

NASA Satellite Data for Environmental Justice in Atlanta

A collaboration between Emory scientists, the Center for Sustainable Communities, and Atlanta residents to expand the reach and use of NASA Satellite Data for all

Why does this matter?

NASA collects environmental data via satellite. This includes land surface temperature, aerosol optical depth (air pollution), soil moisture, and more.

What did we want to know?

Can NASA data contribute to understanding and addressing environmental justice?

What did we do?

- Our Emory scientists partnered with the Center for Sustainable Communities. We received NASA funding to gather input from EJ communities on using NASA satellite data.**
- Hosted three community workshops with Fulton County residents.**
 - December 2022**
Shared information about NASA satellites. Asked residents, "What will the impacts of climate change be in your community?"
 - April 2023**
Created and presented maps (see "What did we find?") using NASA data based on the residents' anticipated climate impacts.
 - October 2023**
Presented updated maps based on residents' feedback. Discussed next steps for the data.
- Presented community workshop findings to professional stakeholders.**
We summarized the workshops to stakeholders working on environmental justice and/or climate issues and asked how NASA data can support their work.

What did we find?

Residents were concerned about the environmental health impacts of climate change, especially how **poor air quality** from burning fossil fuels leads to an increase in **respiratory illnesses**.

Mapping Variables Based on resident concerns, we mapped 3 variables using NASA satellite data:

- 1. Greenspace**
- 2. Temperature**
(Summer and Winter mapped separately)
- 3. Air Pollution**
(Summer and Winter mapped separately)

Time Series Analysis

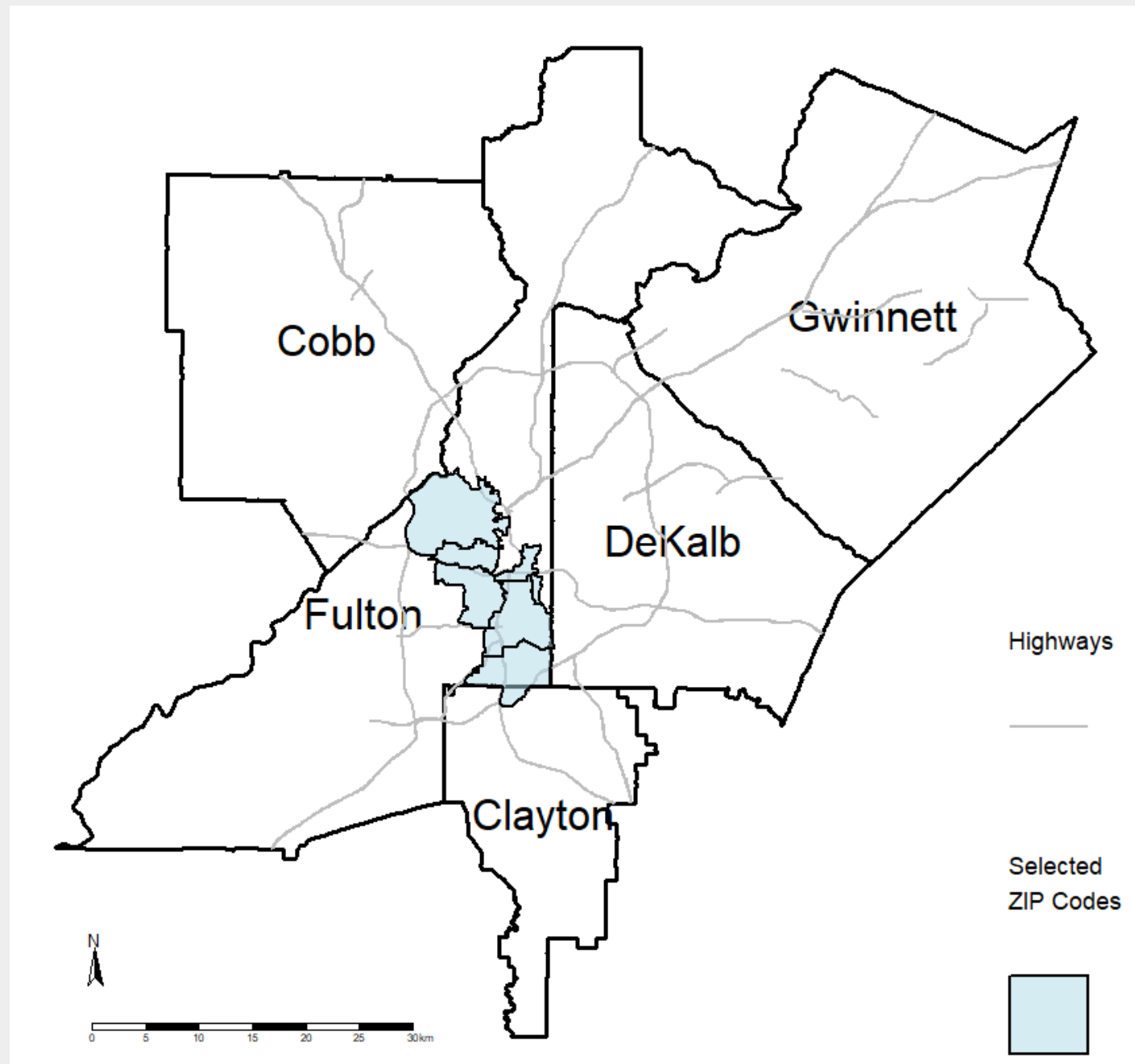
We graphed a trendline for each variable from 2002-2022 for metro Atlanta and the selected zip codes (see map on the right).

Main Findings from Maps

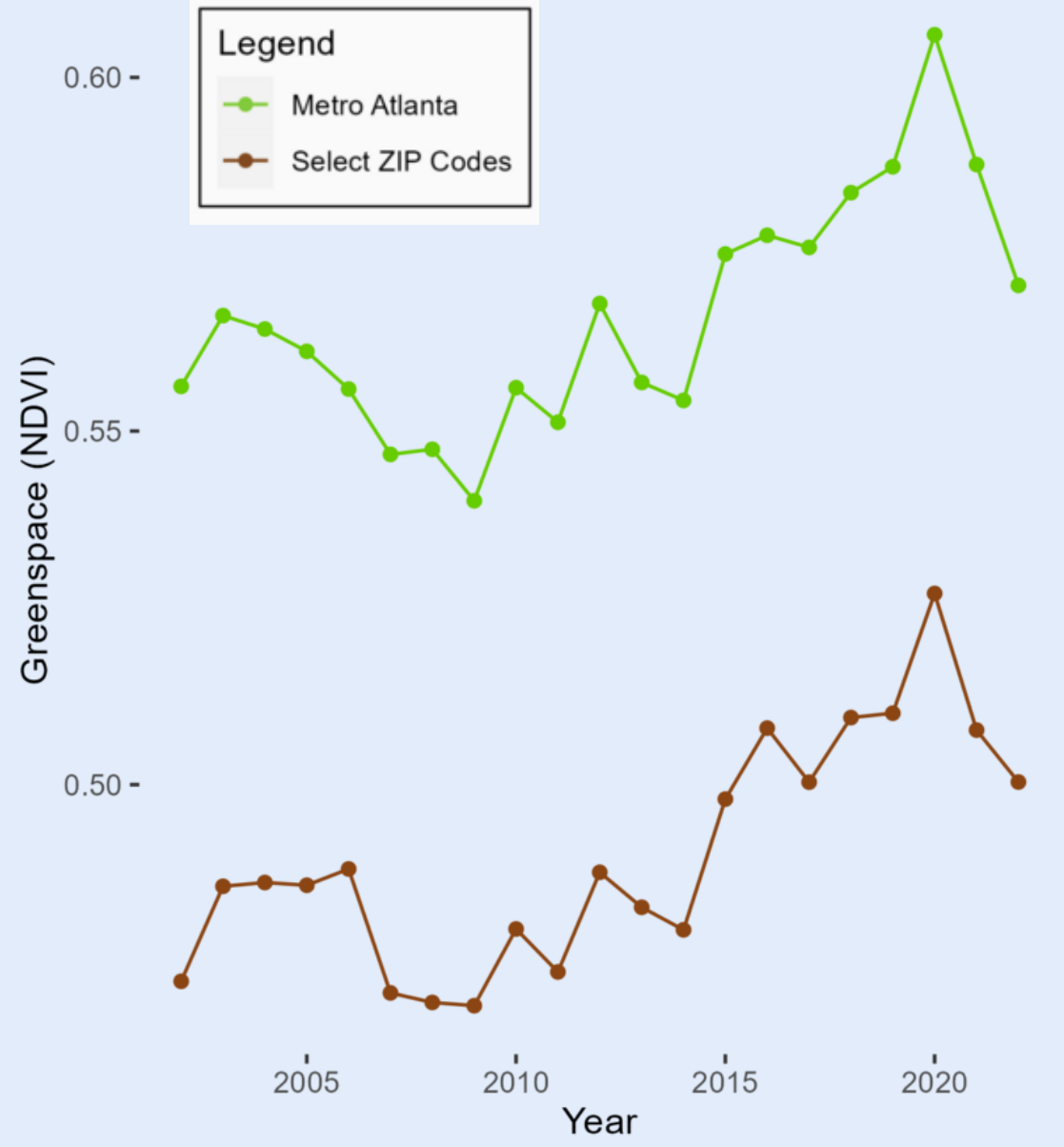
- Air pollution has declined over time.
- Greenspace has increased over time.
- Temperatures have an overall increasing trend, especially winter temperatures.
- The selected zip codes see more air pollution, less greenspace, and hotter temperatures than the rest of Metro Atlanta.

Mapping the Region

We mapped the zip codes where the workshop participants live (highlighted in blue below).



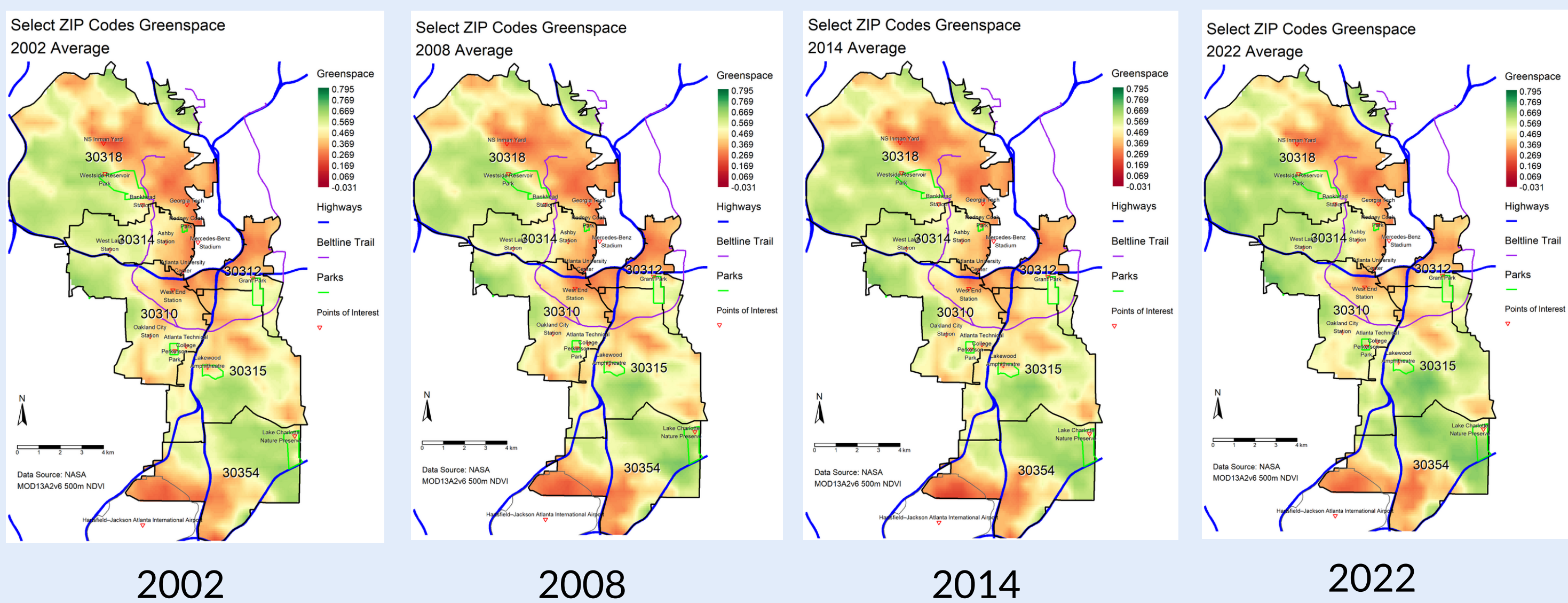
Time Series of Annual Mean Greenspace (NDVI) Metro Atlanta vs Select ZIP Codes, 2002-2022



NDVI, or Normalized Difference Vegetation Index, is a metric which measures levels of vegetation by observing differences in the types of light being reflected from the ground

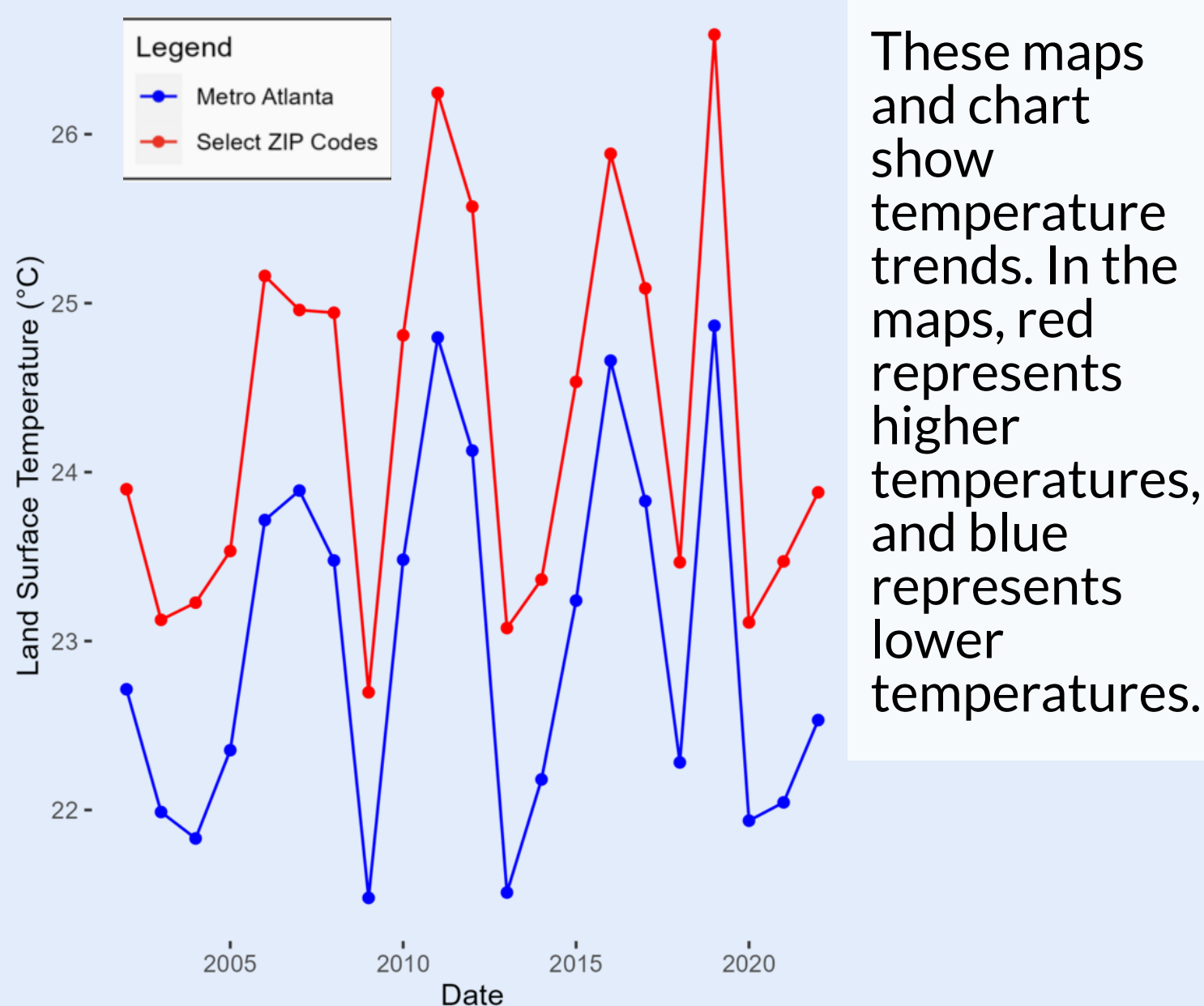
1. Greenspace Maps

These maps and chart show how greenspace changed over time. In the maps, green represents more greenspace, while red represents less greenspace.



2. Temperature Maps

Time Series of Annual Mean Land Surface Temperature Metro Atlanta vs Select ZIP Codes, 2002-2022

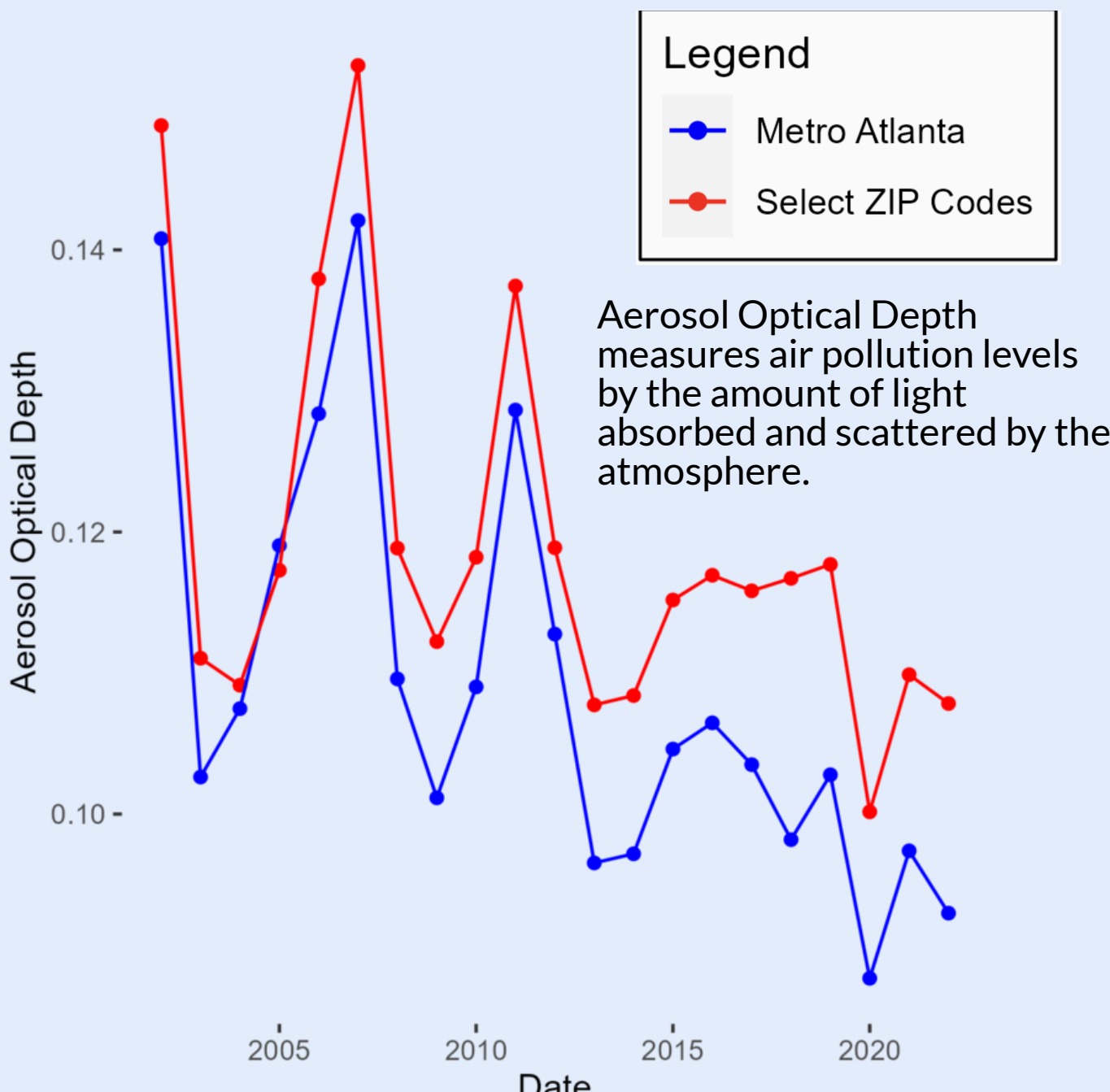


These maps and chart show temperature trends. In the maps, red represents higher temperatures, and blue represents lower temperatures.



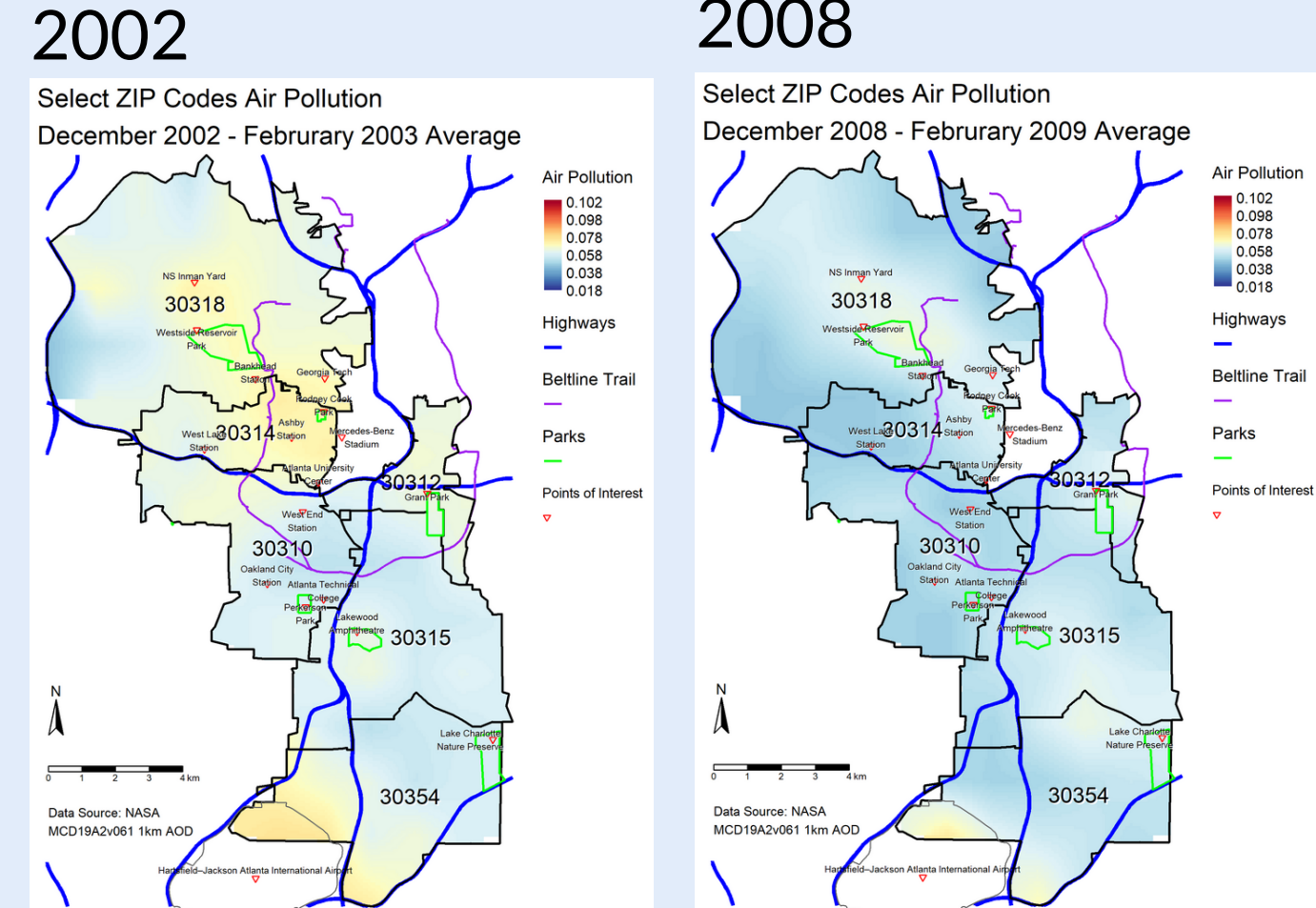
3. Air Pollution Maps

These maps and chart show how air pollution changed over time. In the maps, red represents more air pollution while blue represents less air pollution.

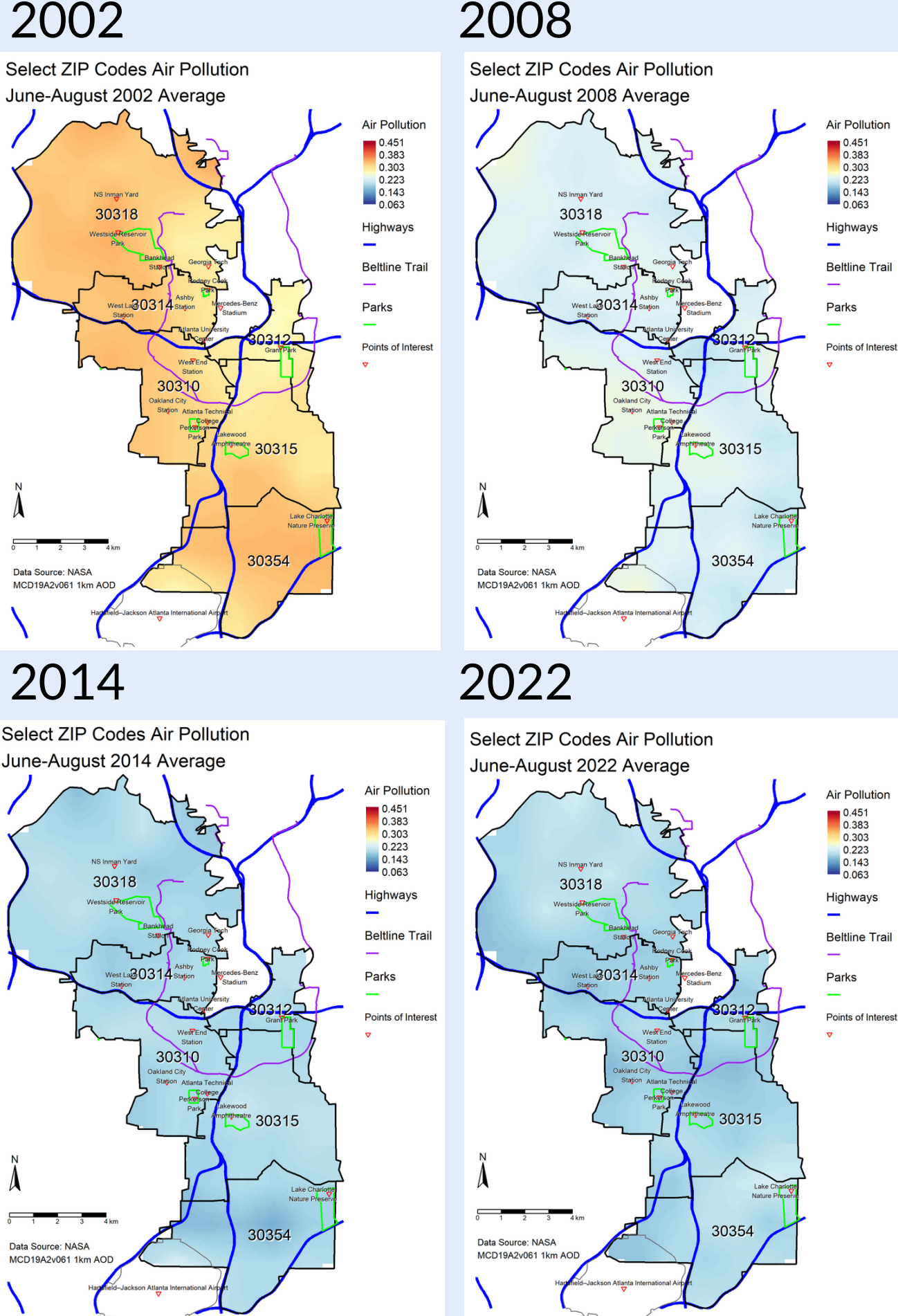


Aerosol Optical Depth measures air pollution levels by the amount of light absorbed and scattered by the atmosphere.

Winter Air Pollution



Summer Air Pollution



Community Members' Stories

Participants shared how **high temperatures** force them to go for walks at unsafe times (e.g. late at night), and **air pollution** limits their outdoor time. They also emphasized the importance of **greenspace** in reducing environmental health concerns like bad smells.

What does this mean?

85% of community workshop 3 attendees responded that NASA data will be useful to their communities.

At the webinar for professional stakeholders, we discussed **potential applications for NASA data**, including:

- Identifying facilities in hot areas and incorporating cooling features there
- Understanding the impact of air pollution on asthma-related emergency room visits
- Informing the City of Atlanta Tree Ordinance update

Our Emory scientists are considering applying for another NASA grant to further explore the use of NASA data for EJ.

Additional Resources



Globe Observer Application: A citizen science application for monitoring the environment and contributing data to NASA to benefit local communities.



EJScreen: An environmental justice mapping tool to combine environmental data with demographic and socioeconomic data. ([Alternative site](#) if unavailable)



Environmental Justice Greenbook: Provides an introduction to laws regulating pollution in Georgia communities and the tools you can use to effect change.

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