

URBAN CLIMATOLOGY

VIII. Urban climate classificalion, Local Climate Zones











Urban Climate	Urban Climate Zone, UCZ ^e	Image	Rough ness class?	Aspect ratio ³	% Built (imperm- eable)#
zones (Oke 2004)	 Intensidy developed arban with detached close-set high-rise buildings with cladding, e.g. downtown lowers 		8	>2	> 90
	 Intensely developed high density urban with 2 - 5 storey, attached or very close-set buildings often of brick or store, e.g. old city core 	ເປັນແມ່ໄມ້ແມ	7	1.0 - 2.5	> 85
	 Highly developed, medium density arban with row or detached but close-set houses, stores 4 apartments e.g. arban housing 	ALABAII	7	0.5 - 1.5	70 - 85
	 Highly developed, low or medium density urban with large low buildings & paved parking, e.g. shapping mult, warehouses 	مض_ صحح	5	0.05- 0.2	70 - 95
	 Medium development, low density suburban with 1 or 2 storey houses, e.g. suburban housing 	A. M. 10. 34 10 10	6	0.2 - 0.6, up to >1 with trees	35 - 65
	 Mixed use with large buildings in open landscape, e.g. instbations such as hospital, university, algort 	An Coling Ann.	5	0.1 – 0.5, depends on trees	< 40
	 Sensi-tutal development, scattered houses in natural or agricultural area, e.g. farms, estates 	48. 1 W.R.H.	4	>0.05, depends on trees	< 10
	 A simplified set of closure that include relating to wind, thermal and mostlu- urban ternan zones in: (Dct.). Dct). Effective ternan roughness according if Append ratio = nuW is swerage height the clip centre this is the street carry and thermal controls (solar shading 4. Average proportion of ground plan to the areas in occupied by pervious co the areas in occupied by pervious co 	p: Q ² vegetation; — impervious ground, a speech of the schemes of Auer (1978) and Elefort e controls schemes at right, Agressmeth consegons to the bit scheme at right, Agressmeth consegons to the schemes and and an another and an another on the schemes and an another and an another and an engineers schemes (Balding, Here) if an or significant consequence is schemes (Balding and engineers schemes) (Balding, Here) if an engineers schemes) (Balding, Here) if an engineers schemes) (Balding, Here) if and engineers schemes) (Balding, Here) if and engineers schemes) (Balding, Here) (Balding, Here) engineers space, wheth and direct schemes) (Balding) (Balding) and examples schemes) (Balding	(1990/91 lence beto i), 5 (Du3) i), see Tab ided by th to flow reg ase this m her imperi) plus phys ecen UCZ 1.6 (Do6), le 2. en average ime types easure sig ious areat	ical measur and Elefter 7 (none) r spacing, ir (Oke 1987) policantly i the rest of

8.2 Concept of the Local Climate Zones (LCZ)

- Until recently, there was no universal approach to describe and characterize the physical nature of cities for urban climatologists.
- Much of the existing terminology was not transferable across cultural and geographical regions.
- To help standardize methods of observation and documentation in urban heat island studies, Stewart and Oke (2012) developed the <u>Local Climate Zone</u> (LCZ) classification scheme.

Local Climate Zones classification system





Local Climate Zones classification system

- Local climate zones are formally defined as regions of uniform surface cover, structure, material, and human activity that span hundreds of meters to several kilometers in horizontal scale.
- Each LCZ exhibits a characteristic geometry and land cover that results in characteristic screenheight temperature regime that is most apparent over dry surfaces, on calm, clear nights, and in areas of simple relief.
- LCZ scheme consists of 17 standard LCZs, of which 15 are defined by surface structure and cover and 2 by construction materials and anthropogenic heat emissions. The standard set is divided into "built types"(1-10), and "land cover types"(A-G)

There are several methods how to define LCZ:

- Method based on automatic classification of satellite imagery (WUDAPT, Bechtel et al.)
- GIS method using geo-database and a set of logical rules in the form of decision tree









8.3 Final remarks and questions

1. Why is simple Urban – rural division insufficient in urban climatology?

4

- 2. What were the main reasons to create LCZ classification scheme in urban climatology?
- 3. How can be LCZs used for mitigation negative effects of UHI and heat waves?
- 4. How can be LCZ useful e.g. to architects, planners, ecologists, and engineers?