# The WUDAPT Decade

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C. Ren, M. Wong, D. Niyogi, M. Neophytou,
A. Middel, I. Stewart, L. See, S. Arunachalam, Y. Shi

IAUC Community @ICUC-9, Toulouse, France, 2015



## 2011
Emergence of
LCZ Concept:
Croucher ASI,
Hong Kong

## 2012
Proof of Concept
LCZ to WUDAPT at
ICUC8, DUBLIN IR

## 2013
LC Z Workshop,
Dublin IR
Training Areas
from Satellite

## 2015
LCZ Training Workshop
ICUC-9, Toulouse Fr
City Specific LCZ maps
HUMINEX (Quality)

## 2018
ICUC-10, NYC,
City Specific LCZ maps
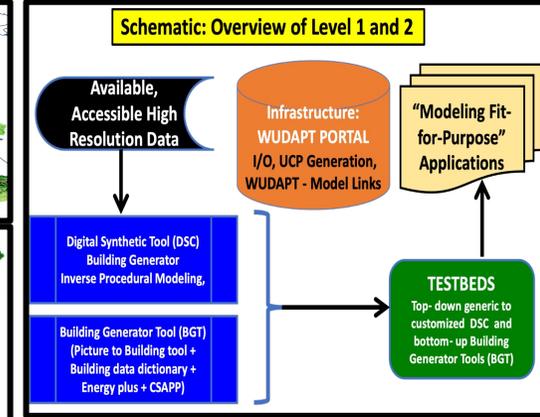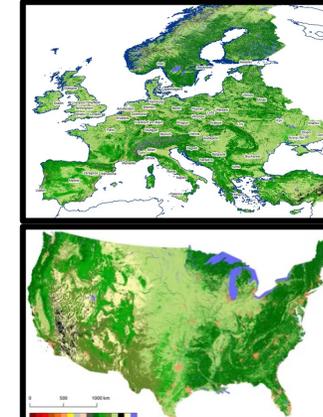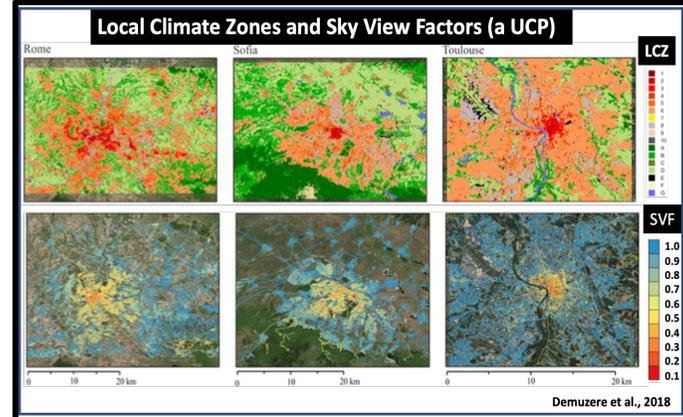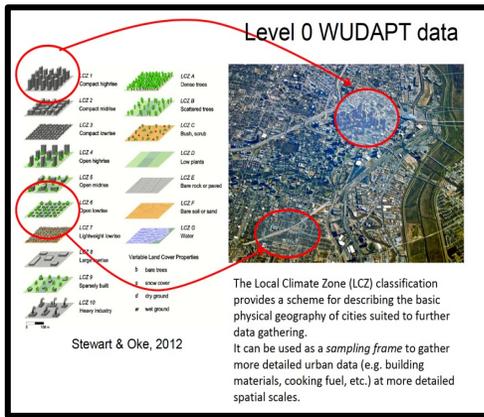Proposed LCZ City-
Regions-Global maps

## 2020 – 2022
AMS-BUE Boston
DSC, UBEM Tools
Regional Maps,
LCZ Generator, UCP Tools
Global  LCZ maps

## Future
Level 1&2 Testbeds
Fit for Purpose Applications
• Intraurban WX, AQ
• Sustainability
• Urban Planning



Level 0 WUDAPT data

Stewart & Oke, 2012

The Local Climate Zone (LCZ) classification
provides a scheme for describing the basic
physical geography of cities suited to further
data gathering.
It can be used as a *sampling frame* to gather
more detailed urban data (e.g. building
materials, cooking fuel, etc.) at more detailed
spatial scales.



**Level 2**
• Fit for Purpose Applications &Analyses
• Links to various multiscale tools
• Current and future climate projections
• WUDAPT to Global Climate Models

**Level 1**
• More Precise UCP for each LCZ
• Focus on Form ( e.g., building heights, street
  Width...) Function and Building Materials
• New Tools: DSC, UCP, UBEM
• Testbed as means to implementation

**Level 0**
• Local Climate Zone(LCZ) and UCP ranges
• Categorize city neighborhoods into LCZ classes
• Local Experts provide Training Areas
• Google Earth, Landsat and SAGA
• City specific, to Regional to Global LCZ Maps



Local Climate Zones and Sky View Factors (a UCP)

Demuzere et al., 2018





Schematic: Overview of Level 1 and 2

Available,
Accessible High
Resolution Data

Infrastructure:
WUDAPT PORTAL
I/O, UCP Generation,
WUDAPT - Model Links

"Modeling Fit-
for-Purpose"
Applications

Digital Synthetic Tool (DSC)
Building Generator
Inverse Procedural Modeling,

Building Generator Tool (BGT)
(Picture to Building tool +
Building data dictionary +
Energy plus + CSAPP)

TESTBEDS
Top- down generic to
customized  DSC and
bottom- up Building
Generator Tools (BGT)

## WHY?
• Enhanced risks, Climate Change
• Urban population exceeds 50%
• Need for Urban Services
• Science-Based Advanced Modeling
  Systems
    • Weather, Air Quality, Climate,
      Energy, GHG systems
    • Future Cities Modeling

## KEY PARADIGMS, APPROACHES
• Universal LCZ foundation
• Multiple Community based collaborations
• Innovation and methodology driven
• Strategic Hierarchical approach,
• Advanced Quality Assurance
• Dynamic LCZ change Implications
• Testbeds for
    • Methods evaluation
    • FFP Applications

## MAJOR OUTCOMES
• Unique City Specific LCZ maps
• Rationale for Intraurban capabilities
• Regional LCZ Maps
• Building to block scale Form and
  Function details
• Global LCZ map
• FFF Scale Dependent studies

## GET INVOLVED!
• Testbeds
• UCP Advances, refinements
• FFP Applications
• Future cities
• Global Climate data
  infrastructure