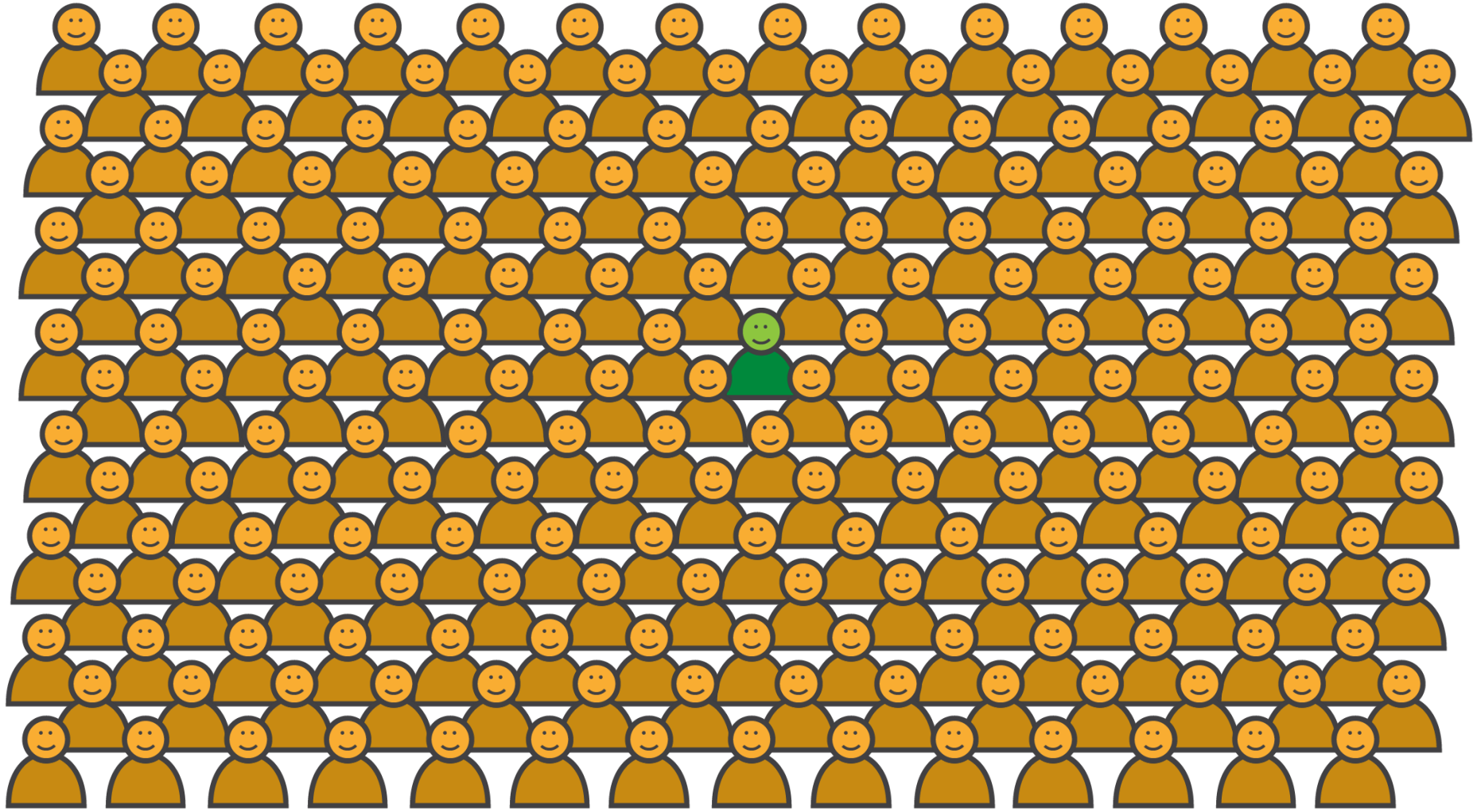
Urban Heat + Health Project

Brittany Sellers, Ph.D.
Orlando's Assistant Director of Sustainability & Resilien
Christopher K. Uejio
NASA HAQAST

WHAT COMES TO MIND WHEN YOU THINK OF ORLANDO?

1 Resident to 245 Tourists



WHAT ARE OUR SUSTAINABILITY & RESILIENCE GOALS?

City of Orlando Sustainability Goals

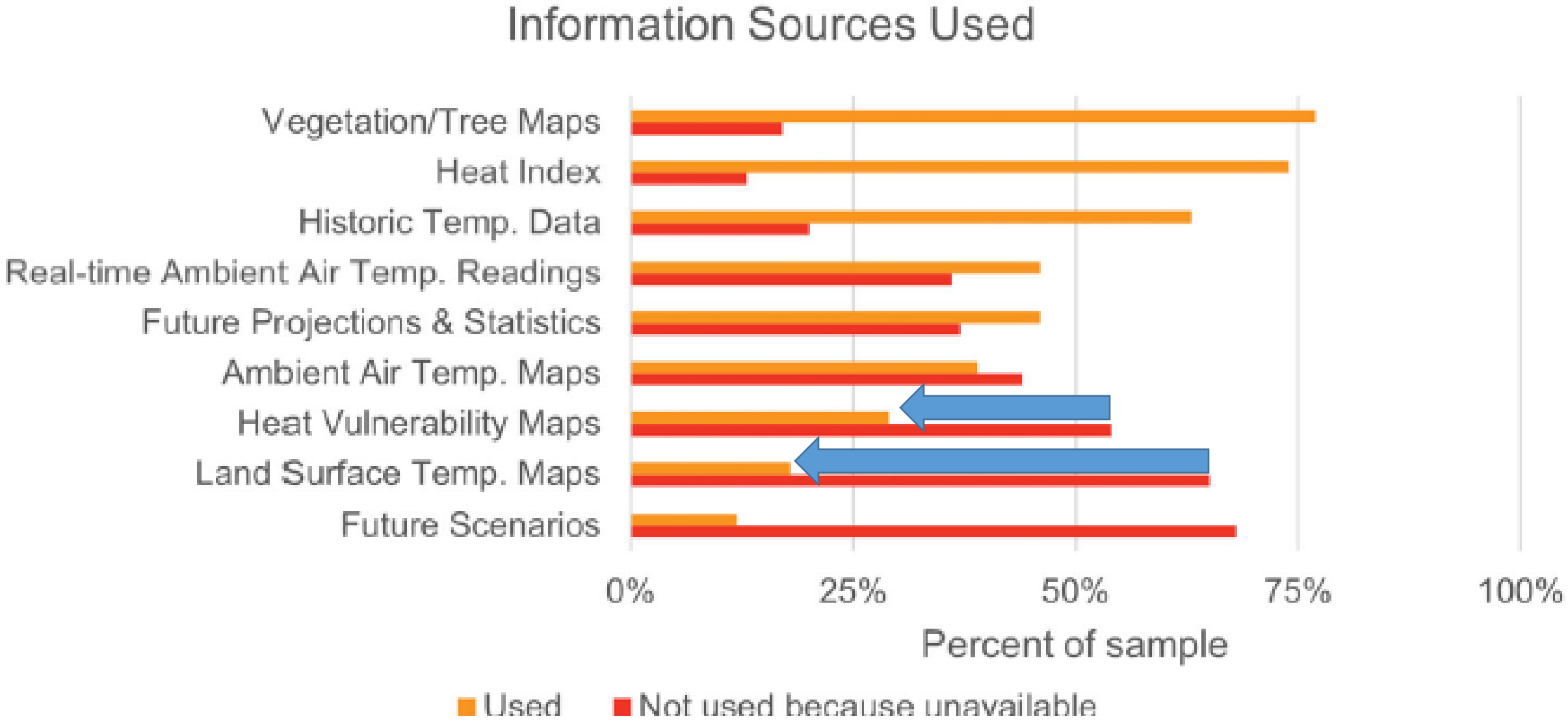
- 100% renewable energy by 2050
- 90% reduction in GHG emissions compared to 2007 levels by 2040
- Reduce water consumption by 20%
- Zero waste sent to landfill by 2040

Key Areas of Resilience

- Extreme heat
- Tropical cyclones & hurricanes
- Inland flooding
- Climate migration
- Drought & wildfire

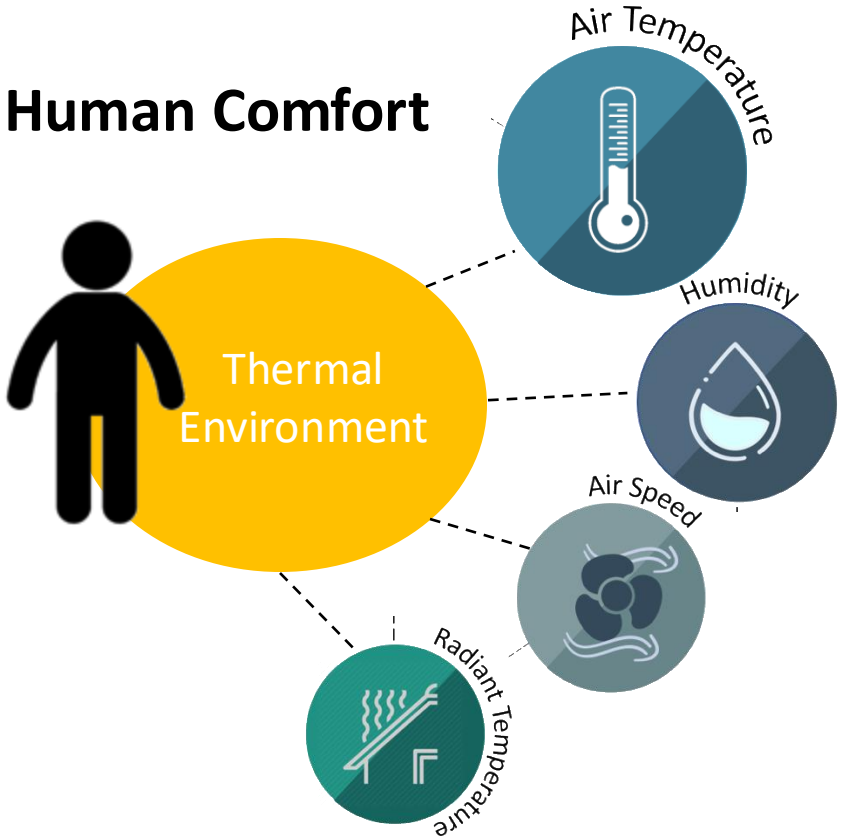
WHAT ARE SOME KEY CHALLENGES & FACTORS?

How Can We Address Different Issues Together?



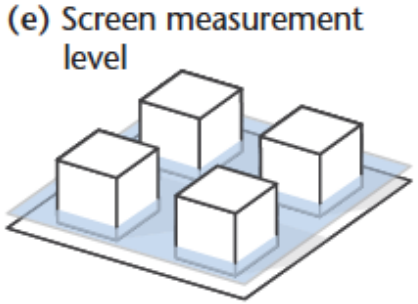
Meerow & Keith (2021)

Human Comfort



Air temperature (T_{air})

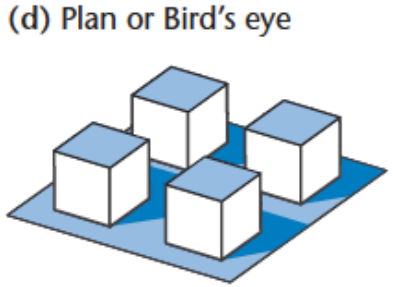
- Thermodynamic term



- Ground based obs.
- Urban canyon layer heat island

Land Surface Temperature (LST)

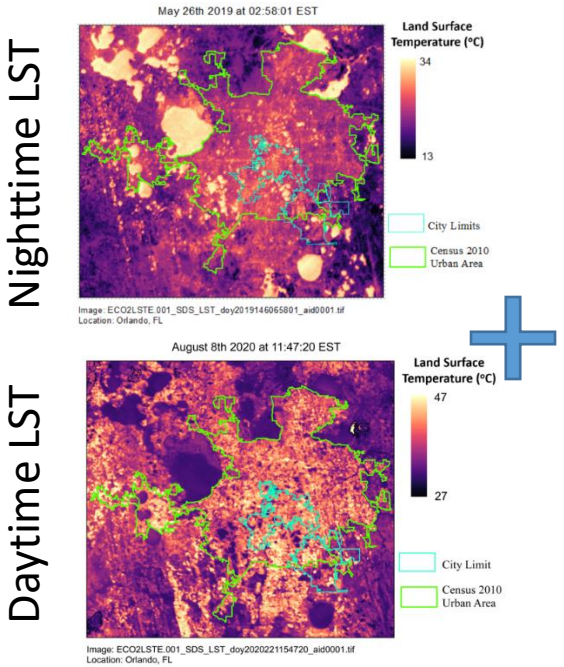
- Directional radiometric term



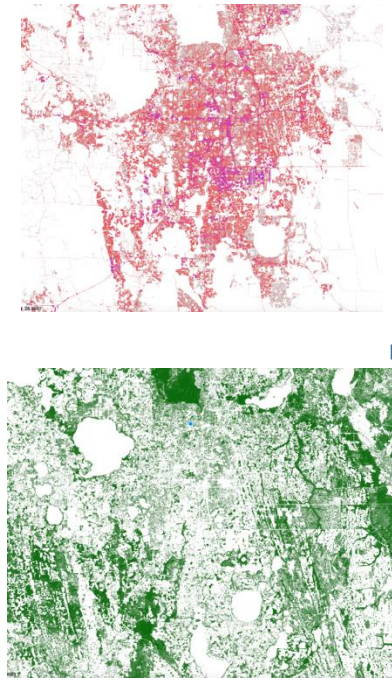
- Remote sensing obs.
- Surface urban heat island (UHI)

Diurnal high-resolution heat patterns over Orlando

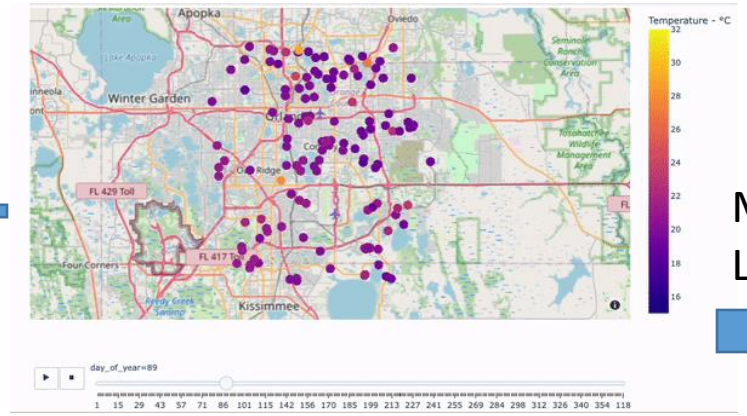
- Construct 70m hourly urban heat (air temperature) maps by blending high-resolution ECOSTRESS products and quality-controlled private weather stations.



ECOSTRESS LST products (70m,diurnal represented)



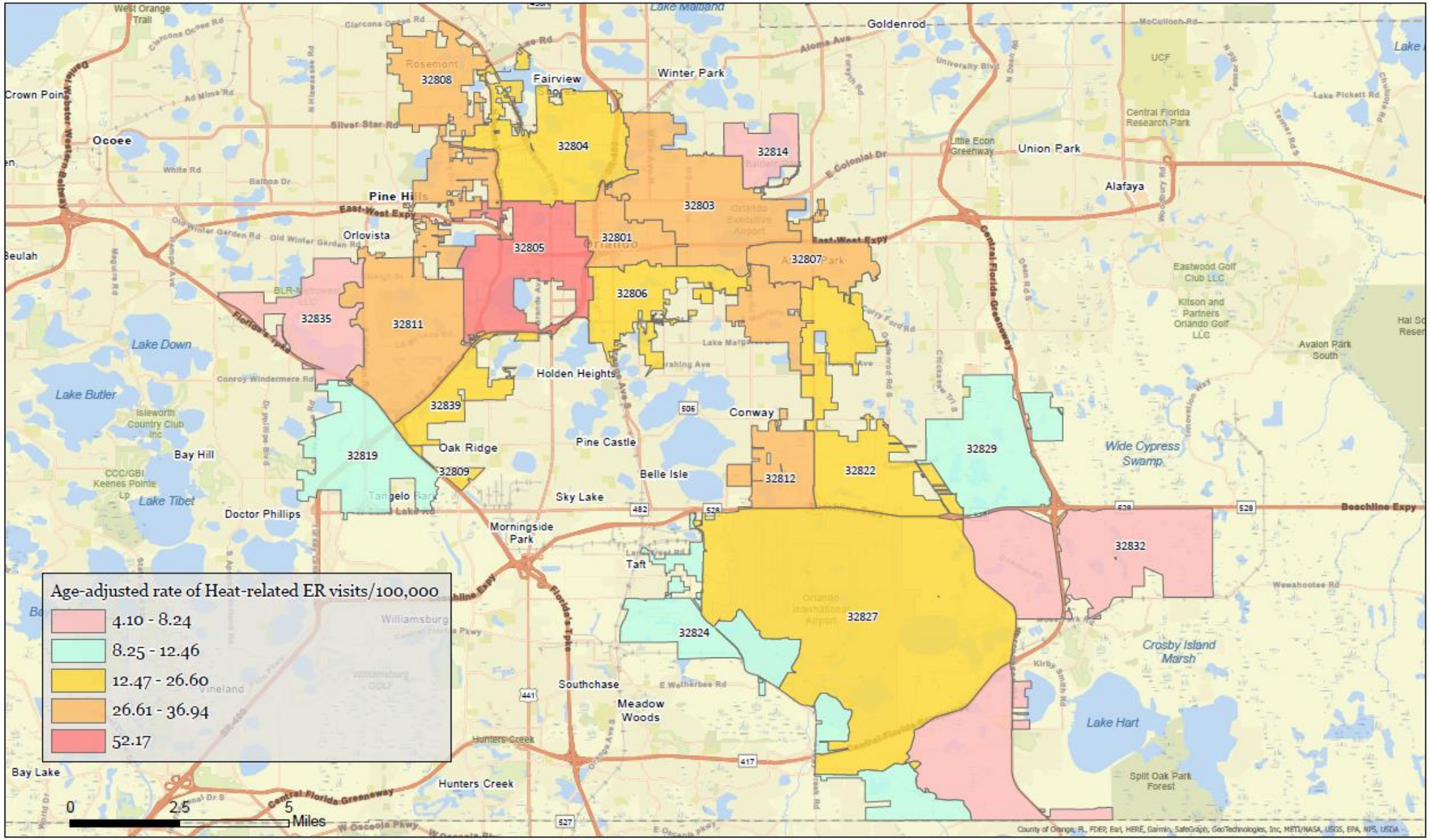
Surface properties, e.g., imperviousness and tree canopy covers (30m,NLCD)

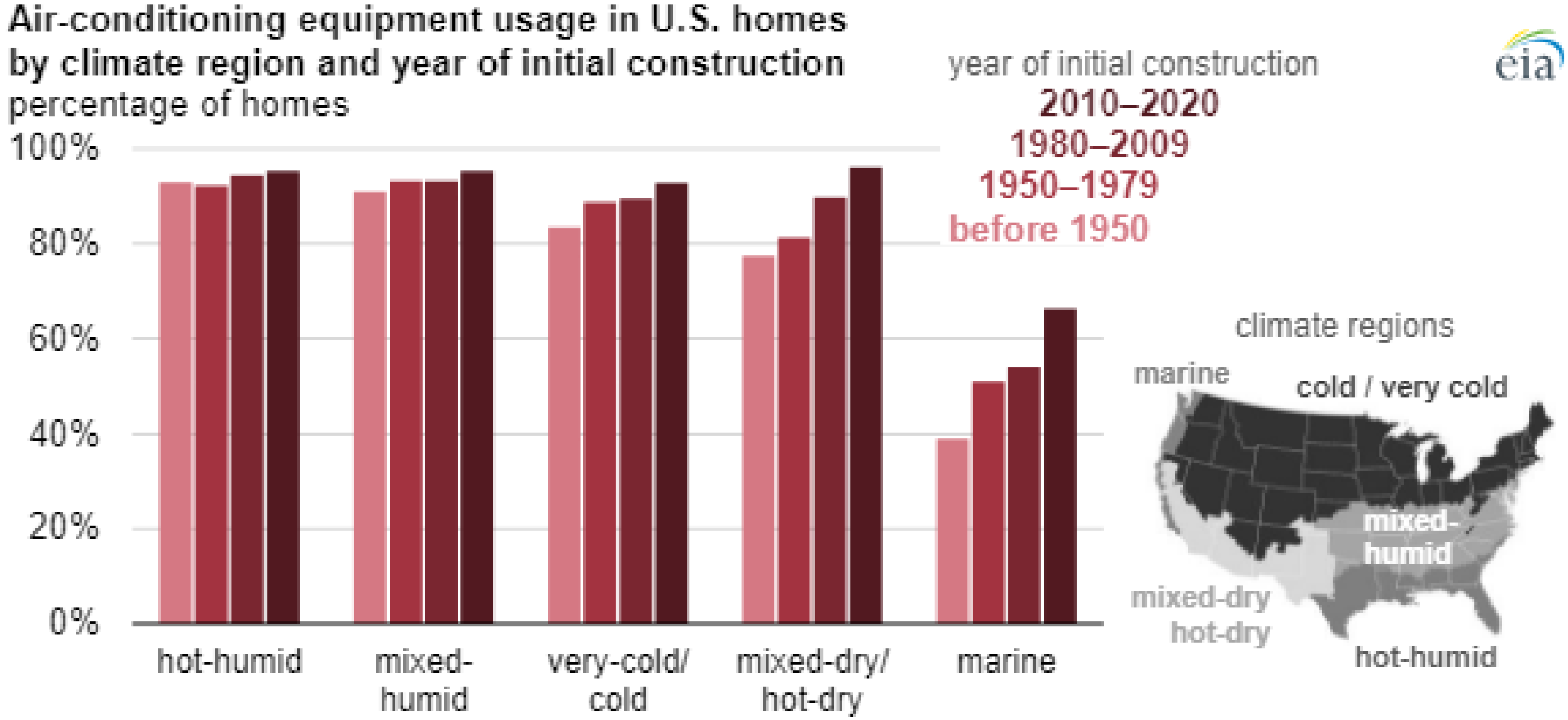


Hourly air temperatures from private weather stations

Machine Learning

City of Orlando Heat-Related Emergency Department Visits during the Summer Months (2015-2019)




Air-conditioning equipment usage in U.S. homes
by climate region and year of initial construction
percentage of homes
year of initial construction
2010–2020
1980–2009
1950–1979
before 1950
100%
80%
60%
40%
20%
0%
hot-humid
mixed-humid
very-cold/cold
mixed-dry/hot-dry
marine
climate regions
marine
cold / very cold
mixed-humid
mixed-dry
hot-dry
hot-humid
eia

Variables	Total (95% confidence interval)
Built Year	−0.01 *** (−0.02,−0.01)
Total area of property (Square ft)	−0.06*** (−0.1,−0.03)
Urbanicity (Metro UC)	0.18*** (0.12,0.25)
Urbanicity (Rural)	0.39*** (0.31,0.47)
% Over 65-year-old	0 (−0.01,0.01)
% Black African	0.01*** (0,0.01)
% Renter Occupied	0 (−0.01,0)
Median household income in the past 12 months (in 2019 inflation-adjusted dollars)	0 (−0.01,0)
% Hispanic or Latino	−0.01*** (−0.02,0)
Median property value (dollars)	0 (−0.01,0.01)
Number of room per resident	−0.01*** (−0.02,0)
% Historical Black African	0.01 *** (0,0.01)
% Complete plumbing households	−0.01 (−0.01,0)

(C) Percentage of no AC

0- 10
11 -20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Census tract boundary

N

0 1500 3000 6000 9000 12000 Kilometers

Thank you

cuejio@fsu.edu
@ckuejio.bsky.social

Picture curtesy online source: Chicago. Photo: JaySi/Getty Images