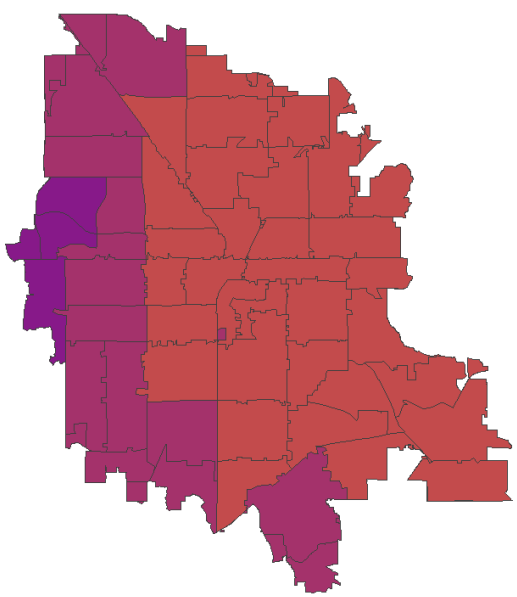
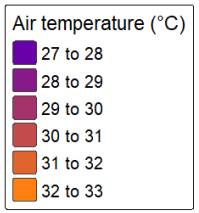
Earth Obsevations & Heat Mortality in Las Vegas, Nevada 2017-2024

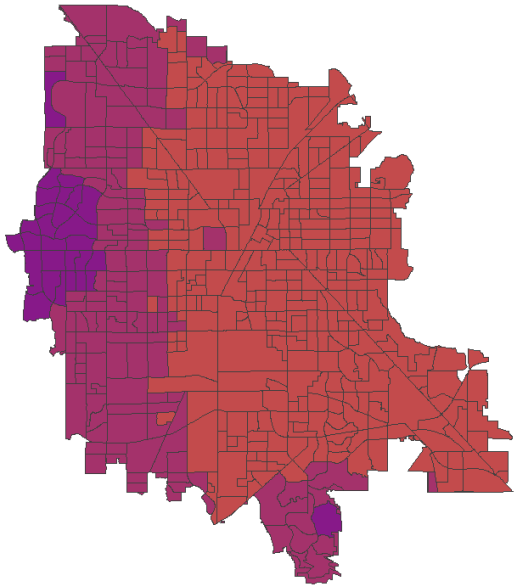
Ryan Slapikas, Chris Uejio, Leiqiu Hu. NASA HAQAST

2017



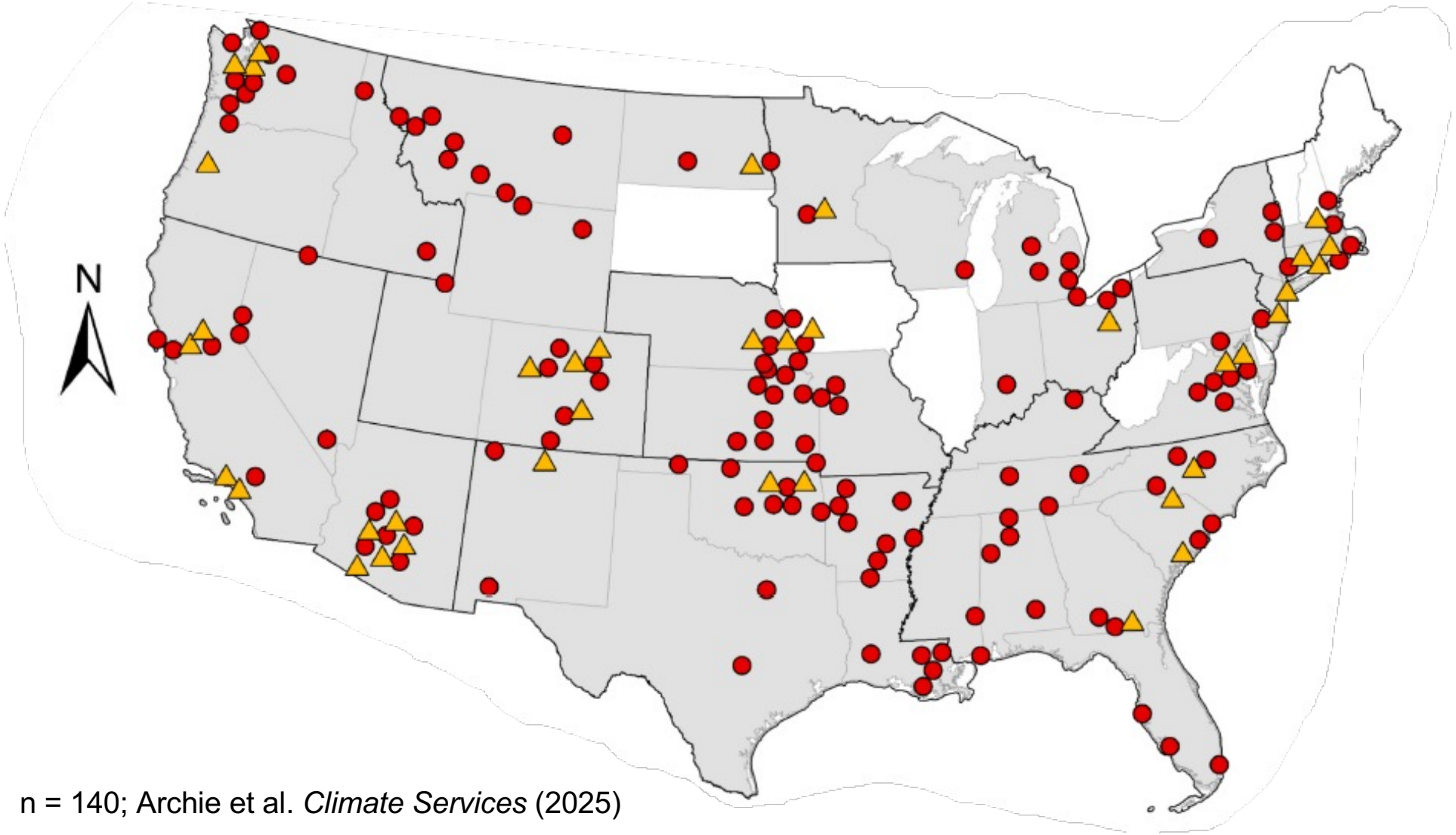


2017



Extreme Heat

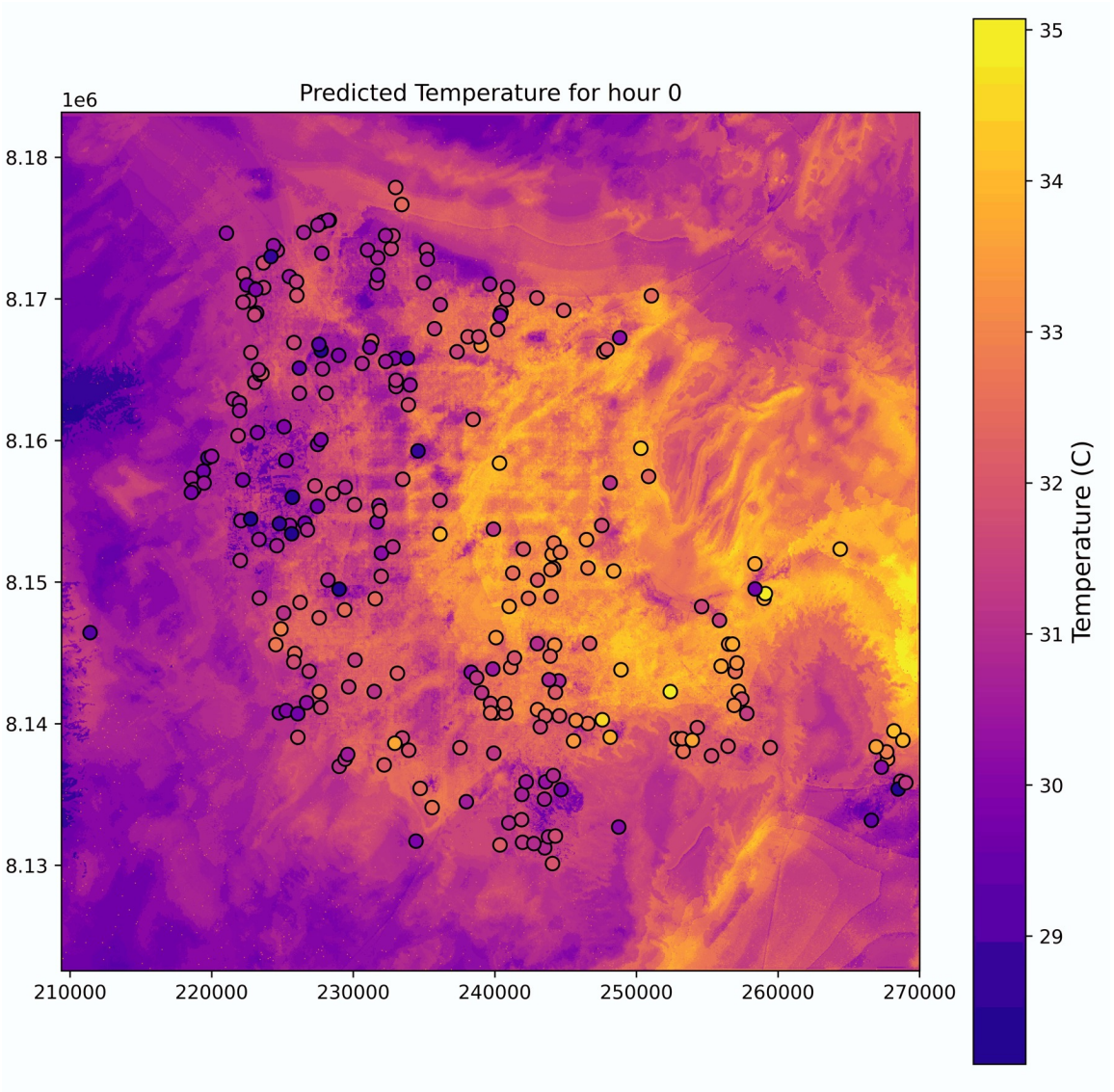
- Poses significant health risks
- Contributes to >12,000 U.S. excess deaths per year
- Local governments at the forefront of adaptation & resilience plans



n = 140; Archie et al. *Climate Services* (2025)

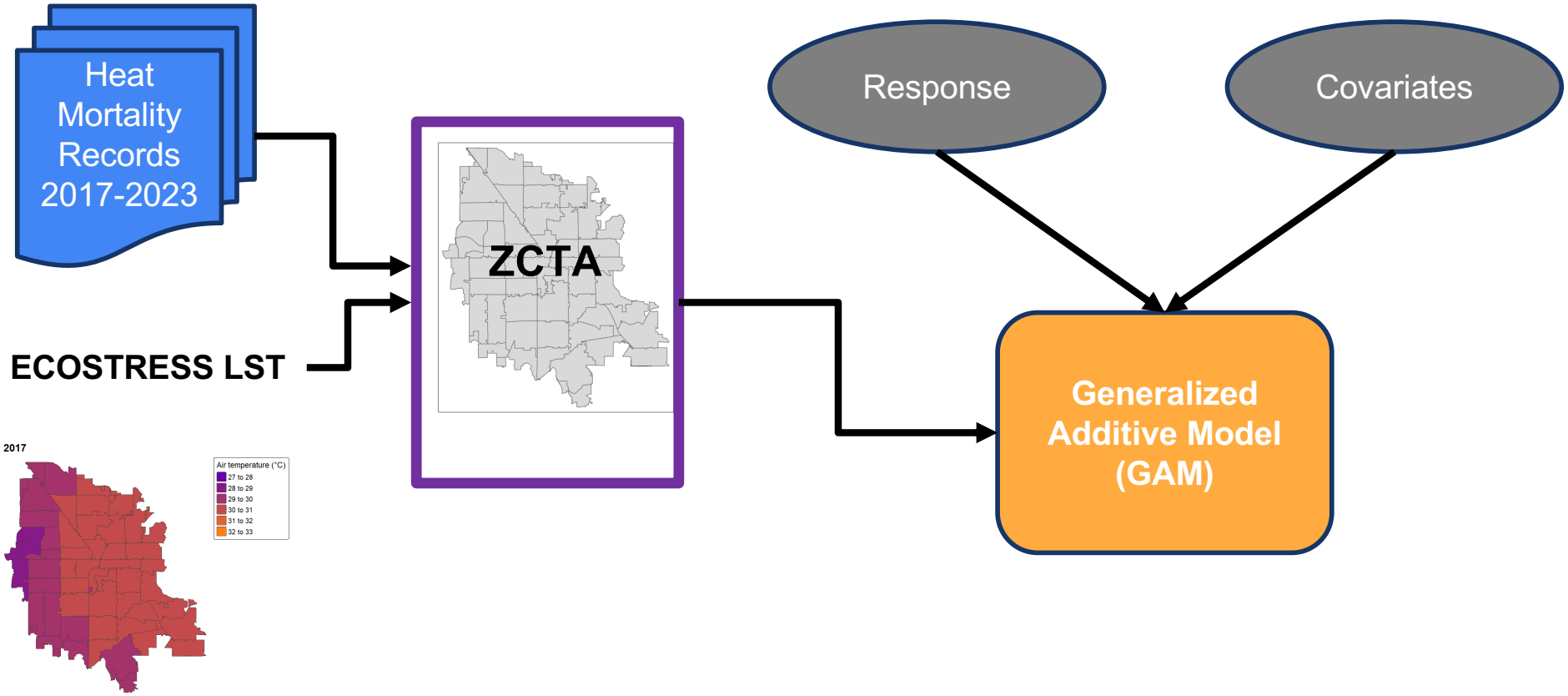
Local, updated heat data`
Heat impacts on systems
Urban design and heat
National center
Nature based solutions
Heat & drought
Landcover inventories
Public health interventions

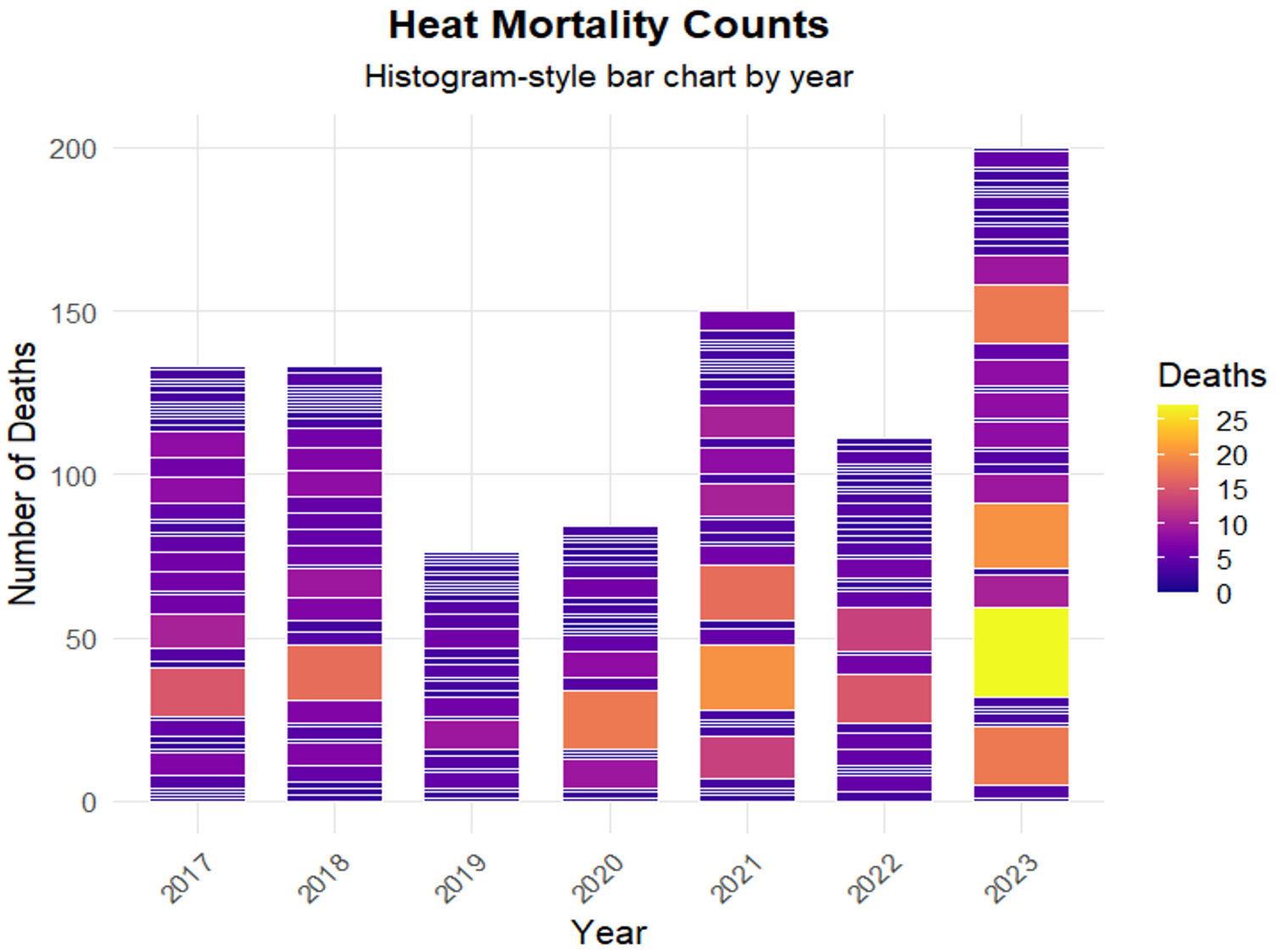
Archie et al. *Climate Services* (2025)



Average daily RMSE:
0.67-0.95 ℃

Methods

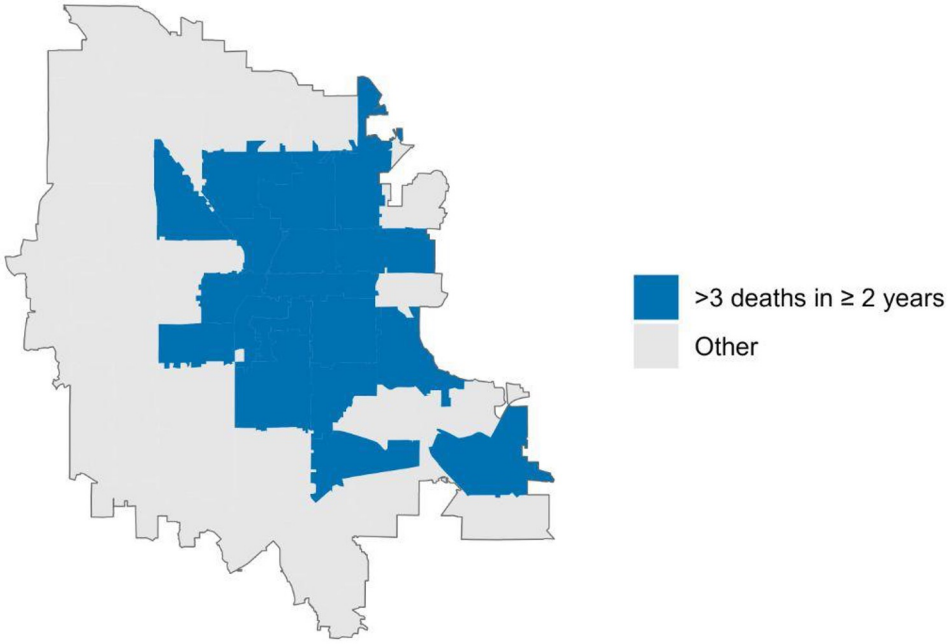

Heat Mortality Records 2017-2023
ECOSTRESS LST
ZCTA
Response
Covariates
Generalized Additive Model (GAM)
2017
Air temperature (°C)
27 to 28
28 to 29
29 to 30
30 to 31
31 to 32
32 to 33


Heat Mortality Counts
Histogram-style bar chart by year
Number of Deaths
200
150
100
50
0
2017
2018
2019
2020
2021
2022
2023
Year
Deaths
25
20
15
10
5
0

ZCTA Death Counts

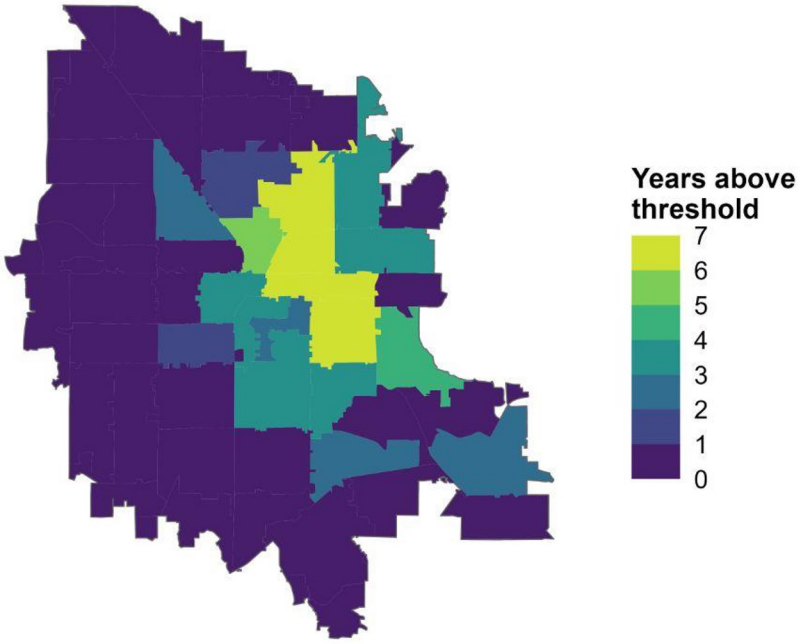
(a) Continued high heat mortality

ZCTA with >3 deaths in ≥ 2 different years



(b) Years with high heat mortality

Count of years with >3 deaths per ZCTA

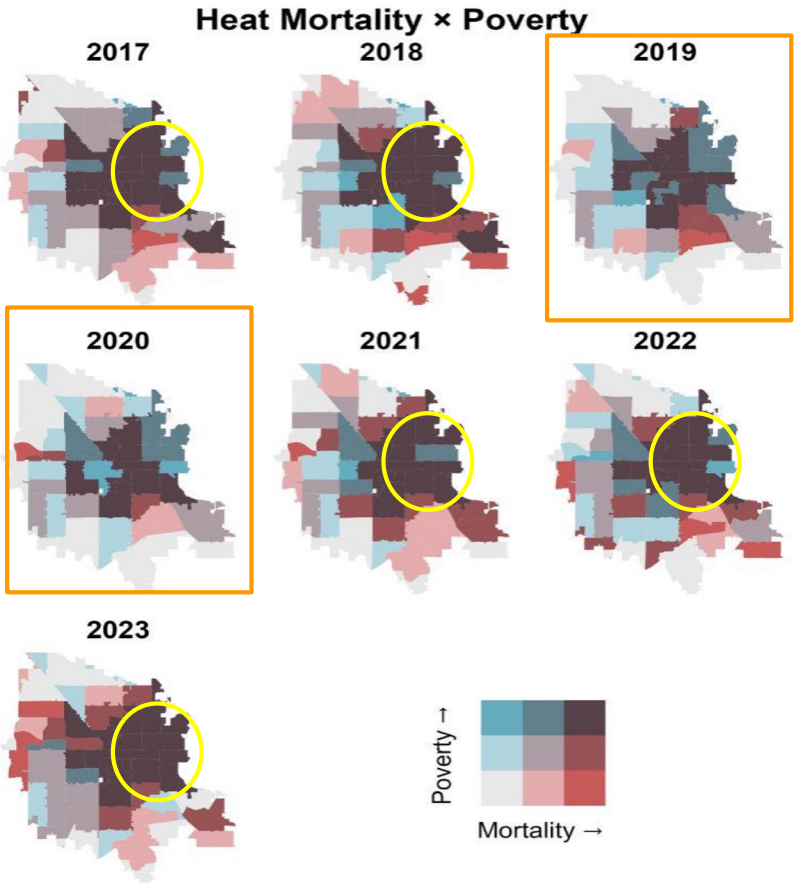


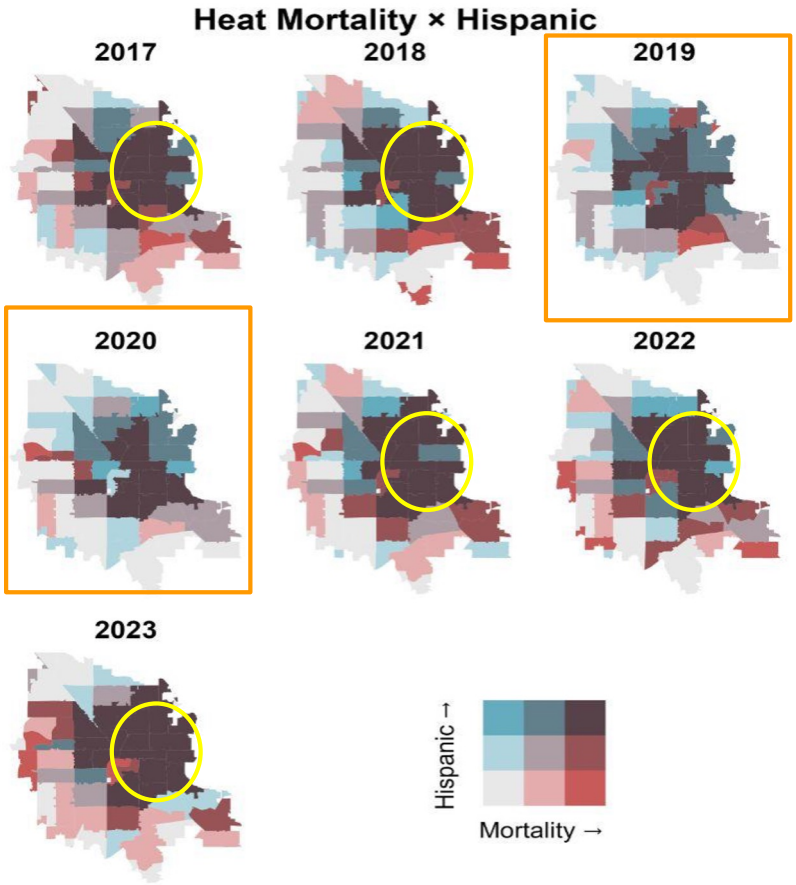
GAM - ZCTA

R-sq.(adj) = 0.72 **Deviance explained** = 65%

- **Temporal trends**
  - Mortality rates were significantly lower in **2019** and **2020**
  - **2023** shows a large increase in heat-related mortality from **2017**
- **Age**
  - **Children < 18** significant protective effect on mortality
  - **Elderly** was seen to be not statistically significant
- **Socioeconomic/household factors**
  - **Living alone, Poverty and Same House 1 Year** was statistically significant increase in heat mortality
  - **Outdoorwork and Linguistic isolation** was seen not to be statistically significant
- **Racial/ethnic disparities**
  - **Black, non-Latino and Hispanic** significant increase in heat morality
  - **Asian** was seen to be statistically significant protective effect

GAM - ZCTA


Heat Mortality × Poverty
2017
2018
2019
2020
2021
2022
2023
Poverty →
Mortality →


Heat Mortality × Hispanic
2017
2018
2019
2020
2021
2022
2023
Hispanic →
Mortality →

DISCUSSION

- **Dramatically higher explanatory power at the ZCTA scale**

- **Public policy**
  - **Occupational heat guidelines**

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HAQAST

NASA HEALTH AND AIR QUALITY APPLIED SCIENCES TEAM

Connecting NASA Data and Tools with Health and Air Quality Stakeholders