

Table S1. A brief presentation of temperature changes within LCZ patterns from studies identified in the review. Values/indices: T_a – air temperature, LST – land surface temperature, UHI – urban heat island, SUHI – surface urban heat island, PET – physiological equivalent temperature, HUMIDEX – HUMAN Influence EXperiment, BBQ – barbeque days, WRF – weather research forecasting model.

NIGHT-TIME				
Fixed (<i>in-situ</i>) measurement				
City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Berlin Germany)	5 stations: summer period 2001–2010	T _a	LCZ 5 > LCZ 6 > LCZ A > LCZ B	Fenner et al. 2014.
Szeged (Hungary)	24 stations, 2 nights: 29–31 March, 2014. 48h	T _a	LCZ 2 > LCZ 3 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ 9 ≈ LCZ D	Unger et al. 2014
Dublin (Eire)	6 stations, 3 nights: 30 August–1 September, 2010 (2100–0600 hours)	T _a	LCZ 2 > LCZ 3 > LCZ 6 ≈ LCZ 5 > LCZ D	Alexander & Mills 2014
Olomouc (Czech Republic)	14 stations, 15 nights: 2010–2011 (8 hours after sunset)	T _a	LCZ 2 > LCZ 5 > LCZ 4 > LCZ 6 ≈ LCZ 9 > LCZ D	Lehnert et al. 2015
Cluj Napoca (Romania)	(8 fixed points, 3 nights: 13–14 May, 22–23 July and 24–25 October, 2015 (2300–0200))	T _a	LCZ 1 ≈ LCZ 2 ≈ LCZ 3 ≈ LCZ B > LCZ 8G > LCZ 9	Herbel et al 2016
Szeged (Hungary)	24 stations, June 2014: May 2015 (mean maximum night-time temperature differences)	T _a	generally: LCZ 3 > LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ 9; ideal days: LCZ 2 ≈ LCZ 3 ≈ LCZ 5 > LCZ 8 > LCZ 6 > LCZ 9	Gal et al. 2016
Novi Sad (Serbia)	8 stations: 5–8 July 2014 (heat wave HW)	PET	LCZ 2 > LCZ 5 > LCZ 8 > LCZ 3 > LCZ 6 > LCZ 9 > LCZ D > LCZ A	Milošević et al. 2016
Szeged (Hungary); Novi Sad (Serbia)	24 stations (Sz), 27 stations (NS): 3–5. July, 2014 and 19–20. July, 2014, 0000 UTC time	T _a	SZ: LCZ 2 > LCZ 3 > LCZ 8 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ D; NS: LCZ 2 > LCZ 6 > LCZ 5 > LCZ 3 > LCZ 8 > LCZ A ≈ LCZ D	Lelovics et al. 2016.
Szeged (Hungary)	20 stations: June–August, 2014;	T _a	LCZ 3 > LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ 9 > LCZ D	Skarbit et al. 2017
Novi Sad (Serbia)	9 stations: 17–25 July and 4–15 August, 2015 HW (2100–0500)	UHI index	LCZ 2 ≈ LCZ 5 > LCZ 3 ≈ LCZ 6 > LCZ 9	Savic et al. 2018
Szeged (Hungary)	2014 and 2017, two 5-day periods: normal (N) and heat wave (HW), UCMN data	PET/ΔT	LCZ 2 > LCZ 6 ≈ LCZ 8 > LCZ 9	Unger et al. 2020
Mobile measurements				
City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Dublin (Eire)	6 stations, 3 nights: 30 August–1 September, 2010 (0100–0200)	T _a	LCZ 2 > LCZ 3 > LCZ 8 > LCZ 6 ≈ LCZ 5 > LCZ D	Alexander & Mills 2014
Szeged (Hungary)	4 nights: 2002–2003 (reference time four hours after sunset)	T _a	LCZ 2 > LCZ 3 > LCZ 8 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ D	Lelovics et al. 2014
Nancy (France)	July–September, 2012 and 2013 (0000–0230)	T _a	LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6/9 > LCZ D	Leconte et al. 2015

Nancy (France)	9 July and 15 August, 2013 (3h after sunset); 5 and 6 September 2013 7h after sunset)	T _a	LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6/9 > LCZ 8 > LCZ D	Leconte et al. 2017
Brno; Olomouc (Czech Republic)	Brno: 4 nights in July–September, 2011 (0–5 h after sunset); Olomouc: 5 nights in July–September, 2016 (2–5 h after sunset)	T _a	Brno: LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ 9 > LCZ A ≈ LCZ D; Olomouc: LCZ 2 > LCZ 5 > LCZ 8 ≈ LCZ 6 ≈ LCZ 9 > LCZ B > LCZ D	Lehnert et al. 2018a
Olomouc (Czech Republic)	16 days: July 2016–February, 2017 (noon and two hours after sunset)	T _a	2h after sunset: LCZ 2 > LCZ 5 > LCZ 6 > LCZ 8 > LCZ B > LCZ E > LCZ D > LCZ 9	Lehnert et al. 2018b
Modelling outcomes				
City	Sample reviewed	Values/indices (T _a /LST/UHI/PET)	LCZ in order of temperature	Source
Oberhausen (Germany)	8 stations: August 2010–July, 2011 (number of tropical nights, warm nights); 10.07.2010 - PET	tropical nights, warm nights; PET	tropical nights, warm nights: LCZ 2 > LCZ 8 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ A ≈ LCZ D; PET (night-time): LCZ A > LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ d > LCZ 9	Muller et al. 2014
Brno (Czech Republic)	14 stations: 4–14 August, 2015 (HW) (1000; 1600; 2200)	HUMIDEX	2200: LCZ 2 > LCZ 10 > LCZ 5 > LCZ 3 > LCZ 4 > LCZ 8 > LCZ 6 > LCZ E > LCZ C ≈ LCZ 9 ≈ LCZ B ≈ LCZ D > LCZ G > LCZ A	Geletič et al. 2018
Antwerp; Brussels; Ghent (Belgium)	Summers 2014 & 2015 (0100): Antwerp 82 nights, Brussels 101 nights, Ghent 76 nights	T _a	Antwerp: LCZ 2 > LCZ 3 > LCZ 8 ≈ LCZ E > LCZ 10 > LCZ 6 > LCZ G > LCZ A > LCZ B > LCZ 9 > LCZ D; Brussels: LCZ 2 > LCZ 3 > LCZ 8 > LCZ 6 > LCZ A > LCZ 9 ≈ LCZ B > LCZ D; Ghent: LCZ 3 > LCZ 2 > LCZ 8 > LCZ 6 ≈ LCZ G > LCZ A > LCZ 9 > LCZ B > LCZ D	Verdonck et al. 2018
42 cities in France	Statistical analysis of the night-time UHI for 42 cities selected according to LWT, based on the results of a six-summer-day simulation with mesoscale atm. model Meso-NH	UHII	LCZ 3 > LCZ 2 > LCZ 1 > LCZ 5 > LCZ 6 > LCZ 4 > LCZ E > LCZ 8 > LCZ 9 > LCZ 7 > LCZ D > LCZ G	Gardes et al. 2020
Remote sensing				
City	Sample reviewed	Values/indices (T _a /LST/UHI/PET)	LCZs in order of temperature	Source
Szeged (Hungary)	12 and 14 August, 2008, between 1815 and 1945 UTC: aeroplane-borne, self-developed low-cost, small-format digital imaging system	LST	LCZ 2 > LCZ 3 > LCZ 5 ≈ 8 > LCZ 6 > LCZ 9 > LCZ A/B/C/D/G	Skarbit et al. 2015
Lisbon (Portugal)	HW day Landsat Scene 06 July, 2013	mean LST (K)	LCZ D ≈ LCZ E ≈ LCZ 6 ≈ LCZ 3 = LCZ 8 ≈ LCZ C ≈ LCZ F ≈ LCZ 5 > LCZ 2 = LCZ 4 > LCZ 1 = LCZ 10 ≈ LCZ 9 ≈ LCZ B > LCZ A > LCZ G	Oliveira et al. 2020
Szeged (Hungary); Novi Sad (Serbia)	MODIS, 01 June, 2014–31 May, 2018	ΔLST	(SZ) winter: LCZ 5 ≈ LCZ 3 ≈ LCZ 2 > LCZ 6 > LCZ 9 > LCZ 8; summer: LCZ 2 > LCZ 3 > LCZ 6 > LCZ 5 > LCZ 9 ≈ LCZ 8; (NS) winter: LCZ 2 > LCZ 5 > LCZ 3 > LCZ 6 ≈ LCZ 8 > LCZ 9; summer: LCZ 2 > LCZ 5 ≈ LCZ 3 > LCZ 8 > LCZ 6 > LCZ 9	Fricke et al. 2020
Budapest (Hungary)	January 2001–October, 2016: MODIS data	SUHII	summer: LCZ 2 > LCZ 5 > LCZ G > LCZ 6 ≈ LCZ 8 > LCZ A > LCZ D; winter: LCZ 2	Dian et al. 2020

> LCZ 5 > LCZ G > LCZ 6 > LCZ A ≈ LCZ 8 > LCZ D

DAYTIME

Fixed (*in-situ*) measurement

City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Hamburg (Germany)	1 September, 2011–31 August 2012, 0800–2000 CET	T _a	LCZ 2 > LCZ 6 > LCZ D	Wiesner et al. 2014
Novi Sad (Serbia)	8 stations: 5–8 July, 2014 (HW)	PET	LCZ D > LCZ 5 > LCZ 3 > LCZ 6 > LCZ 8 > LCZ 9 > LCZ 2 ≈ LCZ A	Milošević et al. 2016
Berlin (Ger- many)	CWS (Netatmo) and 10 reference sites, 2015	T _a	mean annual: LCZ 2 > LCZ 4 = LCZ 5 > LCZ 6 > LCZ A > LCZ D > LCZ 9 > LCZ B	Fener et al. 2017
Augsburg (Germany)	38 stations: 15 December, 2014– 05 October, 2017	T _a	LCZ 2 > LCZ 5 > LCZ 8 > LCZ 6 > LCZ D > LCZ B > LCZ A	Beck et al. 2018
Szeged (Hungary)	24 stations: (32 months, 1 June 2014 - 31 January 2017)	PET	LCZ 2 > LCZ 3 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ D	Unger et al. 2018

Mobile measurements

City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Szeged (Hungary)	4 nights, 2002–2003 (reference time four hours after sunset)	T _a	LCZ 2 > LCZ 3 > LCZ 8 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ D	Lelovics et al. 2014
Nancy (France)	July–September 2012 and 2013 (1400–1630)	T _a	LCZ 2 > LCZ 8 > LCZ 5 > LCZ 6/9 > LCZ D	Leconte et al. 2015
Augsburg (Germany)	22 measurement campaigns: June– August, 2017 (1200–1500)	T _a	LCZ 5 > LCZ B > LCZ A	Rathmann et al. 2020

Modelling outcomes

City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Oberhausen (Germany)	8 stations: August 2010–July, 2011 (BBQ days); 10.07.2010 - PET	BBQ days & PET	BBQ: LCZ 2 > LCZ 8 > LCZ 5 > LCZ 6 > LCZ 9 > LCZ A ≈ LCZ D; PET (daytime): LCZ 2 > LCZ 5 ≈ LCZ 6 > LCZ D > LCZ 8 > LCZ 9 > LCZ A	Muller et al. 2014
Brno (Czech Republic)	14 stations: 4–14 August, 2015 (HW) (1000; 1600; 2200)	HUMIDEX	1000: LCZ 6 > LCZ 9 > LCZ 3 > LCZ 5 ≈ LCZ E ≈ LCZ D > LCZ C > LCZ 8 ≈ LCZ B > LCZ 10 > LCZ A > LCZ 2 > LCZ 4 > LCZ 9; 1600: LCZ 3 > LCZ 5 > LCZ 10 ≈ LCZ 2 > LCZ 6 ≈ LCZ 8 > LCZ E > LCZ 4 ≈ LCZ 9 > LCZ B ≈ LCZ C ≈ LCZ D > LCZ G > LCZ A	Geletič et al. 2018
Brussels (Bel- gium)	UrbClim simulation of T _a for the near future (2031–2050, referred to as 2040) and a far future period (2081–2100, referred to as 2090)	T _a	LCZ 8 ≈ LCZ 1 ≈ LCZ 2 ≈ LCZ 3 > LCZ 5 ≈ LCZ 6 > LCZ 9 ≈ LCZ B ≈ LCZ A ≈ LCZ D	Verdonck et al. 2019
Szeged (Hungary)	18 July (1200 UTC)–24 July (0000 UTC), 2017	T _a -WRF	LCZ 5 > LCZ 2 > LCZ 9 > LCZ 6 > LCZ D	Molnar et al. 2019
Oslo (Nor- way)	Open-access air temperature data from 1452 privately-owned weather (Netatmo) stations during 2018.	T _a	LCZ 2 > LCZ 3 > LCZ 8 > LCZ 5 > LCZ 4 ≈ LCZ 6 > LCZ 9 > LCZ E > LCZ B > LCZ D > LCZ A	Venter et al. 2020

Remote sensing

City	Sample reviewed	Values/indices (T _a /LST/UHI/ PET)	LCZs in order of temperature	Source
Szeged (Hungary)	May 2015; July 2015; Sep 2015; February 2016; (0930-1030)	LST	May 2015: LCZ 2 > LCZ 3 > LCZ 8 > LCZ 6 > LCZ 5 > LCZ 9; July 2015: LCZ 8 ≈ LCZ 2 > LCZ 3 > LCZ 6 > LCZ 5 > LCZ 9; Sept 2015: LCZ 8 ≈ LCZ 2 ≈ LCZ 3 > LCZ 6 > LCZ 5 > LCZ 9; Feb: LCZ 3 > LCZ 2 ≈ LCZ 8 > LCZ 6 ≈ LCZ 5 > LCZ 9	Gemes et al. 2016
Prague; Brno (Czech Republic)	April 2002–June, 2015	LST	LCZ 10 > LCZ 3 > LCZ 2 > LCZ 8 > LCZ B > LCZ C > LCZ G > LCZ A	Geletič et al. 2016b
Brno; Prague (Czech Republic); Novi Sad (Serbia)	LANDSAT-8, 80 images: 19 – Brno, 32 – Prague and 29 – Novi Sad; spring 2013– summer 2018	LST	Brno: LCZ 10 > LCZ 2 ≈ LCZ 3 > LCZ 8 > LCZ 5 > LCZ 4 ≈ LCZ 6 ≈ LCZ E > LCZ 9 > LCZ F > LCZ B ≈ LCZ D > LCZ C > LCZ G > LCZ A; Prague: LCZ 3 > LCZ 2 > LCZ 8 > LCZ 5 > LCZ 10 > LCZ 4 ≈ LCZ 6 ≈ LCZ E > LCZ F > LCZ 9 > LCZ B ≈ LCZ C > LCZ D > LCZ G ≈ LCZ A; Novi Sad: LCZ 10 ≈ LCZ 2 > LCZ 8 ≈ LCZ 3 > LCZ 5 ≈ LCZ E > LCZ 6 > LCZ 7 > LCZ 4 ≈ LCZ F > LCZ 9 > LCZ B ≈ LCZ D > LCZ C > LCZ A > LCZ G	Geletič et al. 2019a
Budapest (Hungary)	January 2001–October 2016: MODIS data	SUHII	summer: LCZ 5 ≈ LCZ 2 > LCZ 8 > LCZ G ≈ LCZ 6 > LCZ D > LCZ A; winter: LCZ 2 > LCZ 5 ≈ LCZ G > LCZ 6 ≈ LCZ 8 > LCZ A > LCZ D	Dian et al. 2020
Szeged (Hungary); Novi Sad (Serbia)	MODIS, 01 June 2014–31 May 2018	ΔLST	(SZ) winter: LCZ 3 ≈ LCZ 5 ≈ LCZ 2 > LCZ 6 ≈ LCZ 8 ≈ LCZ 9; summer: LCZ 2 > LCZ 8 > LCZ 3 > LCZ 5 > LCZ 6 > LCZ 9; (NS) winter: LCZ 2 > LCZ 5 ≈ LCZ 3 > LCZ 8 > LCZ 9 > LCZ 6; summer: LCZ 2 > LCZ 8 > LCZ 3 > LCZ 5 > LCZ 6 > LCZ 9	Fricke et al. 2020
Olomouc (Czech Republic)	10 July, 2016, morning and afternoon aeroplane measurements (0500 and 1300)	LST	Av. afternoon T _s : LCZ 2 > LCZ 5 > LCZ 8 ≈ LCZ 4 > LCZ 6 > LCZ A > LCZ G*; Av. morning T _s : LCZ 8 > LCZ G > LCZ 2 ≈ LCZ 4 > LCZ 5 ≈ LCZ 6 > LCZ A	Pour et al. 2020