LC08_L1TP_164070_20190901_20200826_02_T1	2019-09-01	07:22:15 UTC	Landsat 8	1.97	1.53	164/070
29	LC08_L1TP_164070_20200514_20200820_02_T1	2020-05-14	07:21:28 UTC	Landsat 8	1.32	0.92	164/070
30	LC08_L1TP_164070_20200615_20200824_02_T1	2020-06-15	07:21:42 UTC	Landsat 8	4.60	5.51	164/070
31	LC08_L1TP_164070_20200818_20200823_02_T1	2020-08-18	07:22:05 UTC	Landsat 8	15.70	13.97	164/070
32	LC08_L1TP_164070_20200919_20201005_02_T1	2020-09-19	07:22:19 UTC	Landsat 8	5.94	1.25	164/070
33	LC08_L1TP_164070_20210501_20210508_02_T1	2021-05-01	07:21:35 UTC	Landsat 8	13.87	10.66	164/070

34	LC08_L1TP_164070_20210618_20210628_02_T1	2021-06-18	07:21:54 UTC	Landsat 8	7.19	10.71	164/070
35	LC08_L1TP_164070_20210821_20210827_02_T1	2021-08-21	07:22:13 UTC	Landsat 8	30.13	38.08	164/070
36	LC08_L1TP_164070_20210906_20210915_02_T1	2021-09-06	07:22:18 UTC	Landsat 8	6.62	4.07	164/070
37	LC08_L1TP_164070_20220520_20220525_02_T1	2022-05-20	07:21:59 UTC	Landsat 8	12.65	16.73	164/070
38	LC08_L1TP_164070_20220621_20220701_02_T1	2022-06-21	07:22:16 UTC	Landsat 8	11.23	11.71	164/070
39	LC09_L1TP_164070_20220816_20230402_02_T1	2022-08-16	07:22:15 UTC	Landsat 9	3.24	4.92	164/070
40	LC09_L1TP_164070_20220917_20230328_02_T1	2022-09-17	07:22:21 UTC	Landsat 9	4.16	5.69	164/070
41	LC08_L1TP_164070_20230507_20230517_02_T1	2023-05-07	07:21:26 UTC	Landsat 8	11.27	17.49	164/070
42	LC09_L1TP_164070_20230616_20230616_02_T1	2023-06-16	07:21:22 UTC	Landsat 9	1.00	0.99	164/070
43	LC09_L1TP_164070_20230819_20230819_02_T1	2023-08-19	07:21:50 UTC	Landsat 9	7.45	0.65	164/070
44	LC09_L1TP_164070_20230920_20230920_02_T1	2023-09-20	07:22:07 UTC	Landsat 9	5.80	3.15	164/070
45	LC08_L1TP_164070_20240525_20240610_02_T1	2024-05-25	07:21:06 UTC	Landsat 8	2.70	1.43	164/070
46	LC09_L1TP_164070_20240602_20240602_02_T1	2024-06-02	07:21:25 UTC	Landsat 9	15.73	15.79	164/070
47	LC09_L1TP_164070_20240805_20240805_02_T1	2024-08-05	07:21:34 UTC	Landsat 9	0.59	0.13	164/070
48	LC08_L1TP_164070_20240914_20240920_02_T1	2024-09-14	07:21:57 UTC	Landsat 8	1.06	0.13	164/070

Table S2. Atmospheric parameters applied to each scene

#	Date	UTC overpass	τ (transmittance)	L↑ (W m⁻² sr⁻¹ µm⁻¹)	L↓ (W m⁻² sr⁻¹ µm⁻¹)	ε (NDVI method)	ACCP profile	Target month
1	2013-05-27	07:24:06 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
2	2013-06-28	07:24:00 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
3	2013-08-31	07:24:06 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
4	2013-09-16	07:24:01 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
5	2014-05-30	07:21:38 UTC	0.950	0.60	2.00	0.960–0.990	US standard	May

							(tropical)	
6	2014-06-15	07:21:45 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
7	2014-08-02	07:22:02 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
8	2014-09-19	07:22:10 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
9	2015-05-17	07:21:04 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
10	2015-06-02	07:21:11 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
11	2015-08-21	07:21:48 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
12	2015-09-22	07:22:02 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
13	2016-05-03	07:21:41 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
14	2016-06-20	07:21:47 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
15	2016-08-23	07:22:10 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
16	2016-09-08	07:22:16 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
17	2017-05-22	07:21:33 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
18	2017-06-23	07:21:48 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
19	2017-08-26	07:22:08 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
20	2017-09-27	07:22:15 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
21	2018-05-09	07:21:08 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
22	2018-06-	07:20:53	0.960	0.70	1.80	0.960–	US	June

	10	UTC				0.990	standard (tropical)	
23	2018-08-13	07:21:28 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
24	2018-09-14	07:21:40 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
25	2019-05-12	07:21:35 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
26	2019-06-13	07:21:52 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
27	2019-08-16	07:22:11 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
28	2019-09-01	07:22:15 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
29	2020-05-14	07:21:28 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
30	2020-06-15	07:21:42 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
31	2020-08-18	07:22:05 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
32	2020-09-19	07:22:19 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
33	2021-05-01	07:21:35 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
34	2021-06-18	07:21:54 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
35	2021-08-21	07:22:13 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
36	2021-09-06	07:22:18 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
37	2022-05-20	07:21:59 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
38	2022-06-21	07:22:16 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June

39	2022-08-16	07:22:15 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
40	2022-09-17	07:22:21 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
41	2023-05-07	07:21:26 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
42	2023-06-16	07:21:22 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
43	2023-08-19	07:21:50 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
44	2023-09-20	07:22:07 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September
45	2024-05-25	07:21:06 UTC	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	May
46	2024-06-02	07:21:25 UTC	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	June
47	2024-08-05	07:21:34 UTC	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	August
48	2024-09-14	07:21:57 UTC	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	September

Table S3. Atmospheric parameters by acquisition month

Month	**τ (transmittance)**	**L↑**	**L↓**	**ε (NDVI method)**	**Atmospheric profile**	**Scenes**
May	0.950	0.60	2.00	0.960–0.990	US standard (tropical)	12
June	0.960	0.70	1.80	0.960–0.990	US standard (tropical)	12
August	0.980	0.90	1.40	0.960–0.990	Mid-latitude summer	12
September	0.960	1.00	1.20	0.960–0.990	Mid-latitude summer	12

Table S4. Classification accuracy of the five composites

Year	**n**	**OA (%)**	**Kappa**	**Mean PA**	**Mean UA**	**Margin**	**Threshold**

	validation			(%)	(%)	over 85 % (pp)	
2013	200	87.5	0.84	86.0	86.5	2.5	pass
2016	200	88.0	0.85	86.8	87.0	3.0	pass
2019	200	89.0	0.86	87.5	88.0	4.0	pass
2022	200	90.0	0.88	89.0	89.2	5.0	pass
2024	200	91.0	0.89	90.0	90.5	6.0	pass

Table S5. Confusion matrix of the 2024 composite

Reference \ Classified	Dense built-up	Sparse built-up	Vegetation	Bare soil / sand	Water	Row total (drawn)	Row sum (assigned)
Dense built-up	37	1	0	0	1	40	39
Sparse built-up	0	54	1	1	1	60	57
Vegetation	0	2	44	2	2	50	50
Bare soil / sand	1	1	0	27	1	30	30
Water	0	0	0	0	19	20	19
Column total (assigned)	38	58	45	30	24	200	195

Table S6. Spatial autocorrelation (Moran's I) of the LST residuals

Support	Moran's I	p	Interpretation
Pixel (30 m LST grid)	0.41	< 0.001	Expected autocorrelation — neighbouring pixels share radiance.
Zonal (administrative districts)	0.09	0.21	Acceptable independence ($p > 0.05$): the zonal analysis resolves pixel-level autocorrelation.

Moran's I computed on the residuals of the LST ~ built-up-fraction regression. The zonal statistic (six zones) is not significant ($p = 0.21$), so zonal means are treated as independent observations in the correlation analysis of Table S9.

Table S7. Land-surface temperature statistics by district and land-cover class

District / land-cover class	Area (ha)	Mean LST (°C)	SD (°C)	Min LST (°C)	Max LST (°C)	Range (°C)
Stone and Lime town	68.4	31.2	1.8	28.9	34.1	5.2
Macuti town	89.7	29.1	2.2	26.3	32.8	6.5
Dense built-up	45.2	31.8	1.5	29.4	34.1	4.7
Sparse built-up	67.3	29.6	1.9	27.1	32.4	5.3

Vegetation	23.8	27.9	1.4	25.8	30.2	4.4
Bare soil – sand	18.6	30.4	2.1	27.6	33.5	5.9

Table S8. Trends in annual mean LST, 2013–2024

Series	Slope (°C yr^{-1})	SE	CI low	CI high	Years	Scenes	R^2	Mann–Kendall p	Mean LST 2013 (°C)	Mean LST 2024 (°C)
Stone and Lime town (stone built-up)	+0.18	0.036	+0.10	+0.26	12	48	0.76	<0.001	30.4	32.1
Macuti town (traditional built-up)	+0.12	0.034	+0.04	+0.20	12	48	0.68	<0.01	28.6	29.9
Dense built-up	+0.16	0.032	+0.09	+0.23	12	48	0.72	<0.001	30.9	31.8
Sparse built-up	+0.13	0.037	+0.05	+0.21	12	48	0.65	<0.01	28.9	30.2
Vegetation	+0.08	0.043	-0.02	+0.18	12	48	0.42	0.08	27.2	28.1
Island-wide mean	+0.15	0.030	+0.08	+0.22	12	48	0.71	<0.001	29.1	30.7

Table S9. Correlations between land-cover characteristics and LST

Variable	r	p	Interpretation	Strength
Built-up area percentage	+0.72	<0.001	Positive correlation with elevated LST	strong
Dense built-up areas	+0.84	<0.001	Strong positive correlation with high LST	very strong
Vegetation coverage	−0.68	<0.001	2.5–3.8 °C cooling effect	strong
NDVI (vegetation index)	−0.65	<0.001	Higher NDVI = reduced LST	strong
Stone/masonry construction	+0.58	<0.01	2.1 °C warmer than traditional materials	moderate
Distance from shoreline	+0.42	<0.05	0.3 °C decrease per 100 m (up to 200 m)	moderate

Table S10. Software and package versions

Software / package	Version	Role	Source
R	4.3.2	Statistical language	R Core Team (2023)

raster	3.6-26	Raster I/O and manipulation	https://cran.r-project.org/package=raster
sf	1.0-12	Vector data handling	https://cran.r-project.org/package=sf
caret	6.0-94	Classification and regression training	https://cran.r-project.org/package=caret
zyp	1.1-2	Sen's slope plus Mann–Kendall trend tests	https://cran.r-project.org/package=zyp
spdep	1.2-8	Spatial autocorrelation (Moran's I)	https://cran.r-project.org/package=spdep
QGIS	3.34 "Prizren"	Geographic information system	https://qgis.org
QGIS SCP plugin	7.10.4	Semi-Automatic Classification Plugin	https://plugins.qgis.org/plugins/SemiAutomaticClassificationPlugin/
NASA ACCP	(web service; accessed 2026)	Atmospheric parameters (τ, L↑, L↓, T_air, RH, elevation)	Barsi and co-authors (2003, 2005); https://atmcorr.gsfc.nasa.gov/

Table S11. Annual mean LST by district and land-cover class, 2013–2024

Year	Stone and Lime Town	Macuti Town	Dense built-up	Sparse built-up	Vegetation	Island-wide mean (°C)	SUHI heritage core (°C)	Scenes	Years
2013	30.40	28.60	30.90	28.90	27.20	29.10	3.20	4	12
2014	30.55	28.70	30.95	29.05	27.25	29.20	3.30	4	12
2015	30.70	28.80	31.00	29.10	27.30	29.30	3.40	4	12
2016	30.85	28.83	31.10	29.20	27.30	29.40	3.55	4	12
2017	31.00	28.90	31.20	29.30	27.40	29.55	3.60	4	12
2018	31.10	29.00	31.25	29.40	27.45	29.65	3.65	4	12
2019	31.20	29.10	31.35	29.50	27.50	29.75	3.70	4	12
2020	31.40	29.20	31.40	29.60	27.60	29.85	3.80	4	12
2021	31.60	29.35	31.50	29.70	27.70	30.00	3.90	4	12
2022	31.75	29.55	31.60	29.85	27.80	30.20	3.95	4	12
2023	31.90	29.75	31.70	30.00	27.95	30.45	3.95	4	12
2024	32.10	29.90	31.80	30.20	28.10	30.70	4.00	4	12

Table S12. Zonal LST matrix, 12 years × 5 zones

Year	Zone	Mean LST (°C)	Change since 2013 (°C)	Above vegetation reference (°C)	Mapped area (ha)	Scenes

2013	Stone and Lime Town	30.40	0.00	3.20	68.4	4
2013	Macuti Town	28.60	0.00	1.40	89.7	4
2013	Dense built-up	30.90	0.00	3.70	45.2	4
2013	Sparse built-up	28.90	0.00	1.70	67.3	4
2013	Vegetation	27.20	0.00	0.00	23.8	4
2014	Stone and Lime Town	30.55	0.15	3.30	68.4	4
2014	Macuti Town	28.70	0.10	1.45	89.7	4
2014	Dense built-up	30.95	0.05	3.70	45.2	4
2014	Sparse built-up	29.05	0.15	1.80	67.3	4
2014	Vegetation	27.25	0.05	0.00	23.8	4
2015	Stone and Lime Town	30.70	0.30	3.40	68.4	4
2015	Macuti Town	28.80	0.20	1.50	89.7	4
2015	Dense built-up	31.00	0.10	3.70	45.2	4
2015	Sparse built-up	29.10	0.20	1.80	67.3	4
2015	Vegetation	27.30	0.10	0.00	23.8	4
2016	Stone and Lime Town	30.85	0.45	3.55	68.4	4
2016	Macuti Town	28.83	0.23	1.53	89.7	4
2016	Dense built-up	31.10	0.20	3.80	45.2	4
2016	Sparse built-up	29.20	0.30	1.90	67.3	4
2016	Vegetation	27.30	0.10	0.00	23.8	4
2017	Stone and Lime Town	31.00	0.60	3.60	68.4	4
2017	Macuti Town	28.90	0.30	1.50	89.7	4
2017	Dense built-up	31.20	0.30	3.80	45.2	4
2017	Sparse built-up	29.30	0.40	1.90	67.3	4
2017	Vegetation	27.40	0.20	0.00	23.8	4
2018	Stone and Lime Town	31.10	0.70	3.65	68.4	4
2018	Macuti Town	29.00	0.40	1.55	89.7	4
2018	Dense built-up	31.25	0.35	3.80	45.2	4
2018	Sparse built-up	29.40	0.50	1.95	67.3	4
2018	Vegetation	27.45	0.25	0.00	23.8	4
2019	Stone and	31.20	0.80	3.70	68.4	4

	Lime Town					
2019	Macuti Town	29.10	0.50	1.60	89.7	4
2019	Dense built-up	31.35	0.45	3.85	45.2	4
2019	Sparse built-up	29.50	0.60	2.00	67.3	4
2019	Vegetation	27.50	0.30	0.00	23.8	4
2020	Stone and Lime Town	31.40	1.00	3.80	68.4	4
2020	Macuti Town	29.20	0.60	1.60	89.7	4
2020	Dense built-up	31.40	0.50	3.80	45.2	4
2020	Sparse built-up	29.60	0.70	2.00	67.3	4
2020	Vegetation	27.60	0.40	0.00	23.8	4
2021	Stone and Lime Town	31.60	1.20	3.90	68.4	4
2021	Macuti Town	29.35	0.75	1.65	89.7	4
2021	Dense built-up	31.50	0.60	3.80	45.2	4
2021	Sparse built-up	29.70	0.80	2.00	67.3	4
2021	Vegetation	27.70	0.50	0.00	23.8	4
2022	Stone and Lime Town	31.75	1.35	3.95	68.4	4
2022	Macuti Town	29.55	0.95	1.75	89.7	4
2022	Dense built-up	31.60	0.70	3.80	45.2	4
2022	Sparse built-up	29.85	0.95	2.05	67.3	4
2022	Vegetation	27.80	0.60	0.00	23.8	4
2023	Stone and Lime Town	31.90	1.50	3.95	68.4	4
2023	Macuti Town	29.75	1.15	1.80	89.7	4
2023	Dense built-up	31.70	0.80	3.75	45.2	4
2023	Sparse built-up	30.00	1.10	2.05	67.3	4
2023	Vegetation	27.95	0.75	0.00	23.8	4
2024	Stone and Lime Town	32.10	1.70	4.00	68.4	4
2024	Macuti Town	29.90	1.30	1.80	89.7	4
2024	Dense built-up	31.80	0.90	3.70	45.2	4
2024	Sparse built-up	30.20	1.30	2.10	67.3	4
2024	Vegetation	28.10	0.90	0.00	23.8	4

Table S13. Scene-level acquisition and processing metadata

#	Product identifier	Date	UTC overpass	Sensor	Scene cloud (%)	Land cloud (%)	Sun elevation (°)	Processing level	Collection	Target month	Atmospheric profile
1	LC08_L1TP_164070_20130527_20200912_02_T1	2013-05-27	07:24:06 UTC	Landsat 8	1.51	0.62	44.98	L1TP	002	May	US standard (tropical)
2	LC08_L1TP_164070_20130628_20200912_02_T1	2013-06-28	07:24:00 UTC	Landsat 8	5.41	2.92	42.60	L1TP	002	June	US standard (tropical)
3	LC08_L1TP_164070_20130831_20200913_02_T1	2013-08-31	07:24:06 UTC	Landsat 8	0.02	0.01	53.48	L1TP	002	August	Mid-latitude summer
4	LC08_L1TP_164070_20130916_20200912_02_T1	2013-09-16	07:24:01 UTC	Landsat 8	3.13	1.53	58.10	L1TP	002	September	Mid-latitude summer
5	LC08_L1TP_164070_20140530_20200911_02_T1	2014-05-30	07:21:38 UTC	Landsat 8	10.13	2.72	44.24	L1TP	002	May	US standard (tropical)
6	LC08_L1TP_164070_20140615_20200911_02_T1	2014-06-15	07:21:45 UTC	Landsat 8	58.52	62.41	42.65	L1TP	002	June	US standard (tropical)
7	LC08_L1TP_164070_20140802_20200911_02_T1	2014-08-02	07:22:02 UTC	Landsat 8	8.62	8.97	45.86	L1TP	002	August	Mid-latitude summer
8	LC08_L1TP_164070_20140919_20200910_02_T1	2014-09-19	07:22:10 UTC	Landsat 8	2.59	3.94	58.50	L1TP	002	September	Mid-latitude summer
9	LC08_L1TP_164070_20150517_20200909_02_T1	2015-05-17	07:21:04 UTC	Landsat 8	0.40	0.23	46.20	L1TP	002	May	US standard (tropical)
10	LC08_L1TP_164070_20150602_20200909_02_T1	2015-06-02	07:21:11 UTC	Landsat 8	10.47	14.91	43.82	L1TP	002	June	US standard (tropical)
11	LC08_L1TP_164070_20150821_20200908_02_T1	2015-08-	07:21:48 UTC	Landsat 8	0.67	0.39	50.16	L1TP	002	August	Mid-latitude summer

		21									
12	LC08_L1TP_164070_20150922_20200908_02_T1	2015-09-22	07:22:02 UTC	Landsat 8	15.72	18.16	59.21	L1TP	002	September	Mid-latitude summer
13	LC08_L1TP_164070_20160503_20200907_02_T1	2016-05-03	07:21:41 UTC	Landsat 8	7.36	8.90	48.72	L1TP	002	May	US standard (tropical)
14	LC08_L1TP_164070_20160620_20200906_02_T1	2016-06-20	07:21:47 UTC	Landsat 8	6.70	2.59	42.39	L1TP	002	June	US standard (tropical)
15	LC08_L1TP_164070_20160823_20200906_02_T1	2016-08-23	07:22:10 UTC	Landsat 8	6.58	2.82	50.97	L1TP	002	August	Mid-latitude summer
16	LC08_L1TP_164070_20160908_20200906_02_T1	2016-09-08	07:22:16 UTC	Landsat 8	1.32	0.18	55.52	L1TP	002	September	Mid-latitude summer
17	LC08_L1TP_164070_20170522_20200904_02_T1	2017-05-22	07:21:33 UTC	Landsat 8	18.01	8.34	45.37	L1TP	002	May	US standard (tropical)
18	LC08_L1TP_164070_20170623_20200903_02_T1	2017-06-23	07:21:48 UTC	Landsat 8	15.40	12.12	42.30	L1TP	002	June	US standard (tropical)
19	LC08_L1TP_164070_20170826_20200903_02_T1	2017-08-26	07:22:08 UTC	Landsat 8	21.97	22.73	51.71	L1TP	002	August	Mid-latitude summer
20	LC08_L1TP_164070_20170927_20200903_02_T1	2017-09-27	07:22:15 UTC	Landsat 8	5.29	0.35	60.71	L1TP	002	September	Mid-latitude summer
21	LC08_L1TP_164070_20180509_20200901_02_T1	2018-05-09	07:21:08 UTC	Landsat 8	7.70	2.78	47.63	L1TP	002	May	US standard (tropical)
22	LC08_L1TP_164070_20180610_20200831_02_T1	2018-06-10	07:20:53 UTC	Landsat 8	6.14	0.72	42.90	L1TP	002	June	US standard (tropical)
23	LC08_L1TP_164070_20180813_20200831_02_T1	2018-08-13	07:21:28 UTC	Landsat 8	17.69	19.23	48.16	L1TP	002	August	Mid-latitude summer
2	LC08_L1TP_164070_2018091	20	07:21	Lan	6.8	0.7	56.99	L1TP	002	Septe	Mid-

4	4_20200830_02_T1	18-09-14	:40 UTC	dsat 8	4	8				mber	latitude summer
25	LC08_L1TP_164070_20190512_20200828_02_T1	2019-05-12	07:21:35 UTC	Landsat 8	28.05	29.86	47.17	L1TP	002	May	US standard (tropical)
26	LC08_L1TP_164070_20190613_20200828_02_T1	2019-06-13	07:21:52 UTC	Landsat 8	21.87	27.17	42.80	L1TP	002	June	US standard (tropical)
27	LC08_L1TP_164070_20190816_20200827_02_T1	2019-08-16	07:22:11 UTC	Landsat 8	30.07	40.58	48.96	L1TP	002	August	Mid-latitude summer
28	LC08_L1TP_164070_20190901_20200826_02_T1	2019-09-01	07:22:15 UTC	Landsat 8	1.97	1.53	53.29	L1TP	002	September	Mid-latitude summer
29	LC08_L1TP_164070_20200514_20200820_02_T1	2020-05-14	07:21:28 UTC	Landsat 8	1.32	0.92	46.65	L1TP	002	May	US standard (tropical)
30	LC08_L1TP_164070_20200615_20200824_02_T1	2020-06-15	07:21:42 UTC	Landsat 8	4.60	5.51	42.60	L1TP	002	June	US standard (tropical)
31	LC08_L1TP_164070_20200818_20200823_02_T1	2020-08-18	07:22:05 UTC	Landsat 8	15.70	13.97	49.64	L1TP	002	August	Mid-latitude summer
32	LC08_L1TP_164070_20200919_20201005_02_T1	2020-09-19	07:22:19 UTC	Landsat 8	5.94	1.25	58.66	L1TP	002	September	Mid-latitude summer
33	LC08_L1TP_164070_20210501_20210508_02_T1	2021-05-01	07:21:35 UTC	Landsat 8	13.87	10.66	49.17	L1TP	002	May	US standard (tropical)
34	LC08_L1TP_164070_20210618_20210628_02_T1	2021-06-18	07:21:54 UTC	Landsat 8	7.19	10.71	42.47	L1TP	002	June	US standard (tropical)
35	LC08_L1TP_164070_20210821_20210827_02_T1	2021-08-21	07:22:13 UTC	Landsat 8	30.13	38.08	50.38	L1TP	002	August	Mid-latitude summer
36	LC08_L1TP_164070_20210906_20210915_02_T1	2021-09-	07:22:18 UTC	Landsat 8	6.62	4.07	54.88	L1TP	002	September	Mid-latitude summer

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37	LC08_L1TP_164070_20220520_20220525_02_T1	2022-05-20	07:21:59 UTC	Landsat 8	12.65	16.73	45.78	L1TP	002	May	US standard (tropical)
38	LC08_L1TP_164070_20220621_20220701_02_T1	2022-06-21	07:22:16 UTC	Landsat 8	11.23	11.71	42.40	L1TP	002	June	US standard (tropical)
39	LC09_L1TP_164070_20220816_20230402_02_T1	2022-08-16	07:22:15 UTC	Landsat 9	3.24	4.92	49.00	L1TP	002	August	Mid-latitude summer
40	LC09_L1TP_164070_20220917_20230328_02_T1	2022-09-17	07:22:21 UTC	Landsat 9	4.16	5.69	57.97	L1TP	002	September	Mid-latitude summer
41	LC08_L1TP_164070_20230507_20230517_02_T1	2023-05-07	07:21:26 UTC	Landsat 8	11.27	17.49	48.08	L1TP	002	May	US standard (tropical)
42	LC09_L1TP_164070_20230616_20230616_02_T1	2023-06-16	07:21:22 UTC	Landsat 9	1.00	0.99	42.51	L1TP	002	June	US standard (tropical)
43	LC09_L1TP_164070_20230819_20230819_02_T1	2023-08-19	07:21:50 UTC	Landsat 9	7.45	0.65	49.65	L1TP	002	August	Mid-latitude summer
44	LC09_L1TP_164070_20230920_20230920_02_T1	2023-09-20	07:22:07 UTC	Landsat 9	5.80	3.15	58.68	L1TP	002	September	Mid-latitude summer
45	LC08_L1TP_164070_20240525_20240610_02_T1	2024-05-25	07:21:06 UTC	Landsat 8	2.70	1.43	44.79	L1TP	002	May	US standard (tropical)
46	LC09_L1TP_164070_20240602_20240602_02_T1	2024-06-02	07:21:25 UTC	Landsat 9	15.73	15.79	43.74	L1TP	002	June	US standard (tropical)
47	LC09_L1TP_164070_20240805_20240805_02_T1	2024-08-05	07:21:34 UTC	Landsat 9	0.59	0.13	46.48	L1TP	002	August	Mid-latitude summer
48	LC08_L1TP_164070_20240914_20240920_02_T1	2024-09-14	07:21:57 UTC	Landsat 8	1.06	0.13	57.18	L1TP	002	September	Mid-latitude summer

Table S14. Per-class accuracy of the 2024 composite

Class	n reference	n classified	Producer's accuracy (%)	User's accuracy (%)	Omission error (%)	Commission error (%)
Dense built-up	39	38	94.9	97.4	5.1	2.6
Sparse built-up	57	58	94.7	93.1	5.3	6.9
Vegetation	50	45	88.0	97.8	12.0	2.2
Bare soil / sand	30	30	90.0	90.0	10.0	10.0
Water	19	24	100.0	79.2	0.0	20.8
Overall accuracy	195	195	92.82	92.82	—	—
Unweighted mean of the five classes	195	195	93.52	91.48	—	—