Understanding Regional Air Quality:
Merging Health, Communication, and Atmospheric Data

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Overview

The agricultural fires HAQAST Tiger team is merging health, communication, and atmospheric science data to better understand air quality impacts from small fires and the culture around agricultural burning. In South Florida residents near Lake Okeechobee live and work in and around agricultural areas without state regulatory oversight provided from EPA air quality monitors. While residents support and work for the booming agricultural industry, residents have expressed concern over impacts to health and air quality. Our field campaign focuses on filling in the gaps in air quality monitoring and understanding respiratory health impacts and burning risk perceptions.

Environmental Health

Ambient air pollution has major impacts on the morbidity and mortality among communities of color. Although this disproportionate burden of air pollution in Black, Hispanic, and Indigenous communities is well documented in urban areas, there are limited data on this critical environmental justice issue in agricultural areas particularly in the agricultural area of South Florida. We will use geospatial analysis and a case crossover epidemiological study design to better understand respiratory health impacts from transient smoke exposure.

Figure 1: Population of South Florida by census tract with EPA monitor locations (black dots).
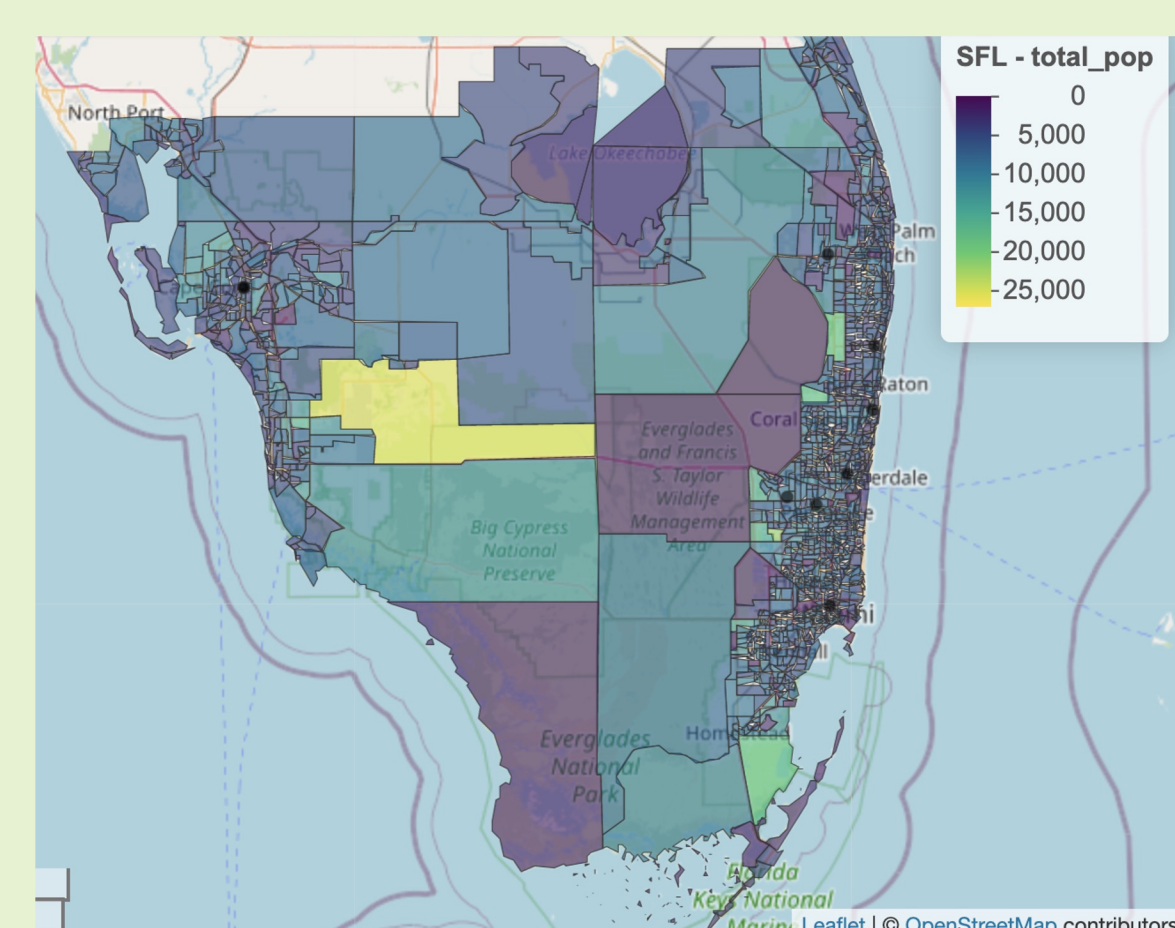
Research Questions

What are the health impacts associated with exposure to smoke from agricultural burning?

Who is impacted by smoke from agricultural burning?

Table 1 : Demographics of interest in South Florida from 2020 Census Data.

County	Proportion: Black	Proportion: Hispanic	Proportion: 100% Under Poverty Line	Proportion: 200% Under Poverty Line
Charlotte	5.50%	7.20%	11.10%	31.60%
Glades	13.50%	21.30%	17.40%	43.60%
Hendry	11.50%	53.70%	25.30%	53.90%
Lee	8.50%	21.30%	13.10%	32.00%
Palm Beach	18.60%	22.40%	12.20%	30.50%
Florida State	16.07%	25.58%	14.01%	34.17%

Atmospheric Science

Days of smoke October 2021

Days of smoke March 2022

Days of smoke May 2022

Research Questions

What are the air quality concentration-associated with agricultural burning in different regions?

When and where are concentrations the highest?

We deployed low-cost PM2.5 sensors (PurpleAir sensors) to improve the temporal and spatial resolution of monitoring air quality near the sugar cane burning region. We will combine ground-based measurements (PurpleAir, EPA AQS) with satellite observations (NOAA HMS, GOES AOD, etc.) to make smoke exposure maps.

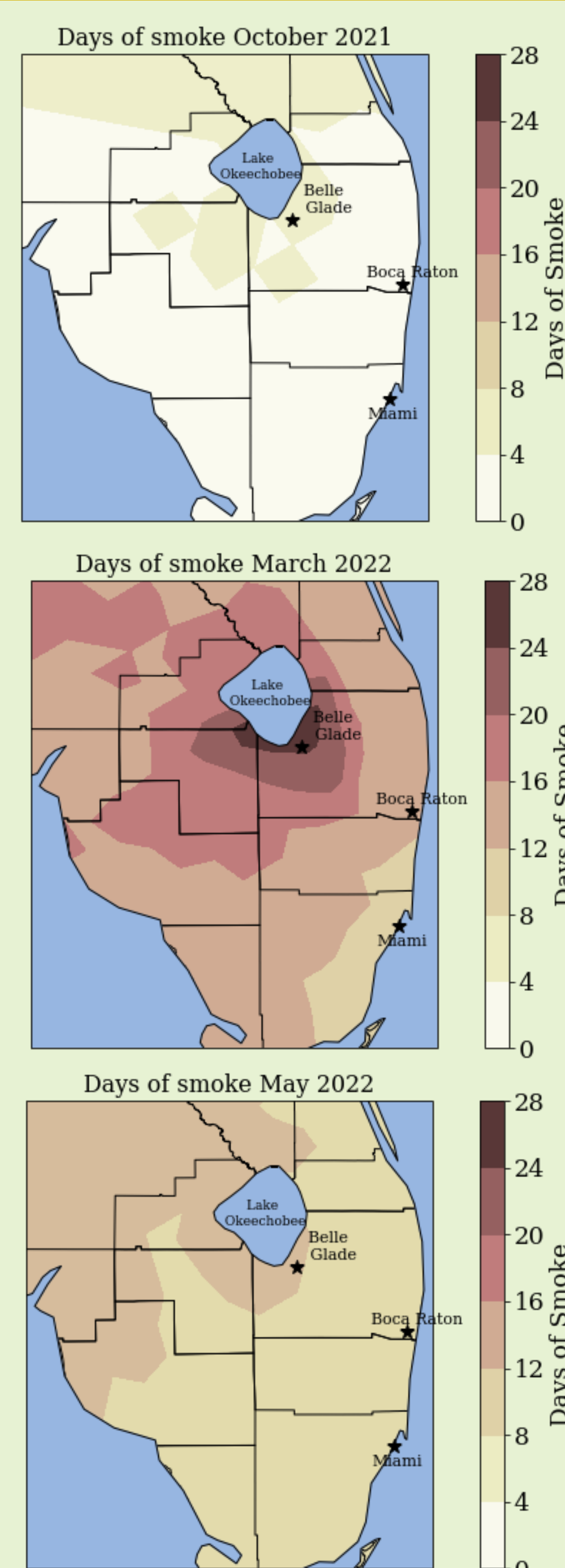Figure 2: NOAA HMS Smoke days for pre burn, burn, and post burn season

Figure 3: Air quality monitors in south Florida after field deployment.
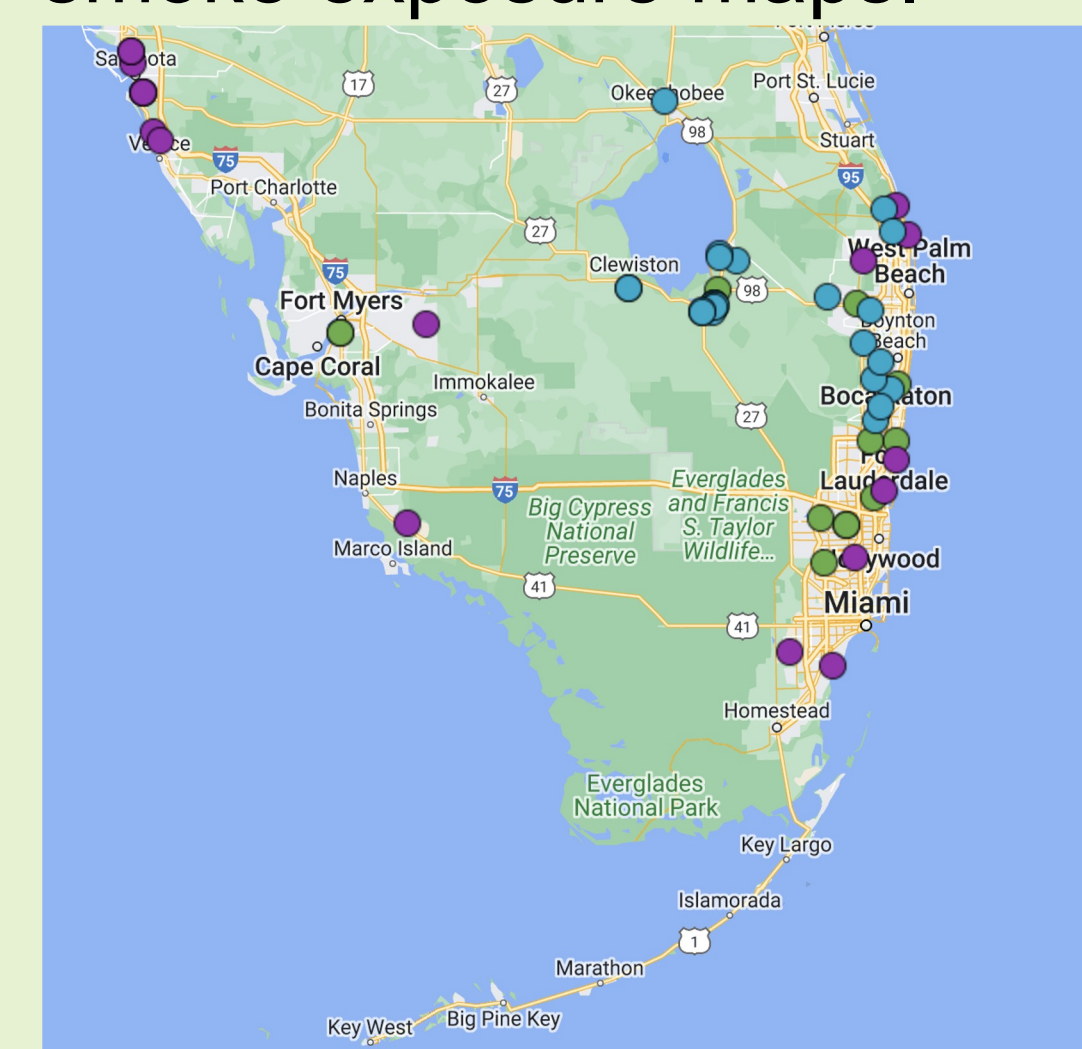
Communication Science

In Florida, controlled sugarcane burning, a yearly practice in the Glades region, is implemented to facilitate harvesting operations. Florida sugarcane burning is of particular interest, as this industry is the main source of income for many in the area, who depend on the industry's success. However, Air quality concerns in the communities near the burning have sparked a conversation around the economic and health impacts created by the process. Journalists, government officials and the general public all weigh in on the subject. The following study aims to gain a better understanding of how representation by journalists and government officials towards sugarcane burning affects audience perceptions of risks surrounding sugarcane burning and audience sharing behaviors.

Health Article Journalist Source	Health Article Governmnet Source
Economics Article Journalist Source	Economics Article Governmnet Source

Research Questions

Do speaker type (journalist/gov. official) and frame (health/econ) in articles describing sugarcane burning in Florida influence sharing behavior among Gen Z by influencing risk perceptions?

Figure 4: 2x2 Experimental design for articles of risk perception

Acknowledgements

Contact Information

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