Health and Air Quality Applied Sciences Team (HAQAST)

Jenny Bratburd, HAQAST Outreach Program Manager

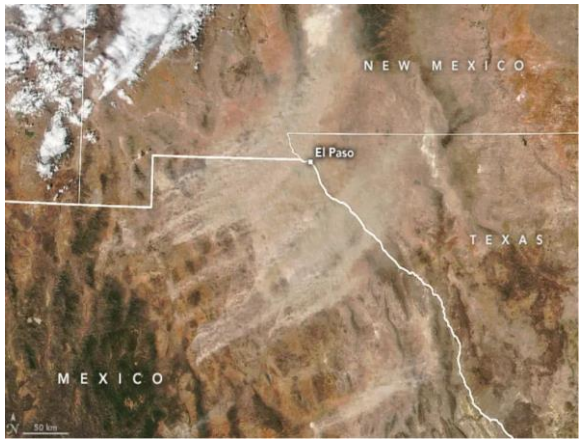
University of Wisconsin—Madison
https://haqast.org/

What is “hay-kast”?

- Health and Air Quality Applied Sciences Team
- Mission: Connect NASA science with air quality and health applications
- 14 member PIs, 60+ co-investigators, 21 ambassadors, 100s of stakeholders
- Three types of work – scaled to different needs
  - Member projects
  - Tiger Teams
  - Outreach, engagement, rapid response

Partnering with NASA to Expand Reliable Air Quality Data for the Department of State

HAQAST and the State Department are working to fill data gaps to help protect personnel health and safety and advance environmental diplomacy.



Satellite Data Can Help Limit the Dangers of Windblown Dust

HAQAST research led by Daniel Tong utilizes NASA and NOAA data to provide early warnings to the public.














14 NASA Health and Air Quality Applied Sciences Team Members (HAQAST)

Tracey Holloway (Team Lead, UW-Madison)
Susan Anenberg (George Washington University)
Bryan Duncan (NASA GSFC)
Arlene Fiore (Massachusetts Institute of Technology)
Pawan Gupta (NASA GSFC)
Yang Liu (Emory University)
Jingqiu Mao (University of Alaska, Fairbanks)
Randall Martin (Washington University)
Ted Russell (Georgia Tech)
Jeffrey Pierce (Colorado State University)
Amber Soja (National Institute of Aerospace)
Daniel Tong (George Mason University)
Christopher Uejio (Florida State University)
Qian Xiao (University of Texas Health Science Center at Houston)

haqast.org

HAQAST1: *2011-2016*

HAQAST2: *2016-2020*
HAQAST3: *2021-2025*

HAQAST4: *2025-2029*

The team structure fundamentally changes outcomes.

- Increased visibility of work and resources to end-users
- Culture to support and promote collaborations and synergies
- Growth of two-way dialogue
- Increased collaborations to meet stakeholder needs
- Rapid spin-up of high-value activities

- Stronger connections with user organizations
- Forging pathways for open science
- Advancing satellite data for health equity
- Characterizing new pollutants and emission sources
- Improved characterization of fire and smoke impacts on health
- Supporting modeling and data fusion
- Building capacity with new satellite instruments

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Encouraging Stakeholder Input

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HAQAST Ambassadors

- High-level stakeholders committed to advancing NASA data for societal benefit and willing to serve as liaisons to their communities
- Provide venues for feedback, discussion, and regular communication with users for deep, sustained involvement with HAQAST activities

"NASA satellite data and training has allowed for collaboration and partnerships that … build a community of practice using satellite data for EJ applications

We are currently part of a HAQAST project that will … look at health effects of … air quality and extreme heat in the context of climate policy initiatives in the state."

The Greening Diplomacy Initiative (GDI) … aims to leverage and integrate satellite data in Department products to provide accurate forecasting capabilities for our personnel overseas."

20 HAQAST Ambassadors so far represent 7 states/regions (CT, GA, NY, TX, WESTAR, LADCO, NESCAUM), 4 federal agencies (EPA, Dept. of Energy, Dept. of State, National Park Service); 4 non-profits (American Cancer Society, Cleveland Clinic, Health Effects Institute, Earth Stewards); and 3 private companies (Google, IQAir, Waste Management)

Twice a year meetings promote collaboration among researchers and stakeholders

"Meetings like these often connect researchers/agencies/workgroups on topics that may not otherwise overlap and provide opportunities to hear about products and developments that may be useful in ways that might not be considered through standard operations." – HAQAST Missouri Stakeholder attendee

"Better understanding of how data are being used and who it's being used by will inform how we do outreach and how we can make our data more discoverable." – HAQAST Missouri, Data Provider attendee

"Participation in this and future HAQAST meetings will play a huge role in allowing us to incorporate NASA data to our advocacy work in a scientifically defensible way." – HAQAST Missouri Stakeholder attendee

"It is nice to see the different applications where my research could add value to different agencies." – HAQAST Missouri, Researcher attendee

Free, public, hybrid meeting

June 3 – Early Career Workshop

June 4 - 5 HAQAST Meeting

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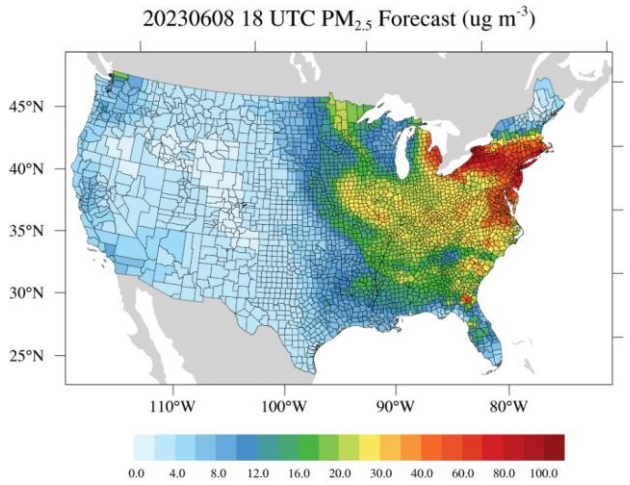


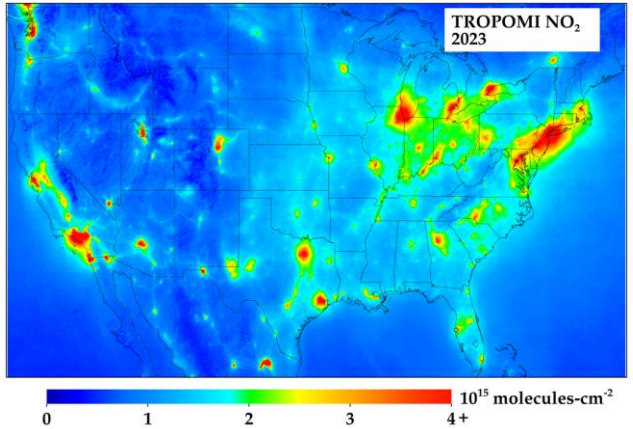
Surface PM2.5 Composition Products from the Hazardous Air Quality Ensemble System

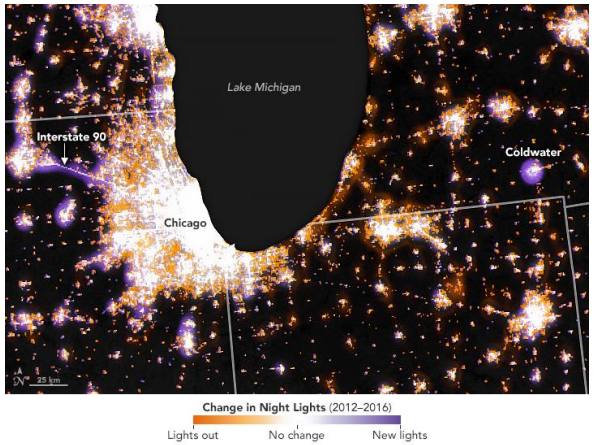
GEORGE MASON UNIVERSITY

Making Data Accessible

TROPOMI NO2 CONUS Annual Level 3 Gridded Data

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC





Annual Artificial Light at Night from VIIRS/S-NPP at CONUS County and Census Tract

UTHealth Houston

Enables stakeholder access to data products with thorough documentation in a central location on NASA Distributed Active Archive Center on

Free, public data on $PM_{2.5}$, NO_2, light at night and more

NASA

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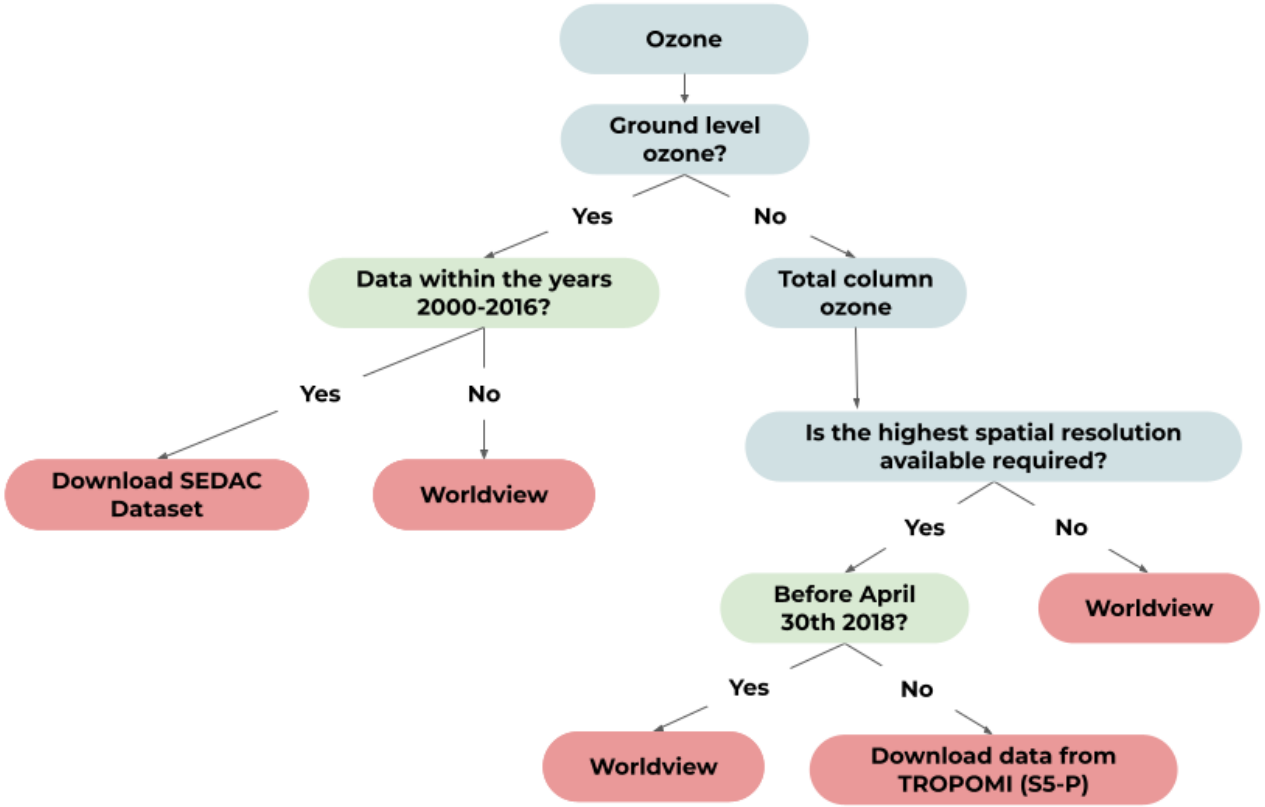
Resources for Users to Find Datasets



Excerpt from HAQAST Flowchart

HAQAST Satellite Data Flowchart guides users to 30+ different tools and tutorials based on their interests.

Find more at https://haqast.org/data-and-tools/

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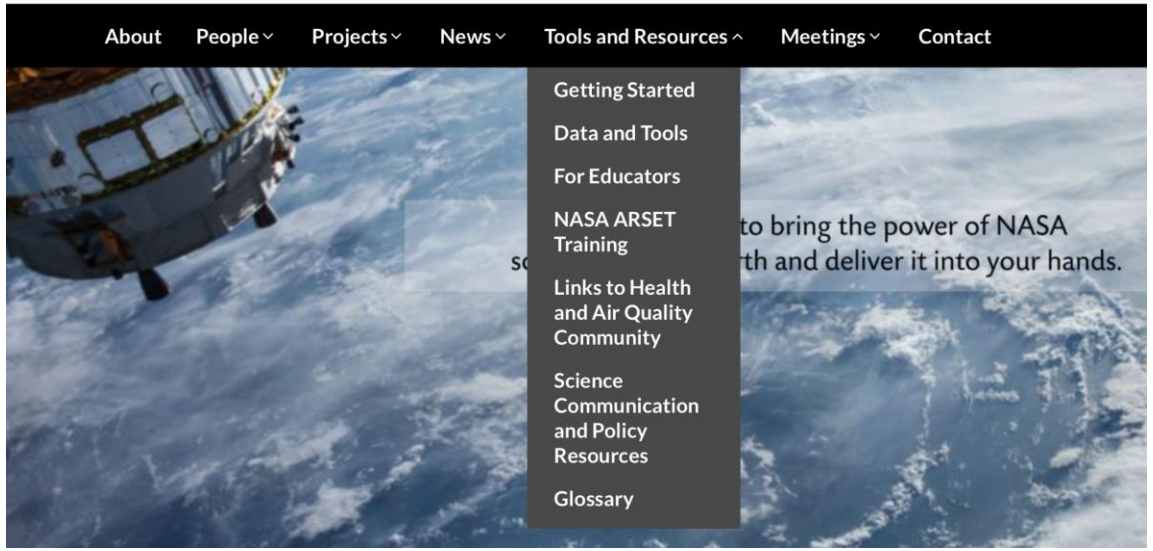
HAQAST

NASA HEALTH AND AIR QUALITY APPLIED SCIENCES TEAM

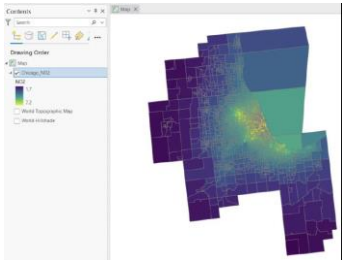
Connecting NASA Data and Tools with Health and Air Quality Stakeholders



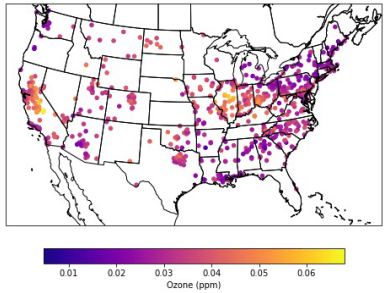
Resources for Users to Learn How to Use Datasets

Tutorials designed for formats users work with, including Google Earth Engine, ArcGIS, Python

[A Practical Methodology Using Google Earth Engine]



[Mapping Gridded TROPOMI NO_2 with ArcGIS]



[Python Tutorials for Atmospheric and Geophysical Sciences]

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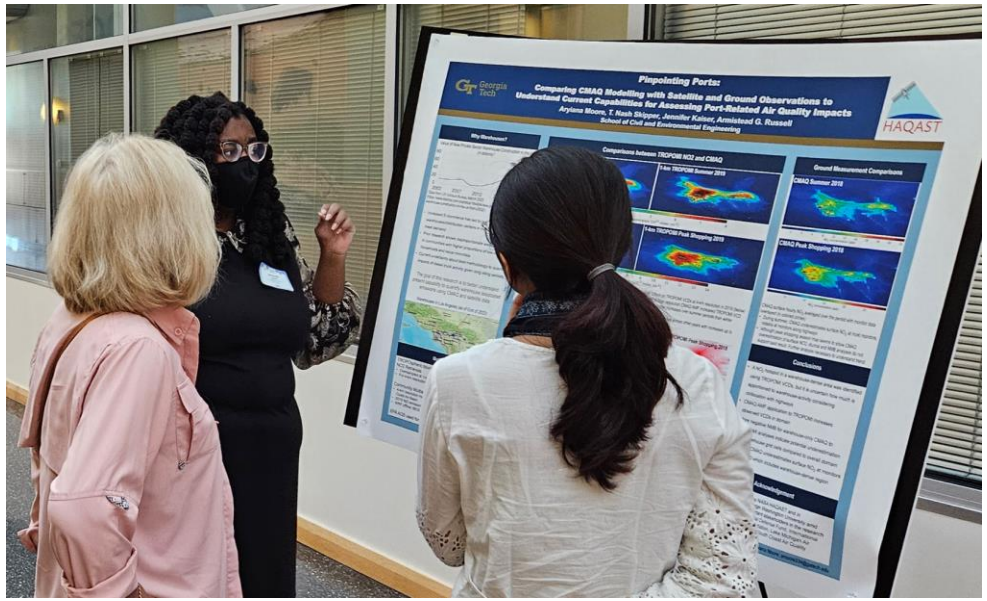
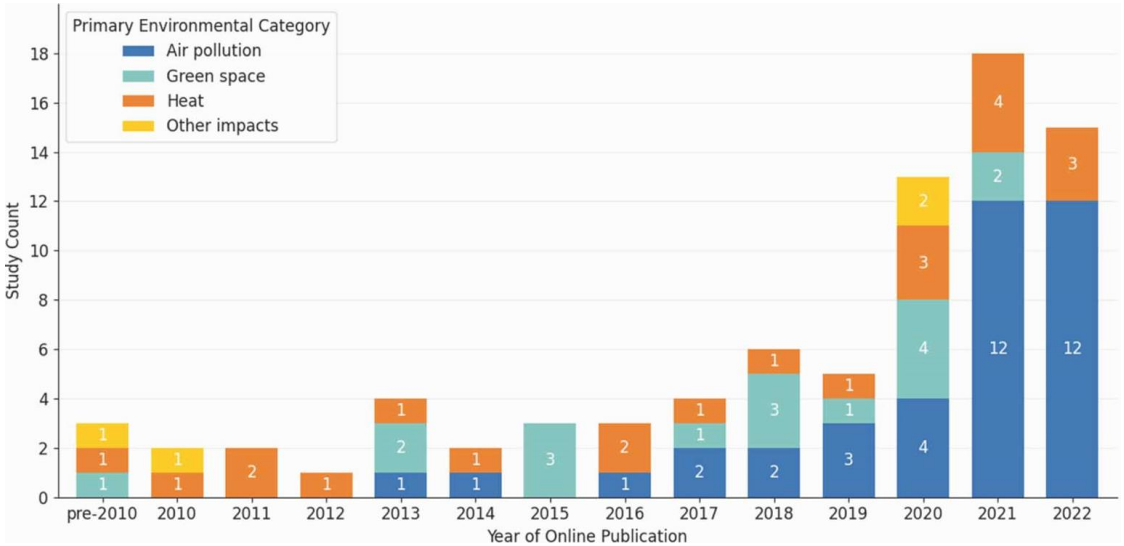
Building Capacity for Satellite Data for Environmental Justice



Participants at HAQAST Utah

- Engaged 160+ in monthly meetings
- Developed training with ARSET
- Integrating satellite data with EJ mapping tools: EPA EJScreen and EDF Climate Vulnerability Index



Kreutzer Sayyed et al. 2024 *Environ. Res. Lett.*

EPA

Environmental Defense

APPLIED REMOTE SENSING TRAINING PROGRAM
TRAIN - EMPOWER - ADVANCE

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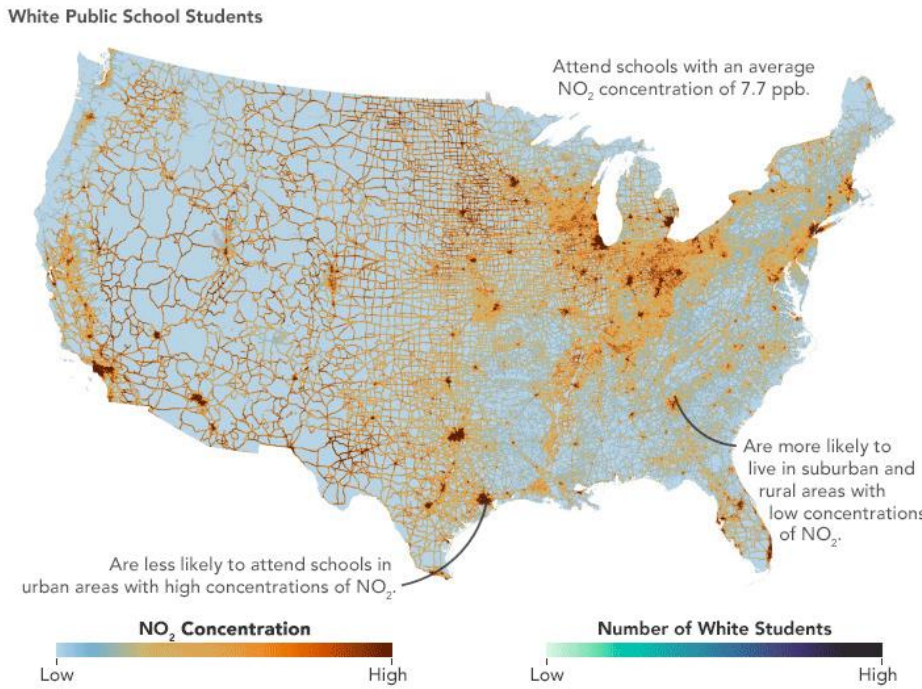
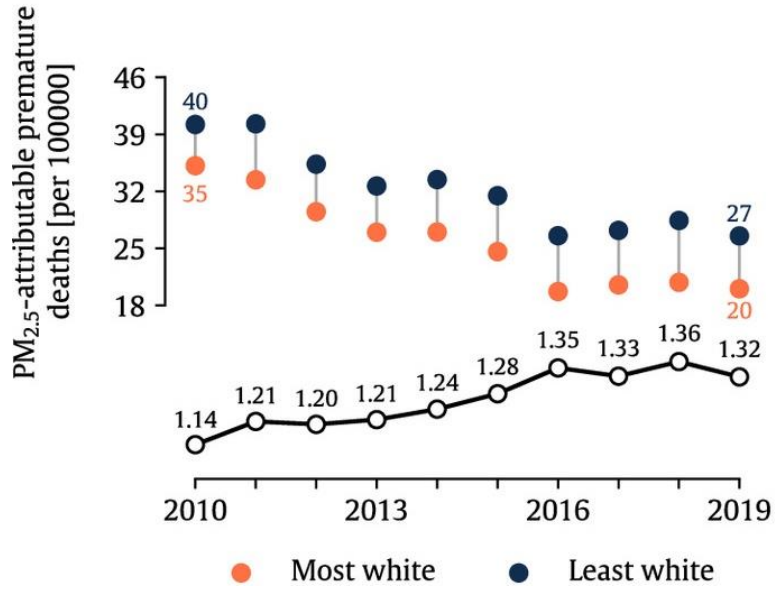


Cheeseman et al. (2022) GeoHealth

COLORADO STATE UNIVERSITY



Kerr et al. (2024) GeoHealth

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WASHINGTON, DC

Using Satellite Data to Measure Air Pollution Equity

- Disparities found in exposure to $PM_{2.5}$, NO_2, artificial light at night, heat
- Associated with health inequities for vulnerable populations

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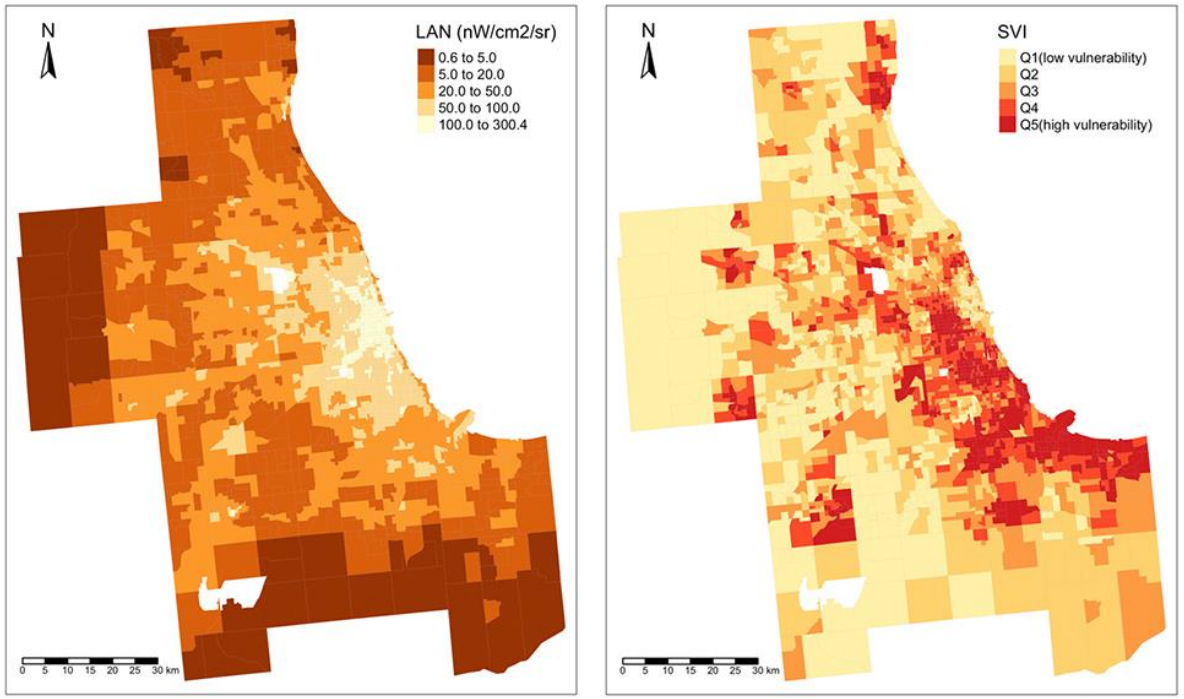

Brighter Neighborhoods Harm Human Health

- Light at night disrupts circadian rhythms, is associated with increased breast cancer risk
- Artificial light at night found to be higher in vulnerable neighborhoods

UTHealth Houston

TEXAS Health and Human Services

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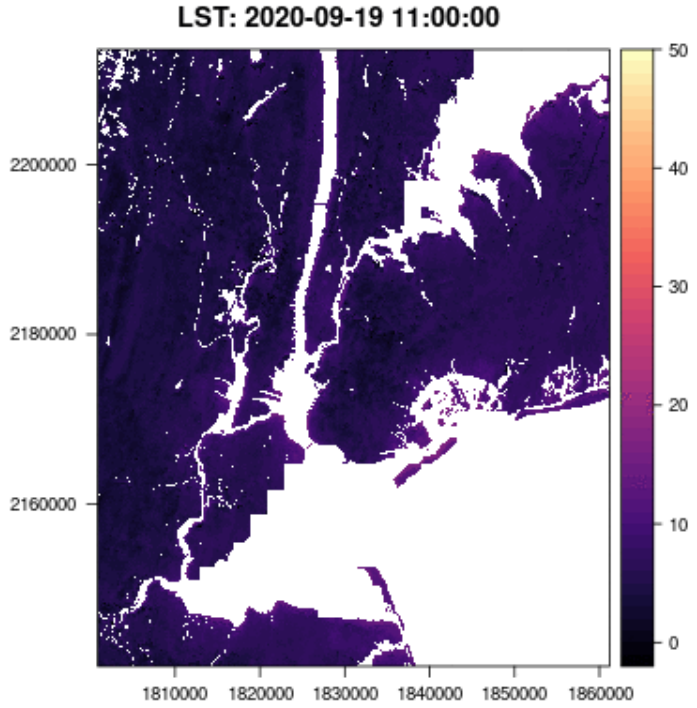
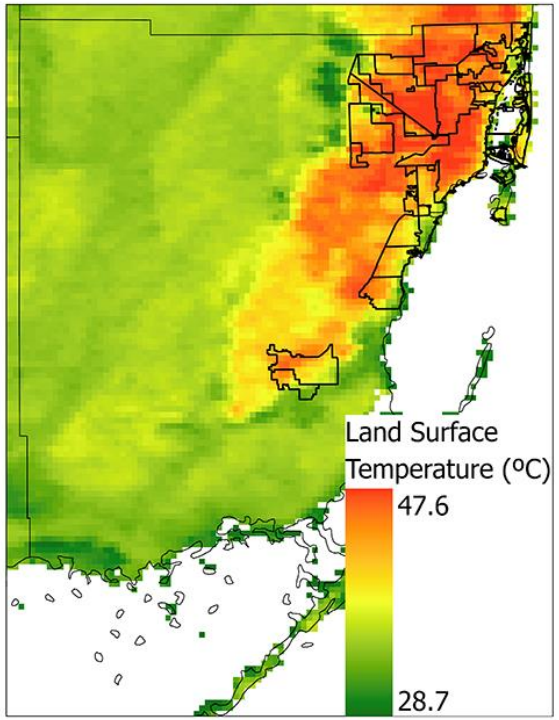
Xiao et al. (2023) Environment International
Xiao et al. (2023) Environmental Science and Pollution Research

Evaluating Urban Heat Island Mitigation Strategies



Animation of hourly ECOSTRESS-based Land Surface Temperature estimations

Hu et al., 2020; Wen et al., 2022



May to September land surface temperature map of Miami-Dade County, FL using MODIS data

These studies will help city leaders identify best strategies to optimal cooling infrastructure to reduce heat exposures and illness.

Cities include New York City, NY , Madison, WI, and Miami-Dade County, FL

FLORIDA STATE UNIVERSITY 1851 VIRES ARTES MORES

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

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Wildfire Exposure Linked to Higher Risk of Death after Lung Cancer Surgery

Study of 400,000+ individuals suggest need to prioritize of cancer patients and other medically high-risk populations in climate adaptation efforts.

American Cancer Society®

EMORY UNIVERSITY

HAQAST

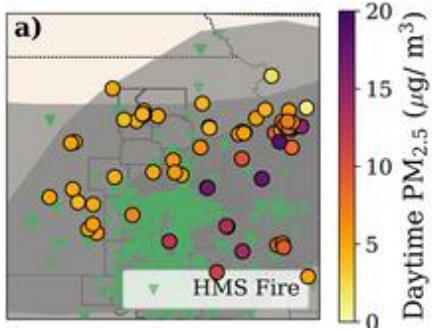
Zhang et al. (2023) JAMA Oncology

Quantifying smoke exposure from prescribed fires

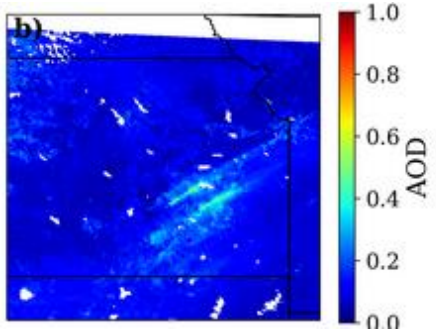
Kansas Flint Hills Smoke Management

Using satellite data and low-cost sensors the median $PM_{2.5}$ concentration increase due to local fires was 3.0 and 5.3 μg m^{-3} in the Flint Hills, Kansas

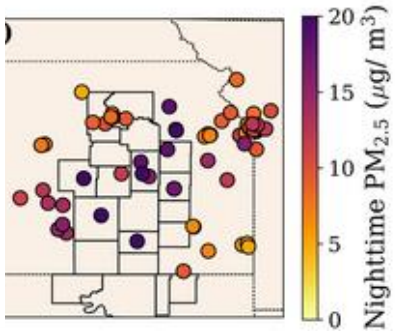
2.1 million acres burned in the Flint Hills in spring 2022



HMS Smoke Plumes and Fire Hotspots



GOES AOD



PurpleAir and EPA AQS measurements

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SIERRA CLUB KANSAS CHAPTER

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Sablan et al. 2024 GeoHealth

Thank you!

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