

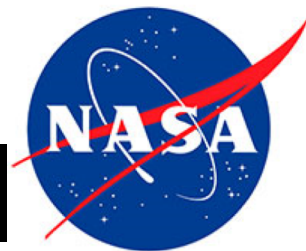
Predicting Prescribed Fire Impacts in the Southeast

Talat Odman, Yongtao Hu and Ted Russell



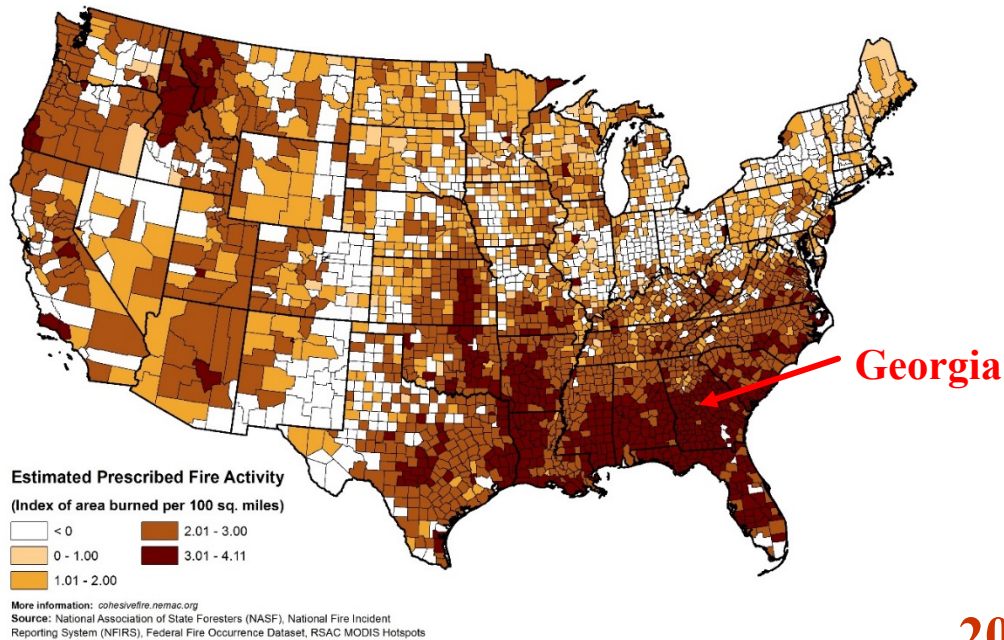
NASA Health and Air Quality Applied Sciences Team
(HAQAST)

University of Wisconsin-Madison
July 16-17, 2018



Prescribed fire: Largest source of PM_{2.5} emissions in the southeastern U.S.

Prescribed fire improves native vegetation and wildlife habitat, controls insects and disease, and reduces wildfire risk.

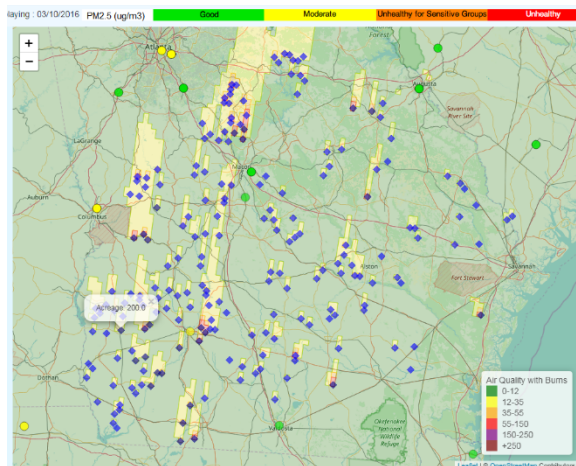


2014 NEI attributes 24% of all PM_{2.5} emissions in the southeastern U.S. to prescribed fire.

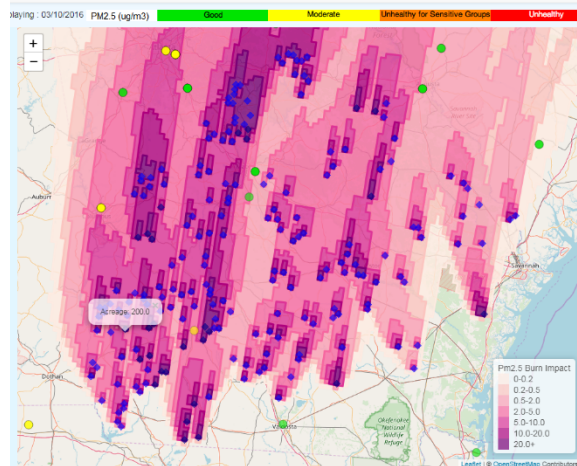
HiRes-X: Operational forecasting of prescribed fire impacts for health, air quality and ecosystem management

- Daily forecasts of prescribed-fire related air quality impacts to state agencies for prescribed burn and air quality management
<https://forecast.ce.gatech.edu>
- Prescribed-fire related exposures to CDC and its partners for public health tracking and source-specific epidemiological assessments
<https://ephtracking.cdc.gov>

PM_{2.5} Forecast



Burn Impact Forecast



Public Health Tracking Network

Health impacts layer of HiRes-X (under development)

Health burden:

$$\Delta H = H_0(1 - e^{-\beta\Delta c})$$

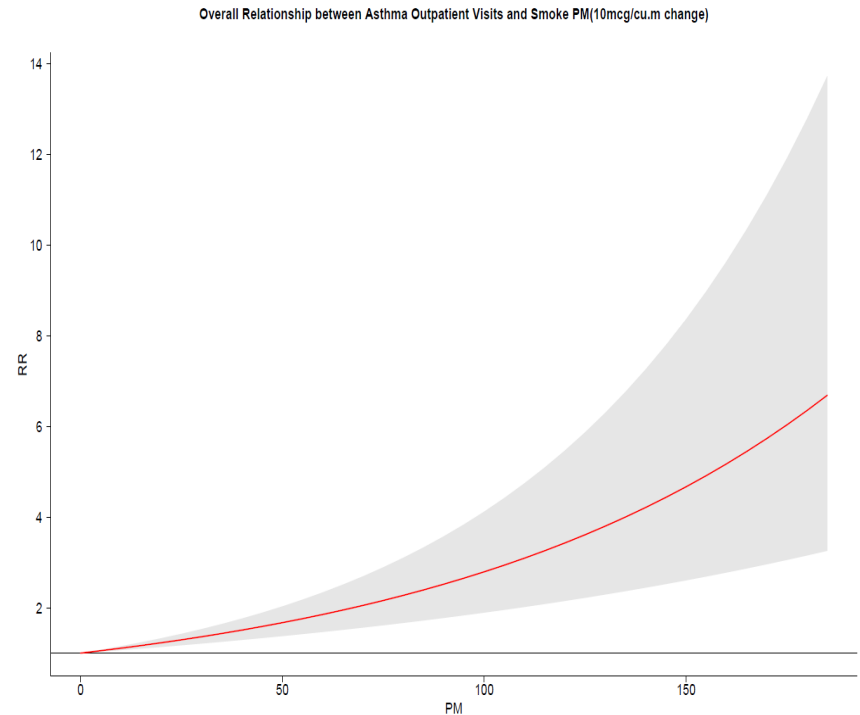
where

H_0 is baseline health rate

β is effect estimate
coefficient (obtained from
C-R function)

Δc is fire impact on
concentration

C-R function for ER visits

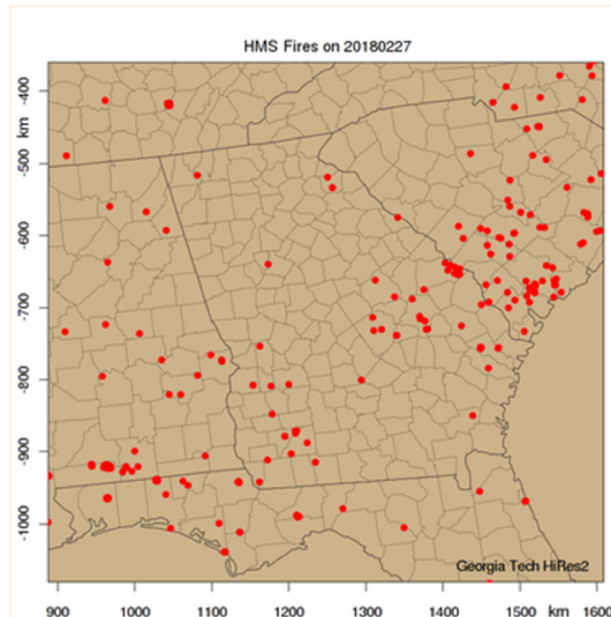


Also for asthma medication use

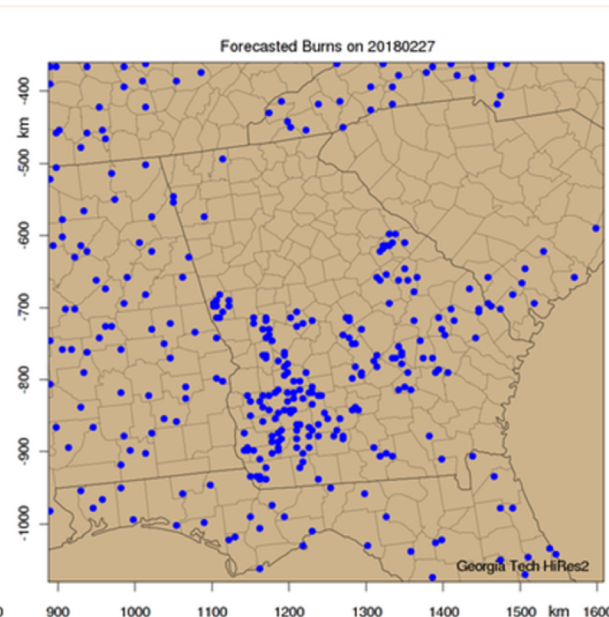
Prescribed fire activity forecasts for the Southeast: Based on weather forecast and historic fire patterns

- 2010-2016 burn permit data in Georgia (GA)
- 2015-2016 GBBEP data in other states
- County-specific CART models in GA for “burn day” forecast
- Meteorological burn/no-burn criteria in other states

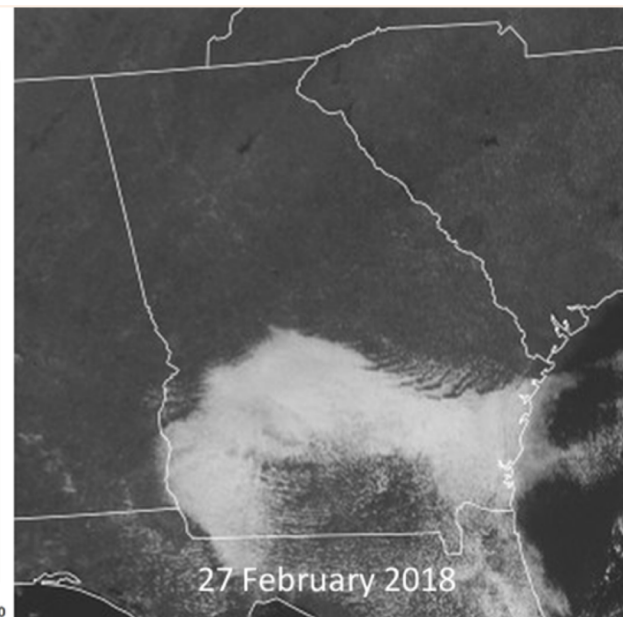
HMS Fire Detections



Our Burn Forecast



Cloud Cover



<https://sipc.ce.gatech.edu/SIPFIS/map/>



Southern Integrated Prescribed Fire Information System

Prescribed Fire and Air Quality Information for the South

[Home](#) [About](#) [Advance Functions](#)

Choose a date: 3/6/2016

Displaying: 03/06/2016 PM2.5 (ug/m3)

Good Moderate Unhealthy for Sensitive Groups Unhealthy Very Unhealthy

POLLUTANT PM2.5

AIR QUALITY

☒ PM2.5 Observations

☐ PM2.5 Predictions

☐ Latest

☐ Earlier

☐ Earliest

FIRES

Observations

☒ HMS Detections

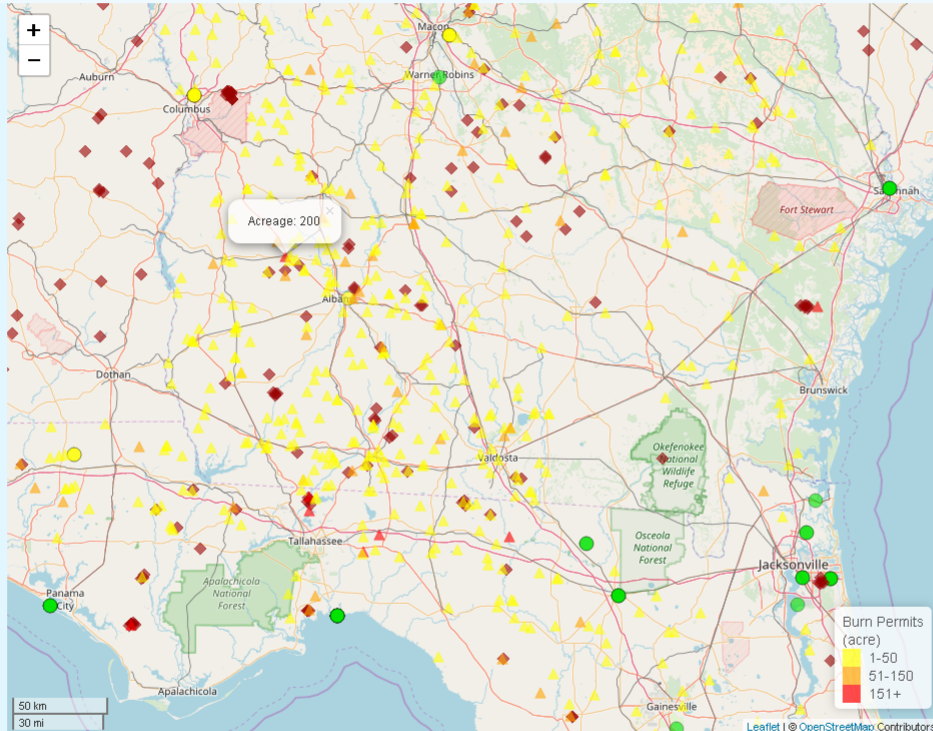
☒ Permits

Predictions

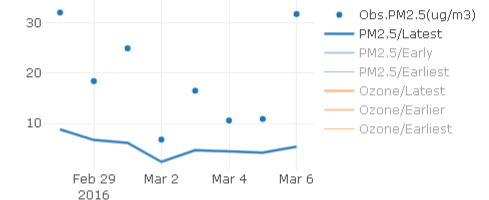
☐ Burns

☐ Air Quality with Burns

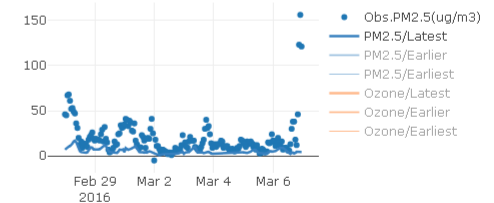
☐ Burn Impacts



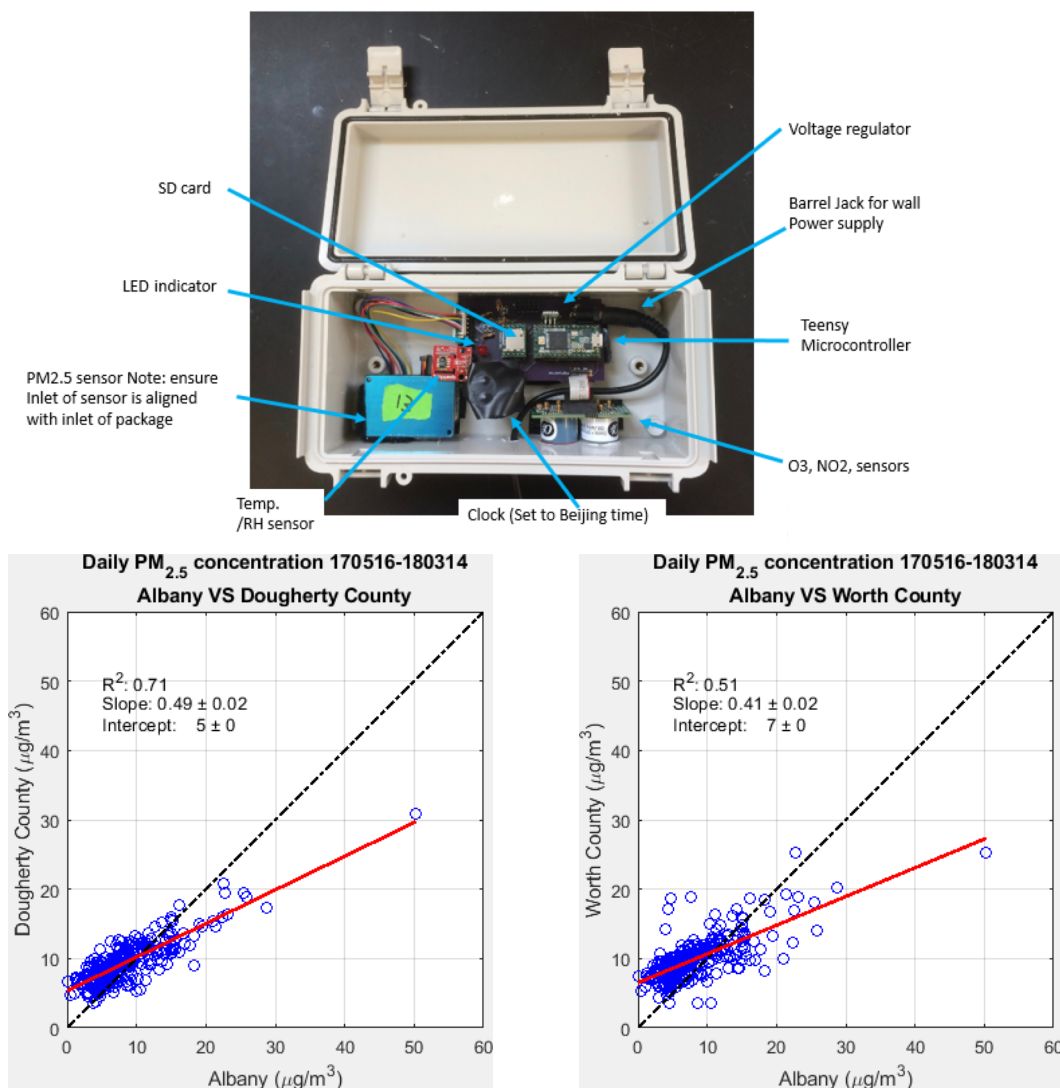
ALBANY - Daily



ALBANY - Hourly



Low-cost sensors collecting data in smoke impacted areas of Southwest GA



2018 active burn
season data analyzed

Year 2 Progress Update, PI Russell

HiRes-X: ... Extension of Operational ... Smoke Impacts Forecasts for Health ...

- Enhance HiRes-2 using Earth observations
 - Expanded prescribed (Rx) fire forecasts to Southeastern U.S. using satellite fire observations; manuscript in preparation
- Provide Rx fire impacts forecasts to local and state agencies
 - Held a workshop; launched and operated SIPFIS website; upcoming webinar; manuscript in preparation
- Maintain a sensor network
 - Deployed and operating a low-cost sensor network in Southwest Georgia: manuscript in preparation
- Presentations at 5 conferences/meetings; 2 papers published

Tiger Team Participation

- TT Fiore: Satellite Data in SIPS
 - Technical Guidance document on “Comparison of CMAQ simulations to satellite observations” (completed, in review and testing); manuscript in preparation
- TT Pierce: Improved NO_x emissions using OMI
 - Investigated how to improve O₃ simulations in the Great Lakes Region; 2 manuscripts submitted, 1 in preparation
- Co-PI Talat Odman is guest editing a special issue of International Journal of Environmental Research and Public Health (IF: 2.145) on “Air Quality and Health Predictions”