

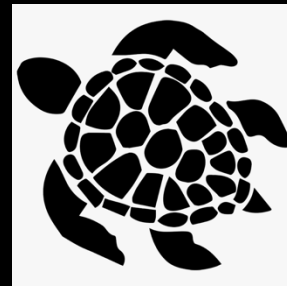
Using Satellite Data to Study Artificial Light at Night (ALAN) as an Emerging Environmental Hazard

Xiao, Qian

Department of Epidemiology

The University of Texas Health Science Center at Houston

Unintended Consequences of ALAN



Health Consequences

- Disrupted sleep and circadian rhythms
- Obesity
- Diabetes
- Cardiovascular diseases
- Various forms of cancer
- Mental health issues
- Cognitive decline

Better Data, Bigger Impact

Study Plan

- Construct ALAN maps
 - Which areas are “hot spots” of ALAN?
 - Which areas have experienced rapid increase in ALAN?
- Promote public access to ALAN data and enable easy linkage with health data
 - Mapped data at county and tract level for public use (NASA GES DISC, CDC)
 - Dashboard development

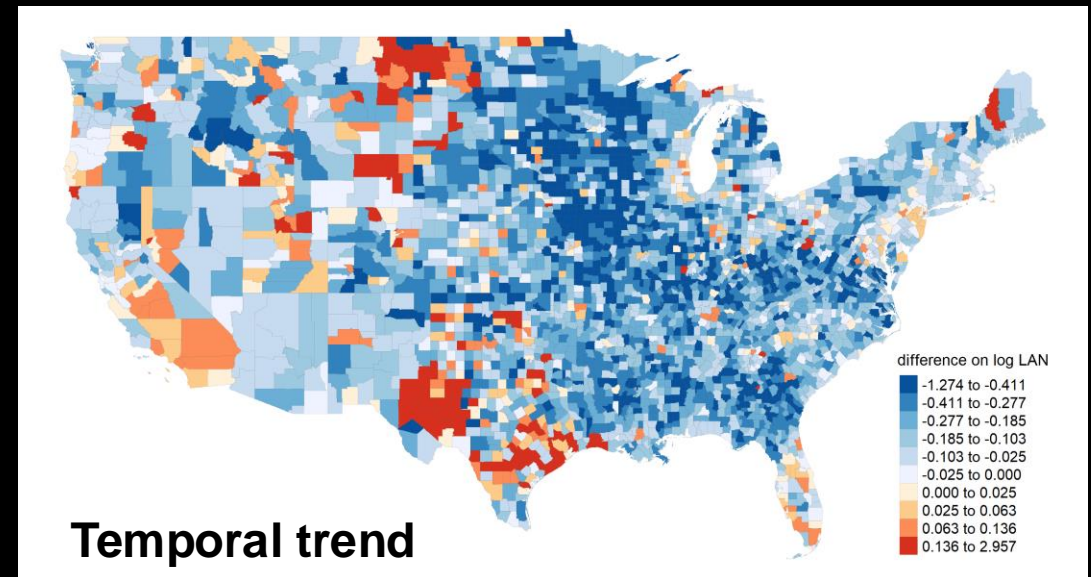
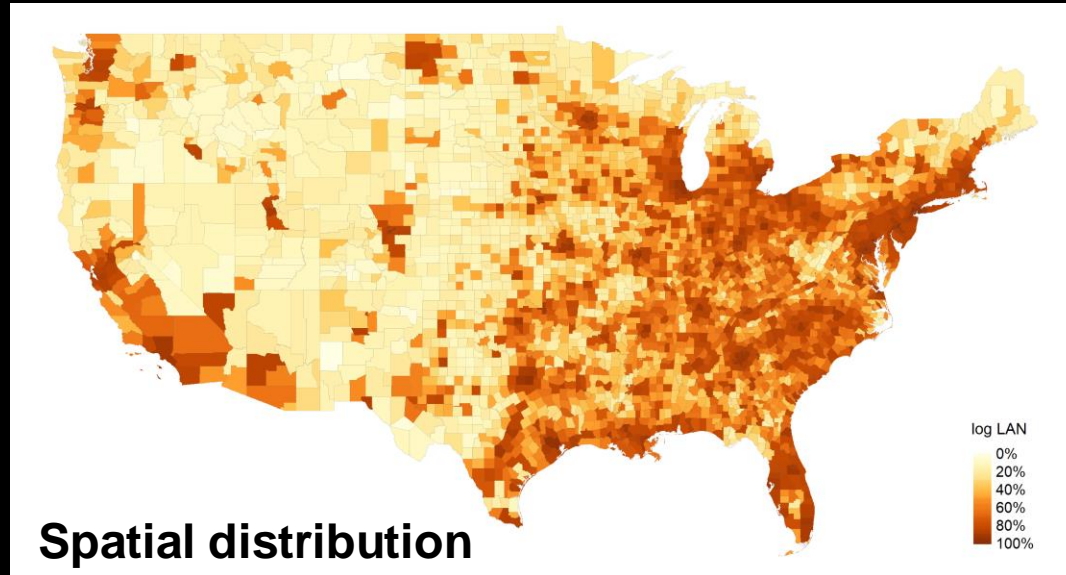


Societal Impact

- Expand scientific knowledge.
- Guide policy design and public health interventions.
- Increase public awareness and knowledge.
- Benefit neighborhoods with high exposure burdens.

ALAN in the US: Spatiotemporal Patterns

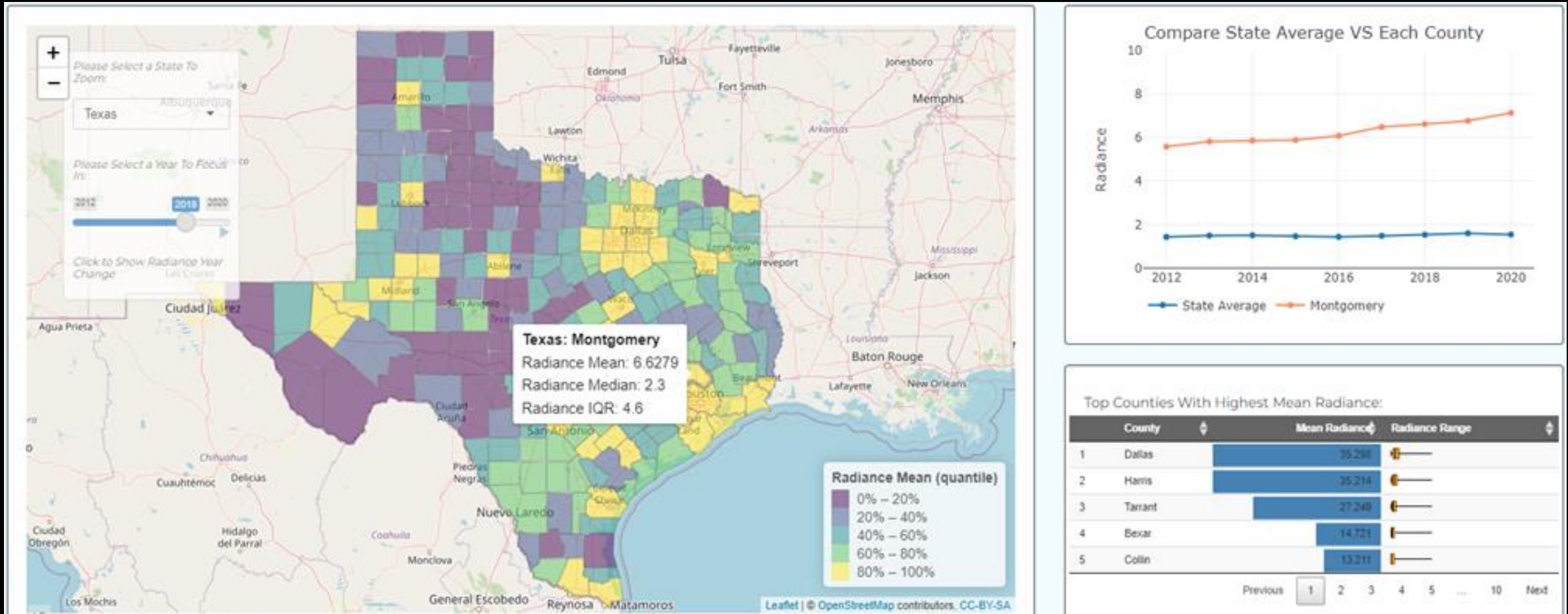
NASA's Black Marble data products (2012-2019).



- The top 10 counties with the most rapid increase in ALAN are all in Texas!
 - Oil and gas drill.
- Most Midwest counties experienced a decline.
- County- and tract-level data are now published and publicly available via NASA's GES DISC.

ALAN Dashboard

<https://spatiotemporal-data-science.shinyapps.io/ALAN/>



Community Engagement

- Identify communities with higher burdens of ALAN.
 - Characterize neighborhoods with higher ALAN exposure.
- Public education and community action about light pollution in Houston and Chicago neighborhoods.
 - Neighborhood night walk with public talks
 - Dashboard development for data visualization and analysis
 - Afterschool and high school curriculum on light pollution
 - Community events focusing on health consequences of light pollution.
- Working with public health departments
 - Conduct health assessment
 - Use ALAN to identify neighborhoods with extended power outage after major disasters