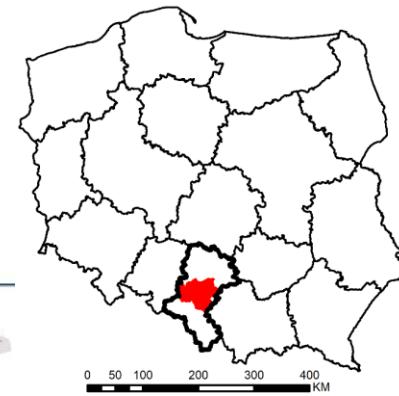


Spatial structure of the Surface Urban Heat Island in summer based on Landsat 8 imagery in the Górnośląsko – Zagłębiowska Metropolis, Southern Poland

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AIM

- (1) Determine the spatial structure of the surface urban heat island (**SUHI**) in GZM;
- (2) assess relationships between the type of land cover and the surface heat island (**SHI**) occurrence.

DATA

- Four LANDSAT 8 satellite images (OLI 30m; TIRS 100m);
- Corine Land Cover 2018 database of land cover and use.

METHODS

- Four LANDSAT 8 satellite images converted to land surface temperature (**LST**);
- Four indices of the SUHI spatial extent (a,b) calculated (Zhang and Wang 2008):

a) based on LST regardless of the type of land cover

SHI → $LST > LST_{mean} + 1 * SD$

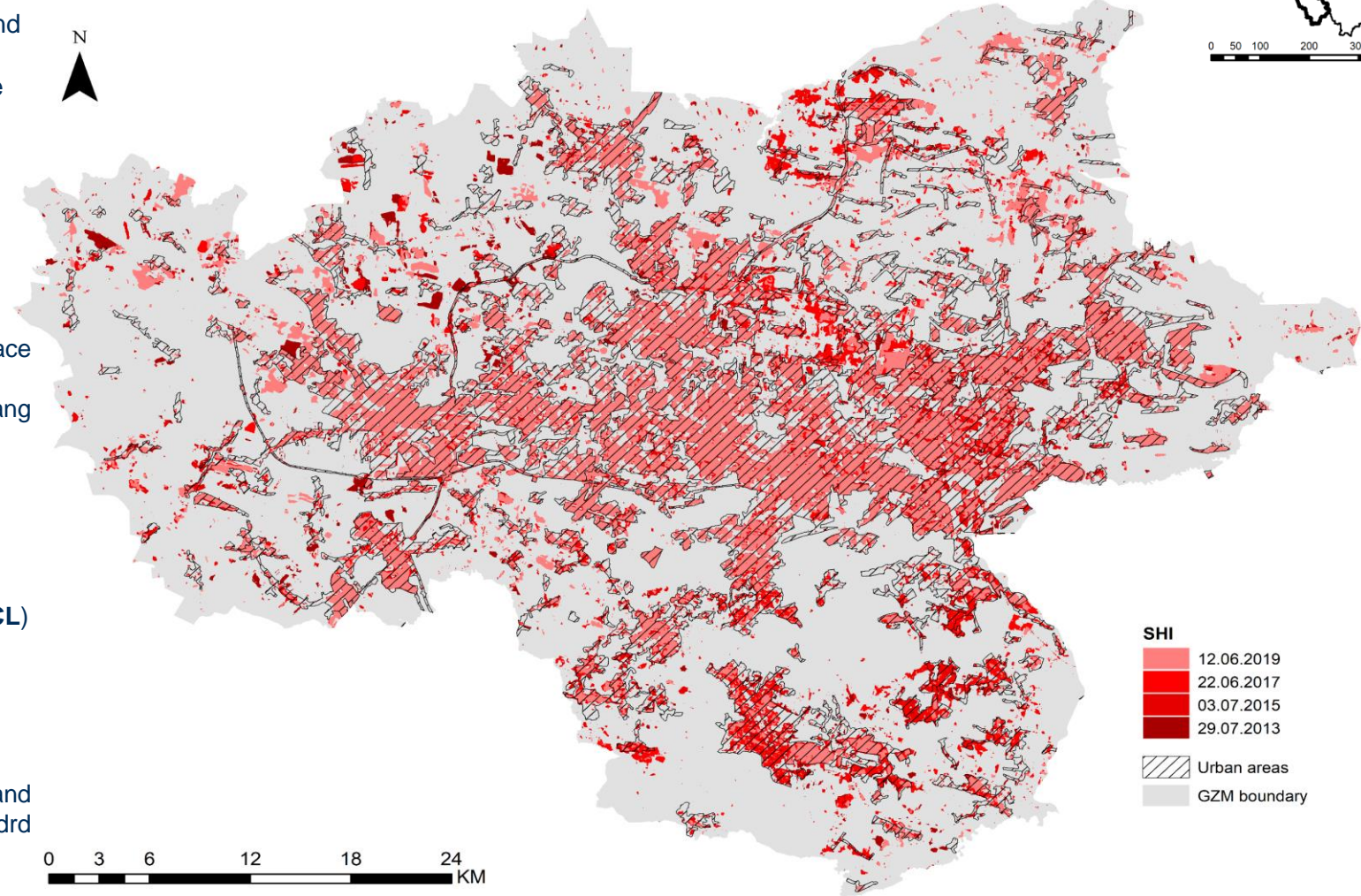
b) based on LST and land cover type, called land cover limited (**LCL**)

LCL SUHI1 → $LST > LST_{mean} + 1 * SD$

LCL SUHI2 → $LST > LST_{mean} + 2 * SD$

LCL SUHI3 → $LST > LST_{mean} + 3 * SD$

- The relationship between the type of land cover and the land surface temperature (LST) (min, max, range, mean and standard deviation of LST) investigated.



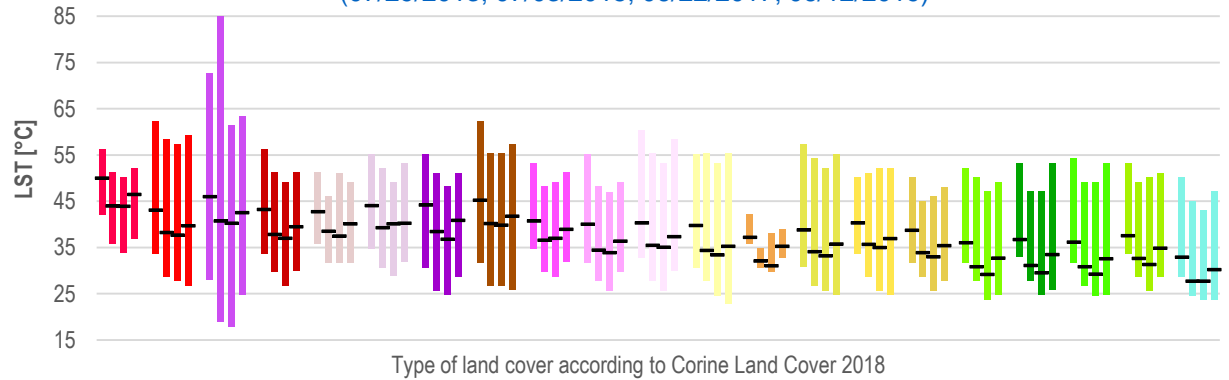
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Thresholds of land surface temperature (LST) for identification of heat islands, their spatial extent and mean LST for considered types of SHIs

Data	Indicator	LST threshold (°C)	SHIs Extent (%)	SHIs Extent (km ²)	Mean LST (°C)
29/07/2013	SHI	43.8	16.2	413.1	46.7 (±2.8)
	LCL SUHI ₁	43.8	13.6	346.3	47.0 (±2.9)
	LCL SUHI ₂	47.9	4.6	116.4	50.3 (±2.5)
	LCL SUHI ₃	52.0	1.0	24.5	54.2 (±2.5)
03/07/2015	SHI	38.7	16.4	418.6	41.4 (±2.8)
	LCL SUHI ₁	38.7	14.4	367.4	41.6 (±2.8)
	LCL SUHI ₂	42.8	4.3	108.8	45.2 (±2.5)
	LCL SUHI ₃	46.9	0.9	21.8	49.2 (±2.6)
22/07/2017	SHI	38.2	15.4	394.1	41.5 (±2.7)
	LCL SUHI ₁	38.2	12.8	326.4	41.7 (±2.7)
	LCL SUHI ₂	42.9	3.9	99.7	45.1 (±2.5)
	LCL SUHI ₃	47.6	0.5	11.6	50.4 (±2.6)
12/06/2019	SHI	40.5	15.9	401.8	43.6 (±2.7)
	LCL SUHI ₁	40.5	13.0	327.4	43.8 (±2.8)
	LCL SUHI ₂	44.8	4.2	105.4	47.2 (±2.3)
	LCL SUHI ₃	49.2	0.8	21.3	50.8 (±2.1)

The average land surface temperature (LST) for land cover types according to the Corine Land Cover 2018 for each analyzed term in chronological order (07/29/2013; 07/03/2015; 06/22/2017; 06/12/2019)



Percentage of the area occupied by land cover types within the surface heat island (SHI) for each analyzed term in chronological order

