

Air pollution in under-monitored and rural regions

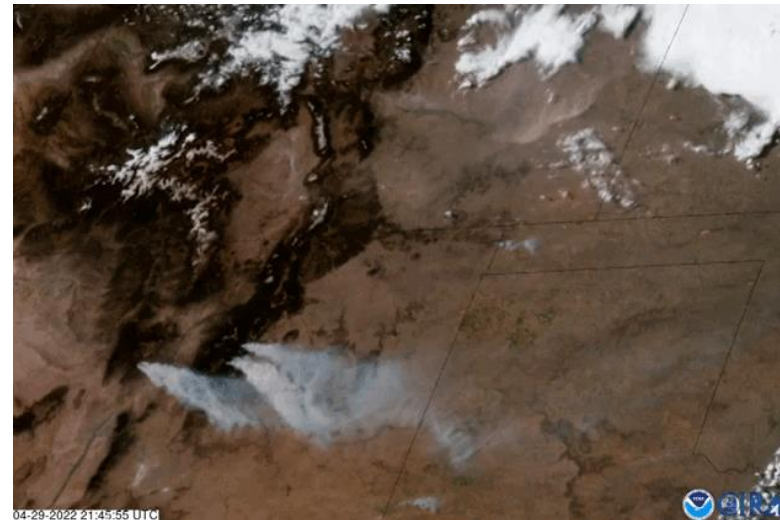
Jeff Pierce, Olivia Sablan, Jennifer McGinnis, Bonne Ford, Emily Fischer, Sheryl Magzamen, Amber Soja, Emily Gargulinski, many others

CSU, Atmospheric Science



Rural regions pollution and EJ

- Rural regions can be overlooked in EJ studies.
 - Often include impoverished regions.
 - Hotspots of certain under-represented groups, particularly Hispanic and Native Americans.
 - Rural populations are often older than urban-suburban populations.
- Rural regions susceptible to particulate matter from:
 - Wild and prescribed fires.
 - Dust.



Rural and urban air quality have different sources.

Rural



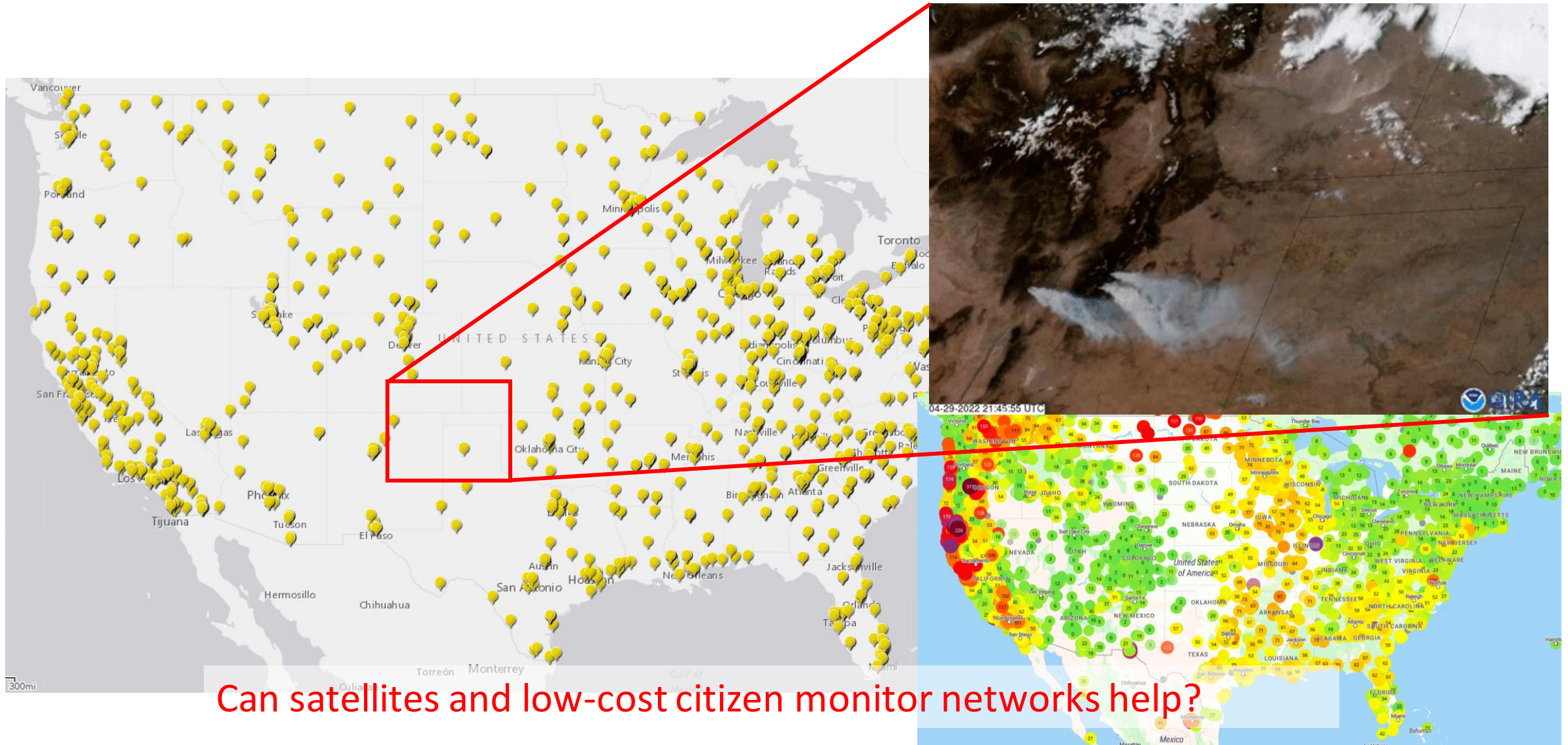
Billy Fanska (top), Vecteezy 2022

Urban

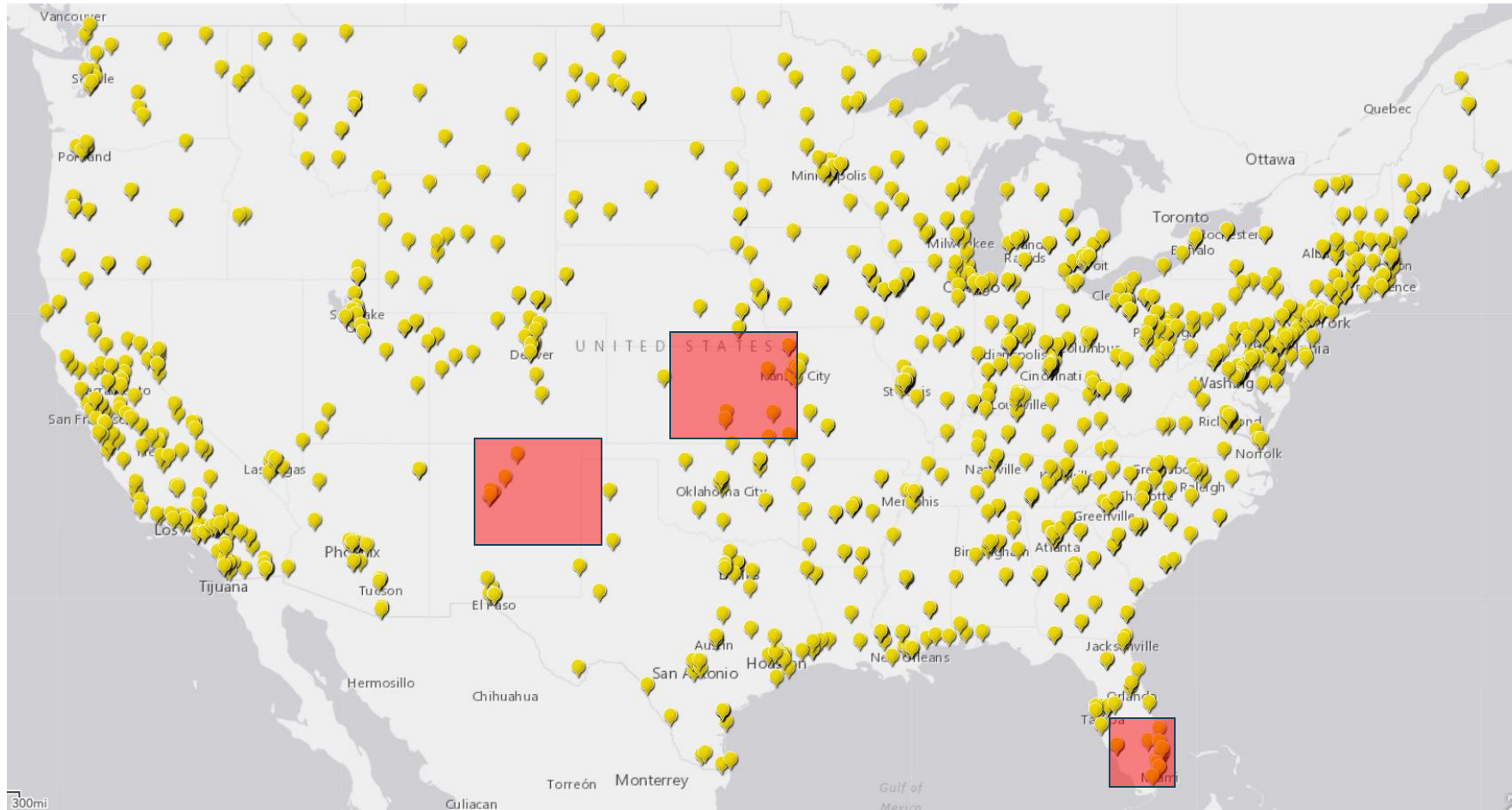


Getty Images 2008 (top), AAA 2020

Rural regions can be under-monitored



3 HAQAST smoke study regions with gaps in regulatory monitors

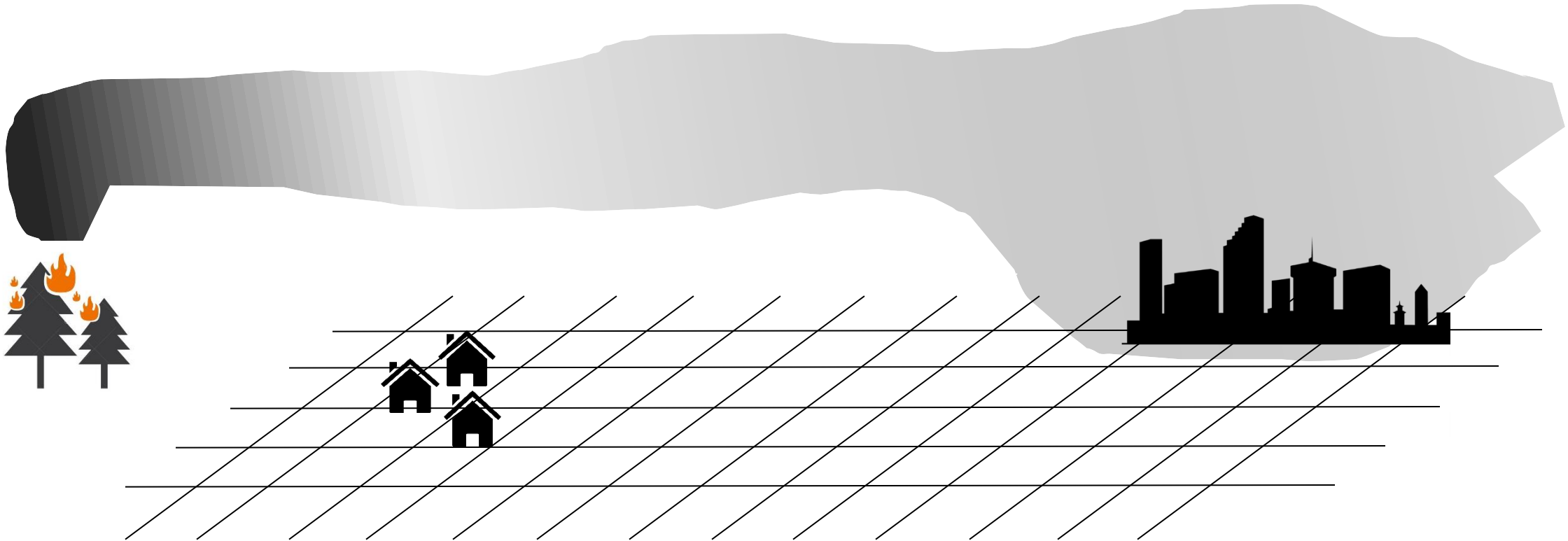


Active regulatory PM_{2.5}
monitors.

We have developed smoke exposure datasets that combine satellite and surface-monitor information.



Satellites— Can detect the plumes spatial extent, but usually can't tell us about surface impacts.

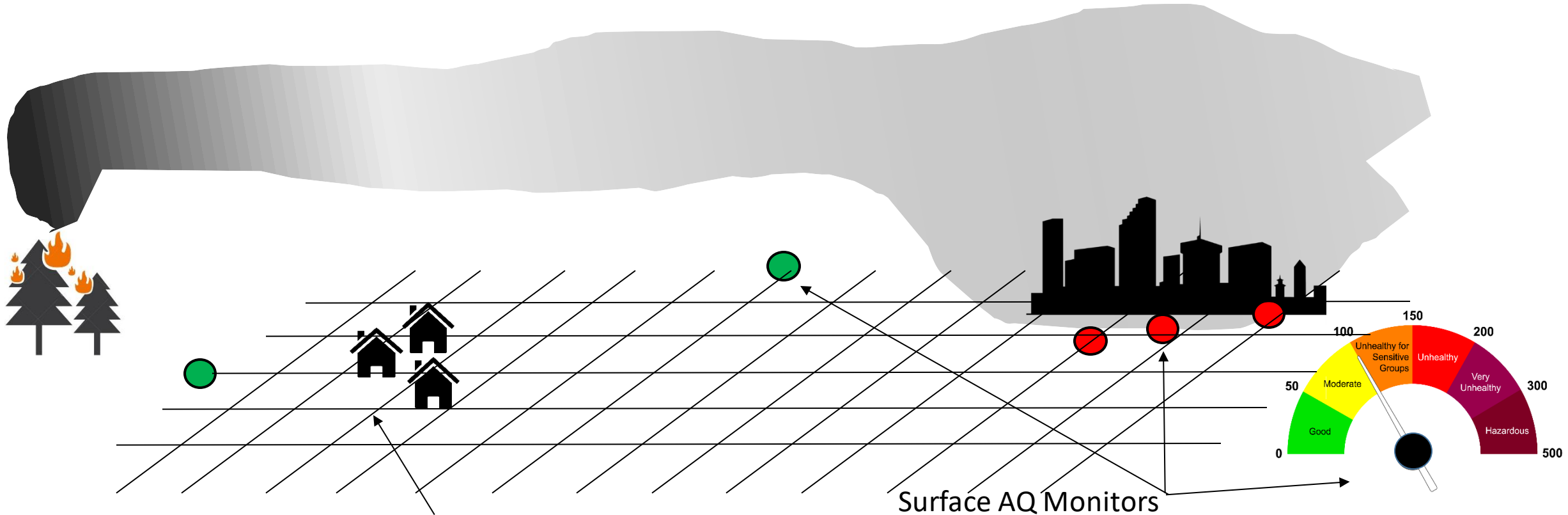


Slide courtesy of Emily Fischer

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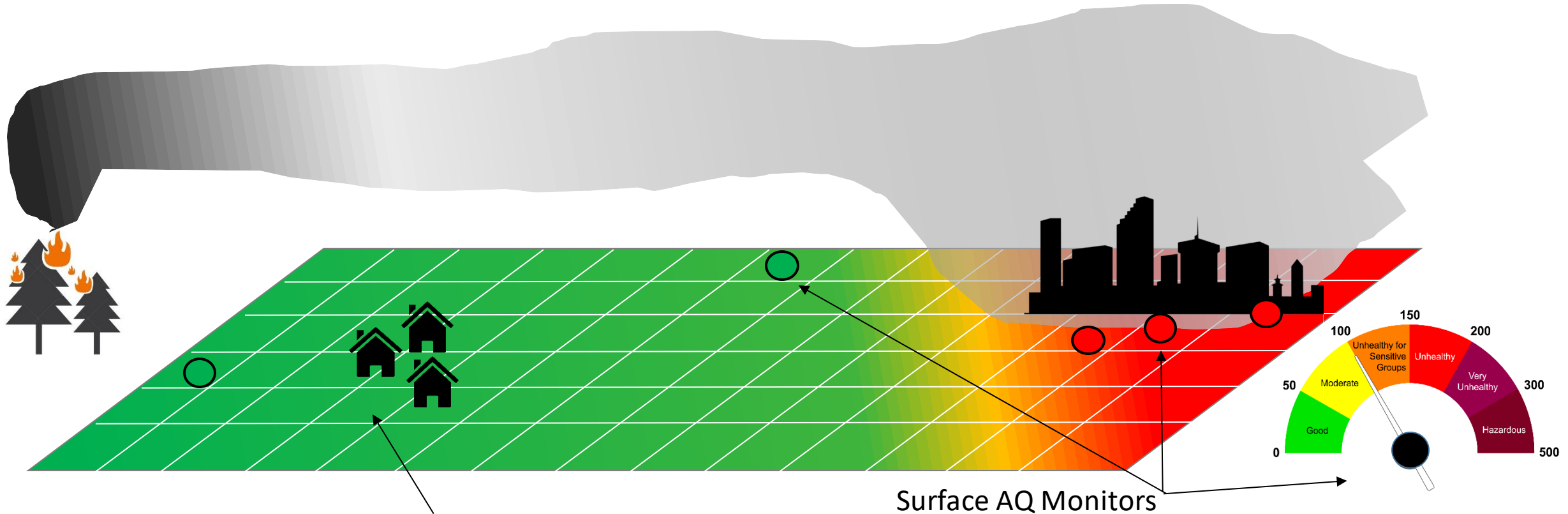
We need to know AQ everywhere where people live, work and play - not just near the monitors!

Surface AQ Monitors
(note these are sparse) Slide courtesy of Emily Fischer

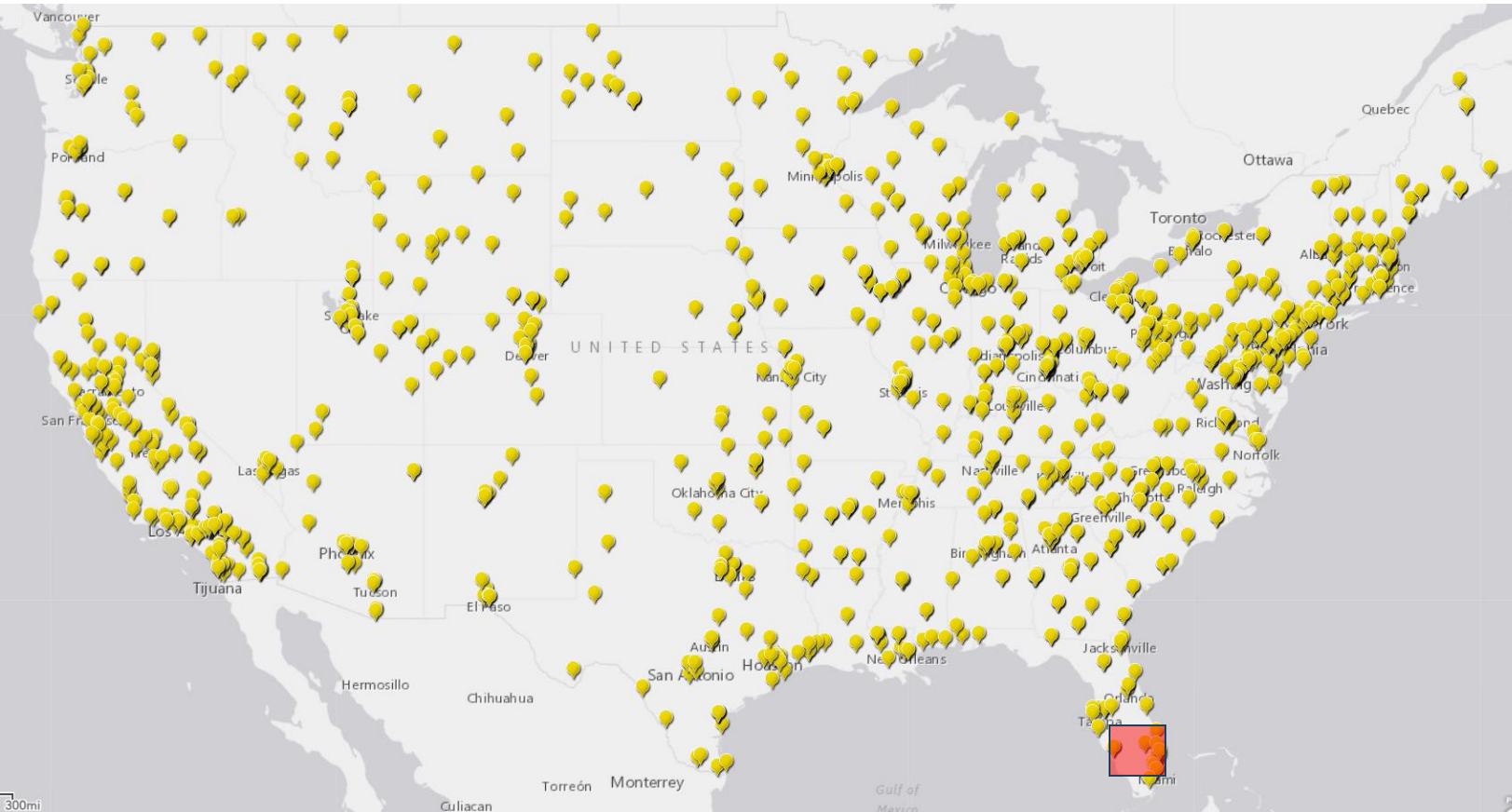
Blend information from satellites and surface monitors to create gridded smoke product.



Satellites – Can detect the plumes spatial extent, but usually can't tell us about surface impacts.



Southern Florida: Agricultural burning



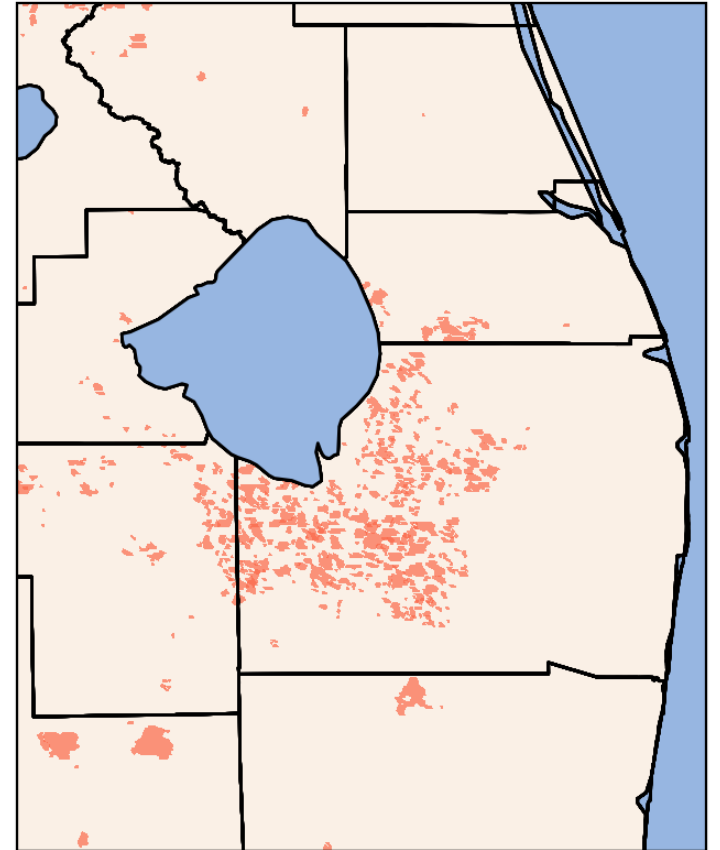
To ease harvesting at a low cost, sugarcane fields are burned annually during October – May.

Partners: Florida Atlantic University, community partners

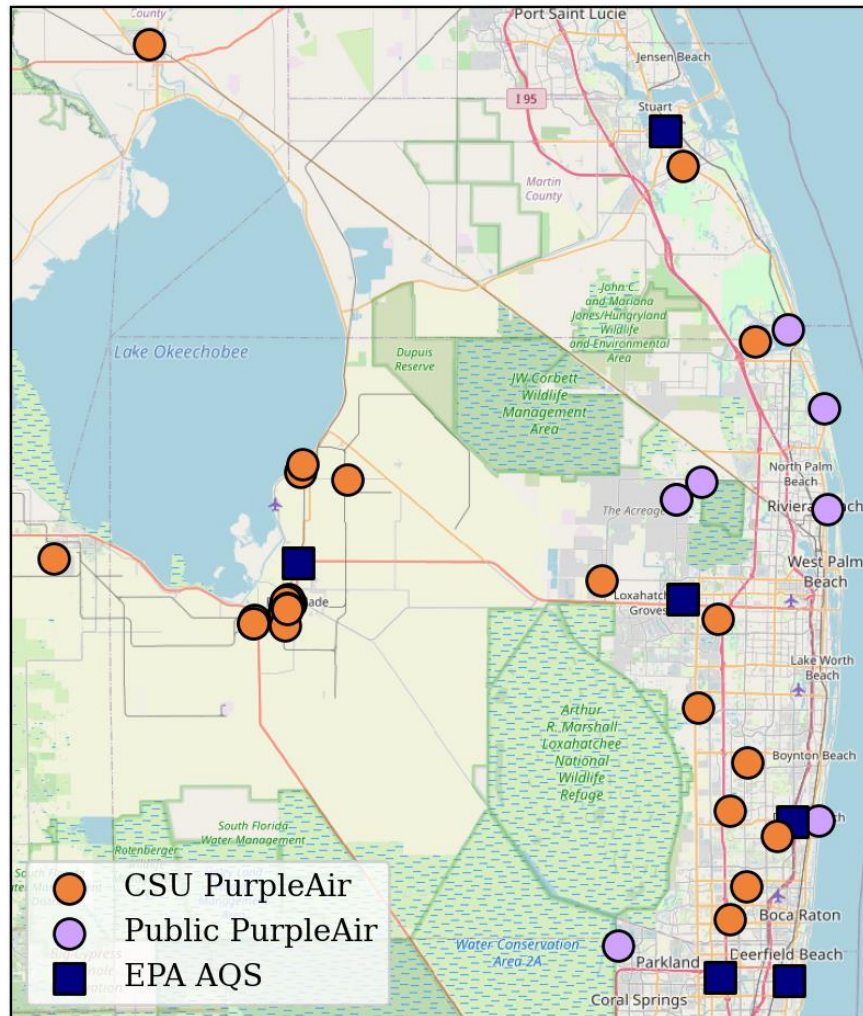
Agricultural burning covers much of the area of south-central Florida.



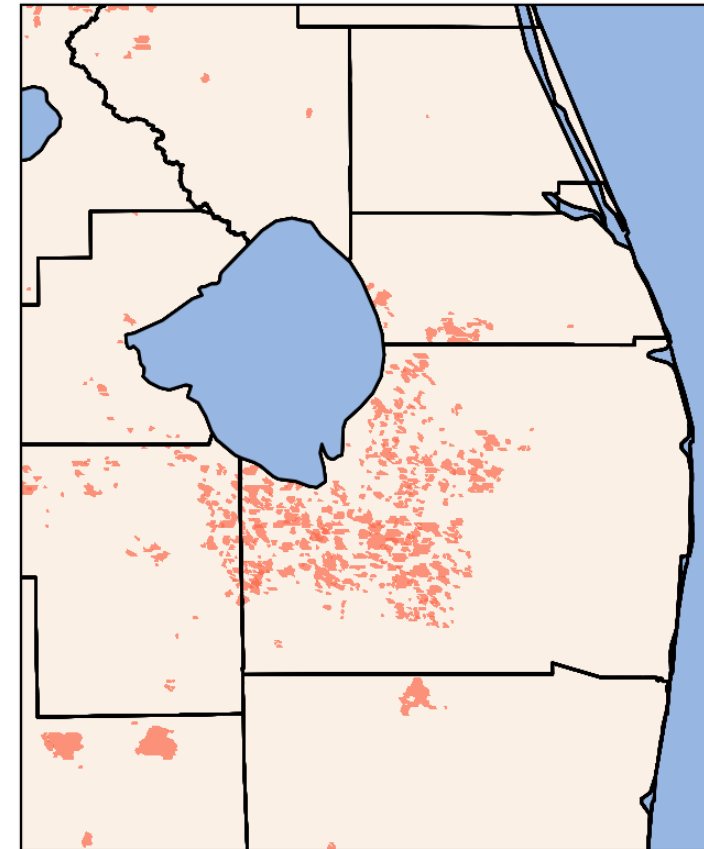
2022-2023 Burned Area
from MODIS (Oct - May)



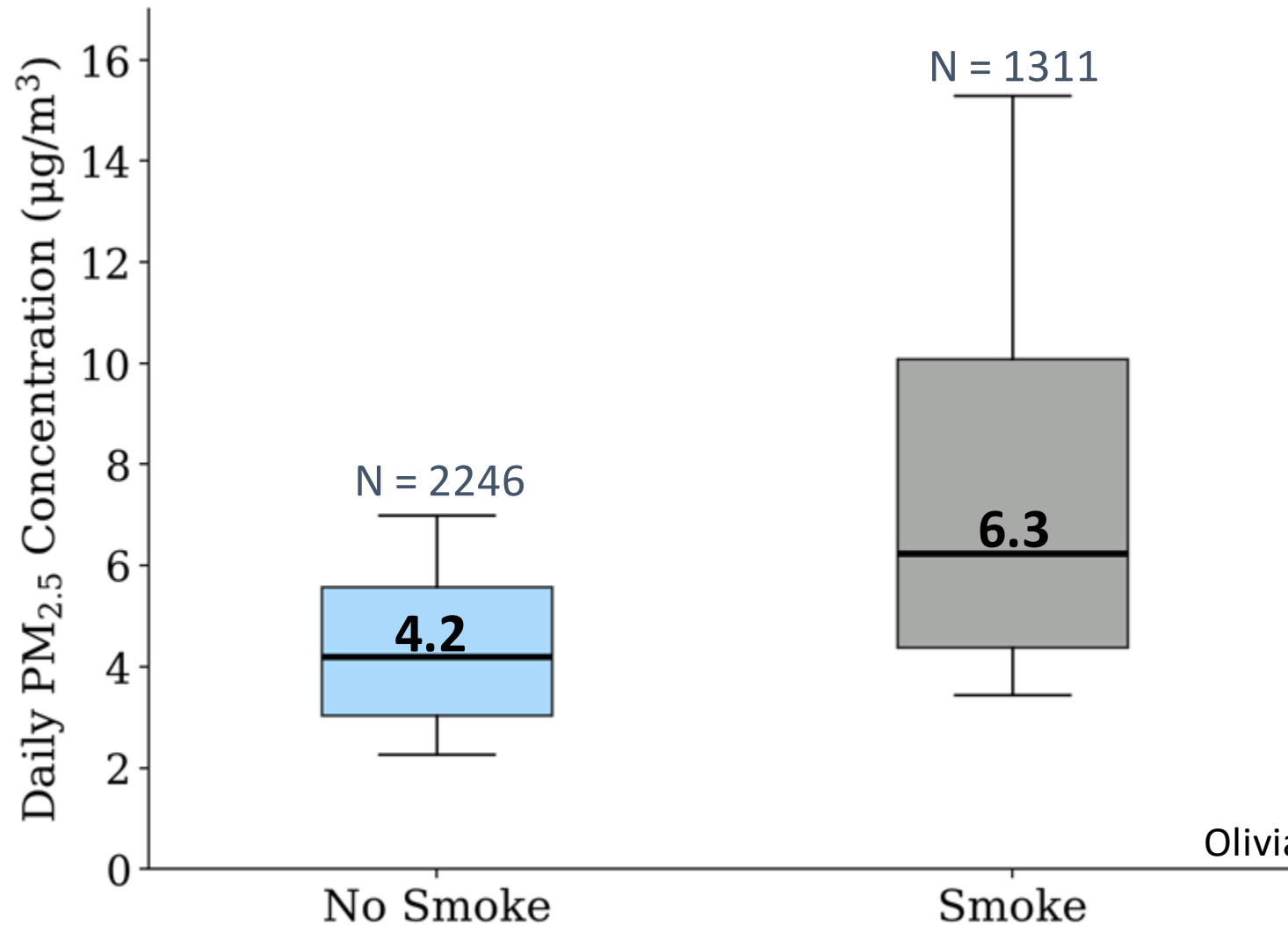
Again, there is a lack of regulatory monitors in the main burning region.



2022-2023 Burned Area
from MODIS (Oct - May)



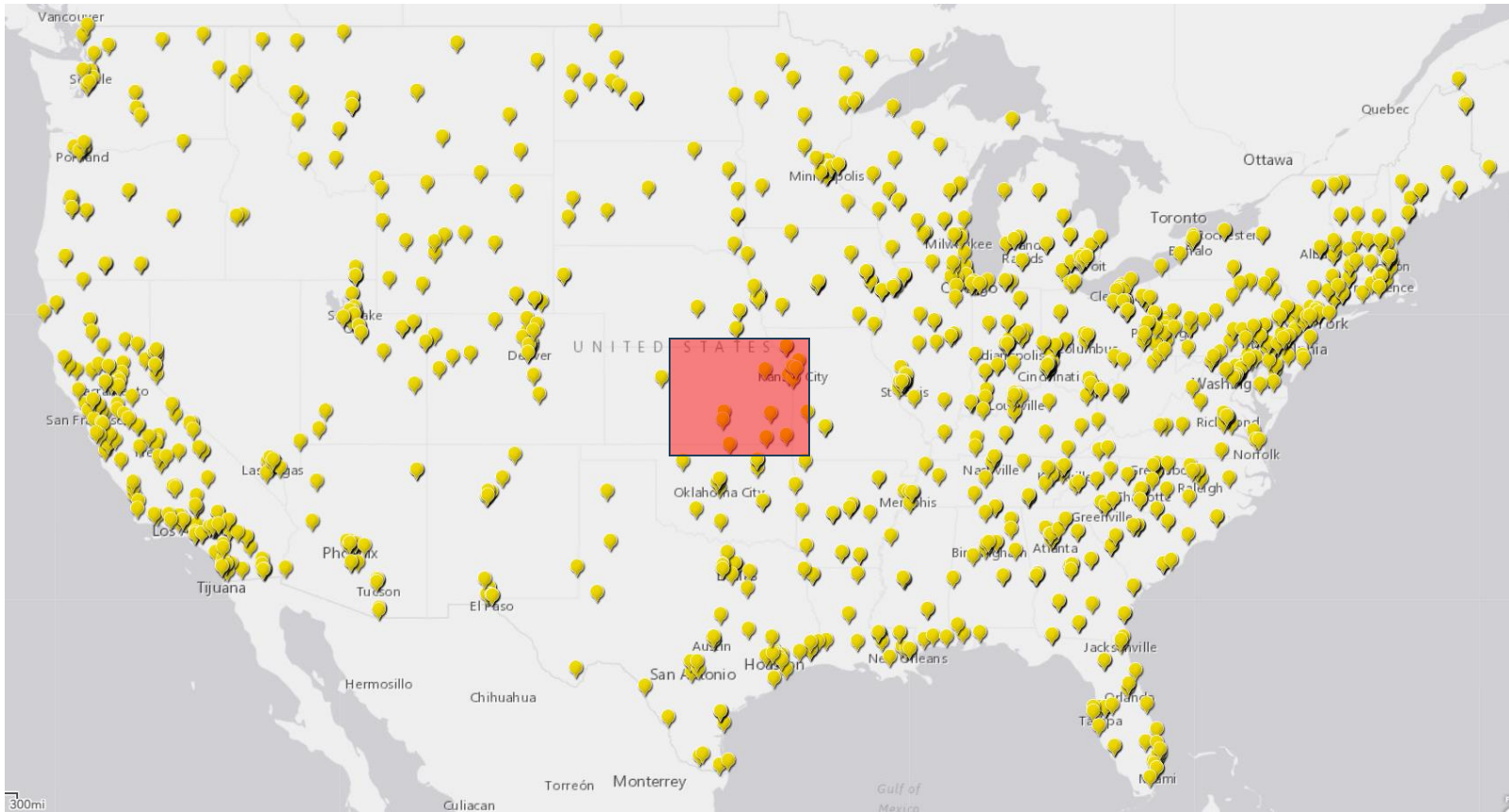
The days impacted by local burning had ~50% higher PM_{2.5}.



Olivia Sablan



Kansas: Spring prescribed fires in the Flint Hills

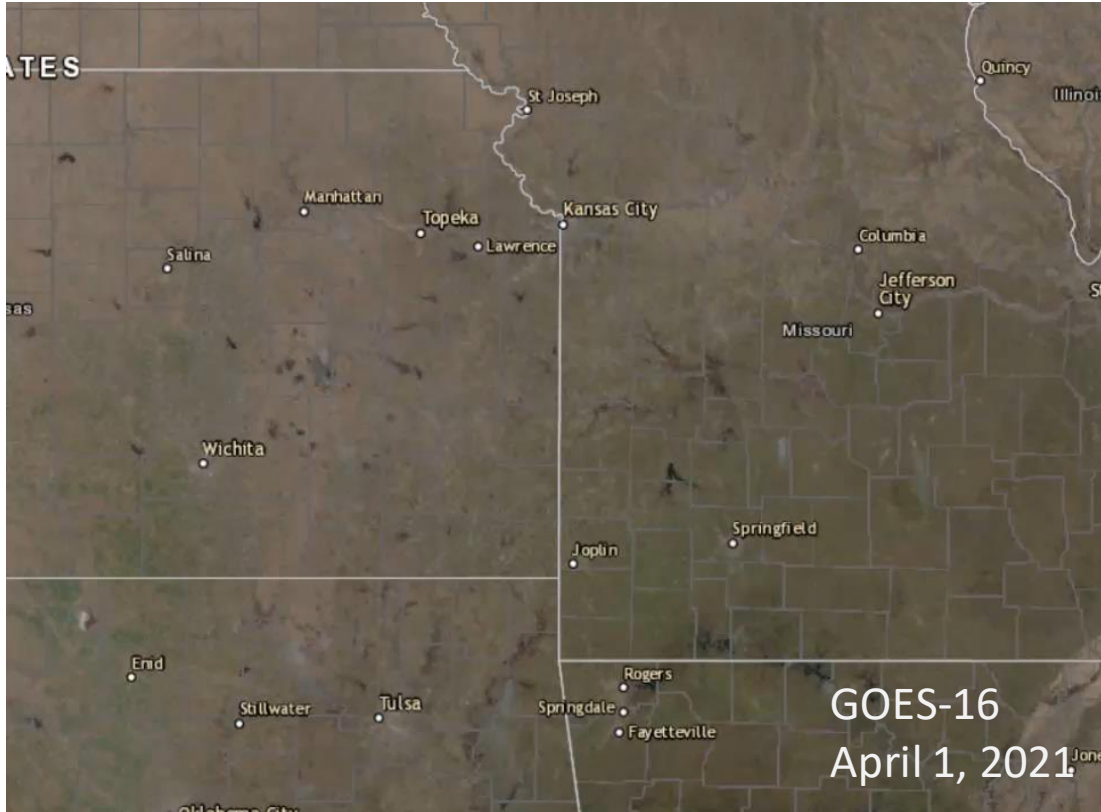


Annual springtime burning to:

- Decrease risk of wildfires
- Maintain the tallgrass ecosystem
 - Control invasive species
 - Decreasing woody encroachment
- Improve nutrition for livestock

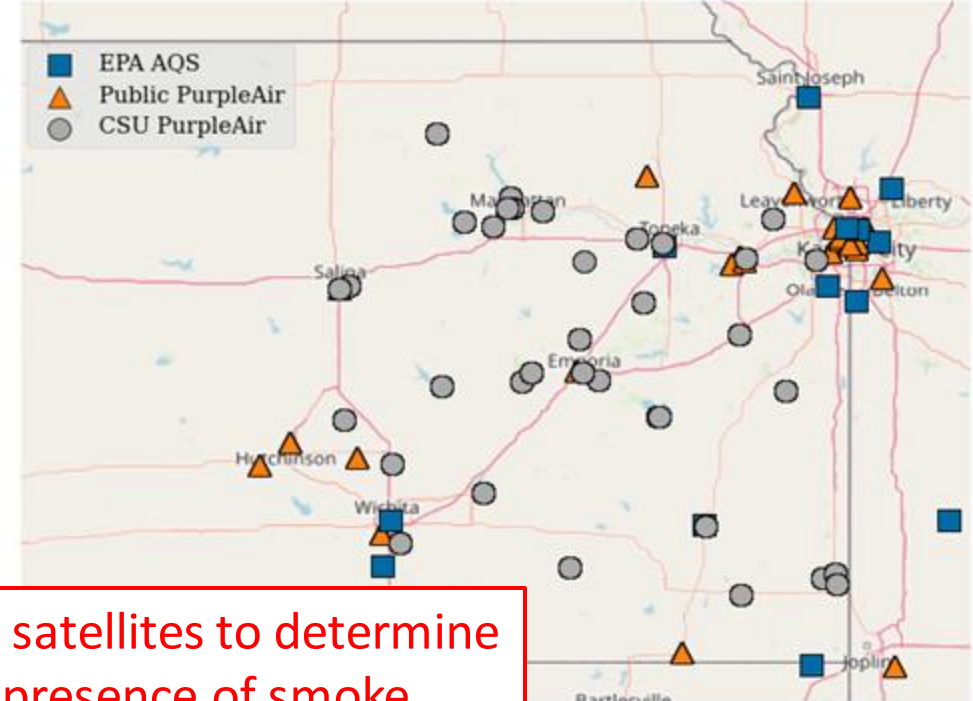
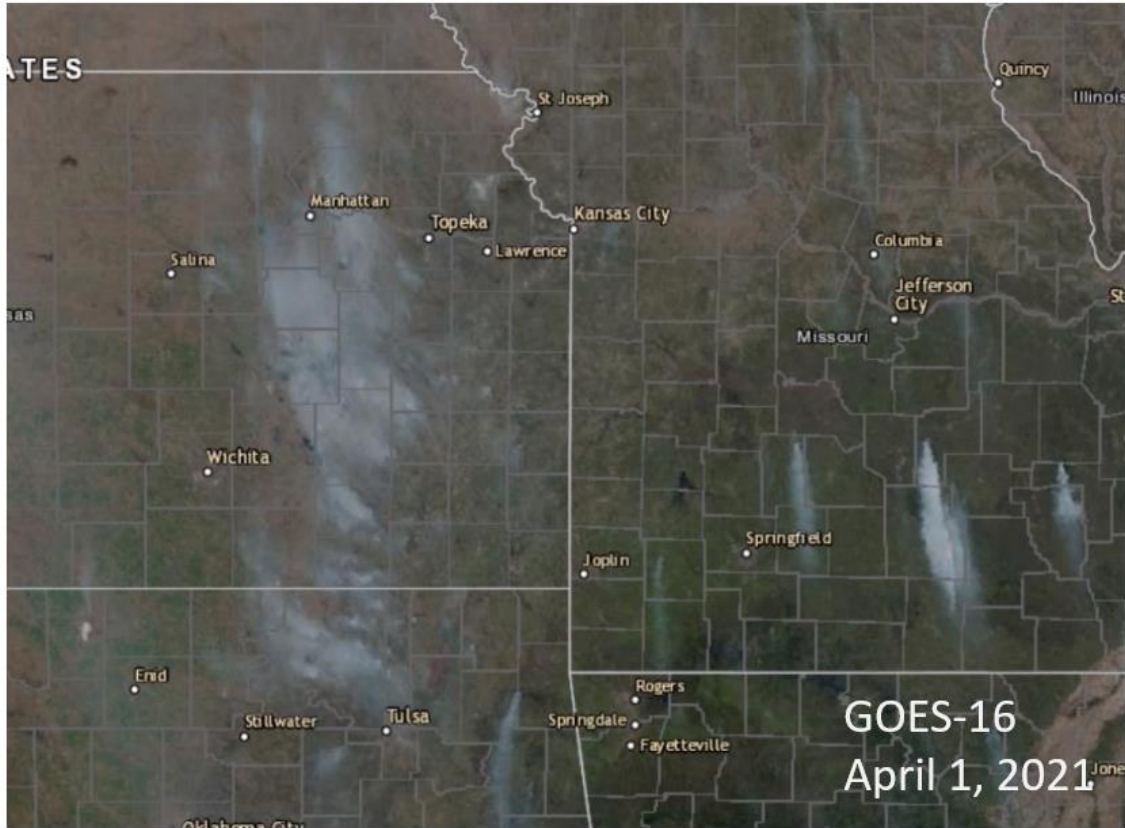
Partners: Kansas Department of Health and Environment, community partners

Prescribed fires in the Flint Hills are away from the regulatory monitors.



Partners: Kansas Department of Health and Environment, community members

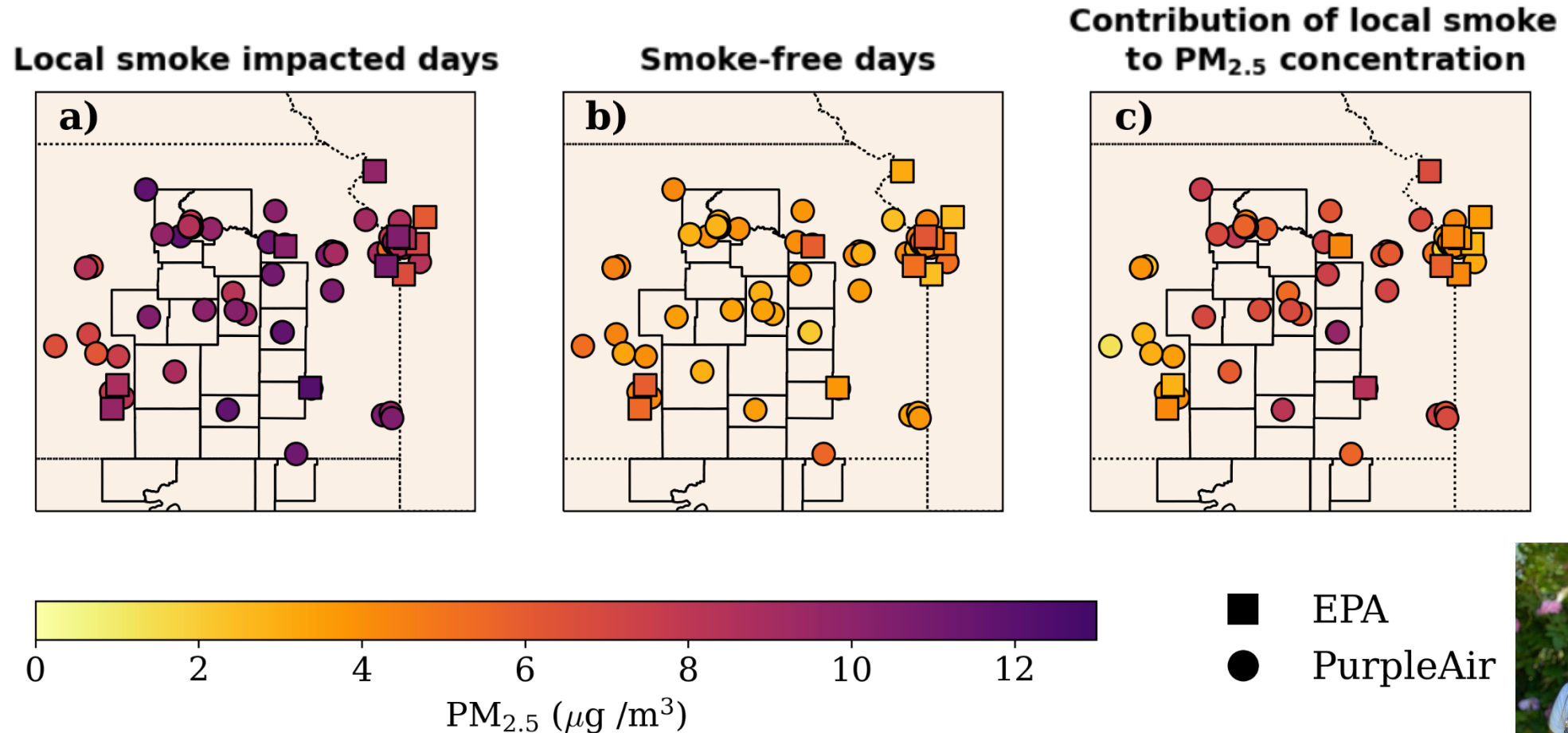
We incorporated low-cost monitors to fill the gaps.



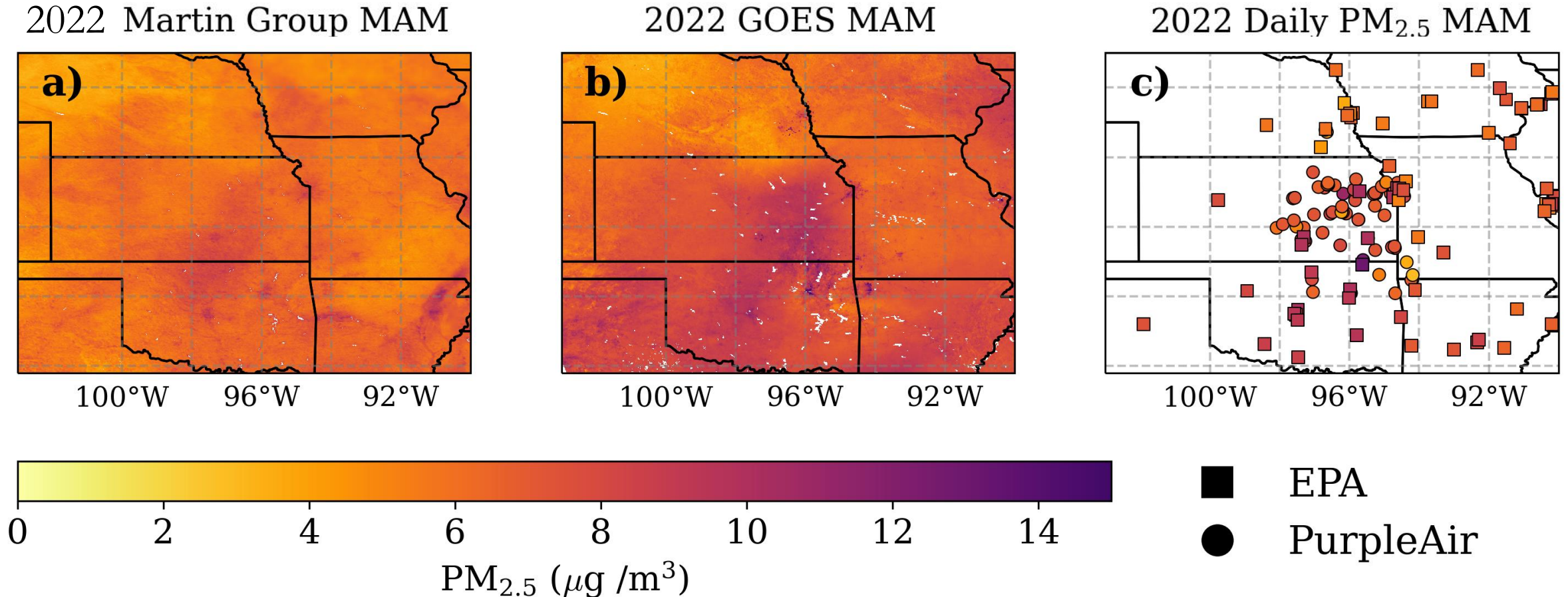
Use satellites to determine the presence of smoke from local fires

Partners: Kansas Department of Health and Environment, community members

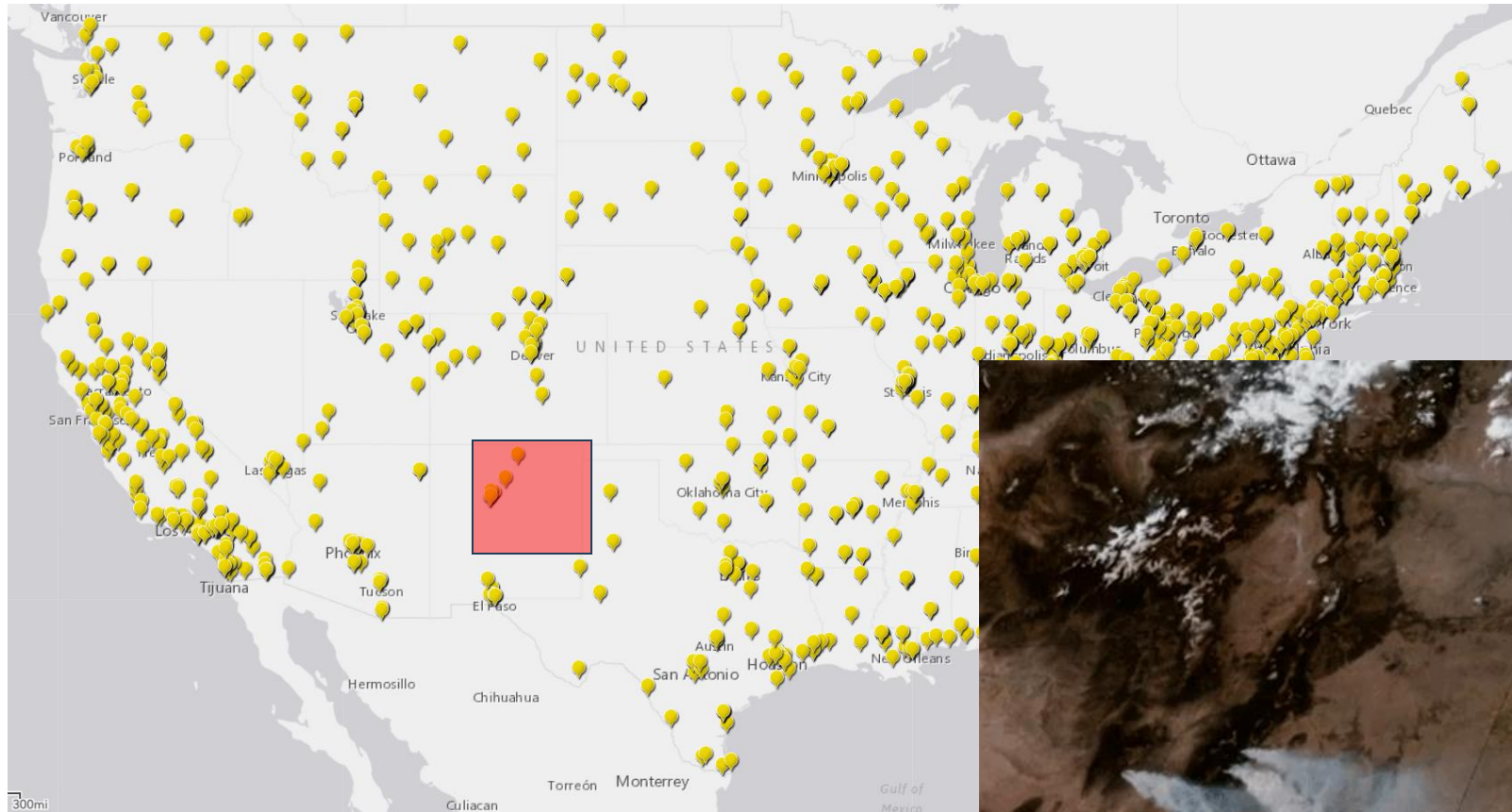
On days with local burning, the $\text{PM}_{2.5}$ concentrations more the double.



Satellite-derived PM_{2.5} products capture the springtime PM maximum in eastern KS.



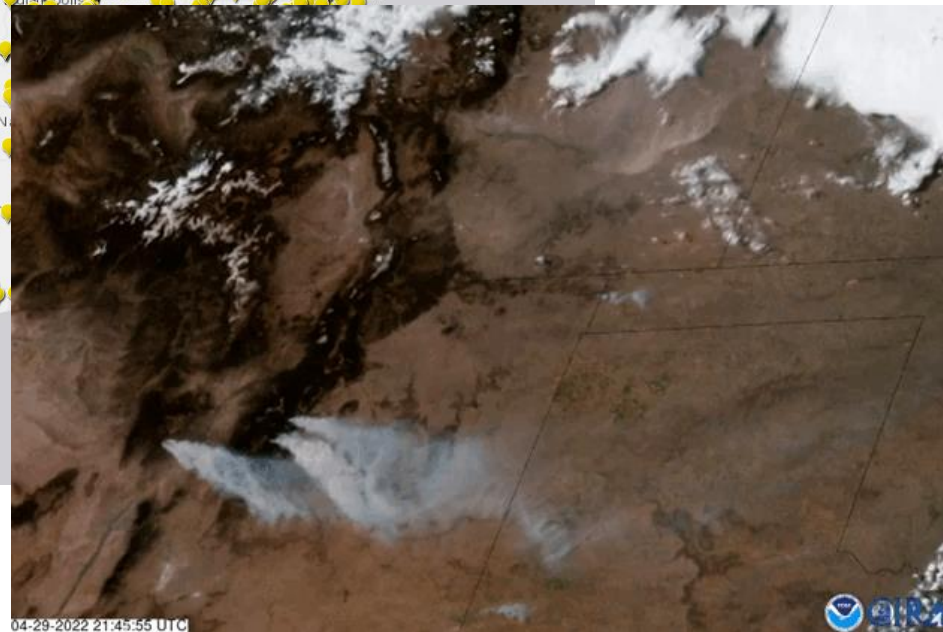
New Mexico: Bad wildfire season in 2022



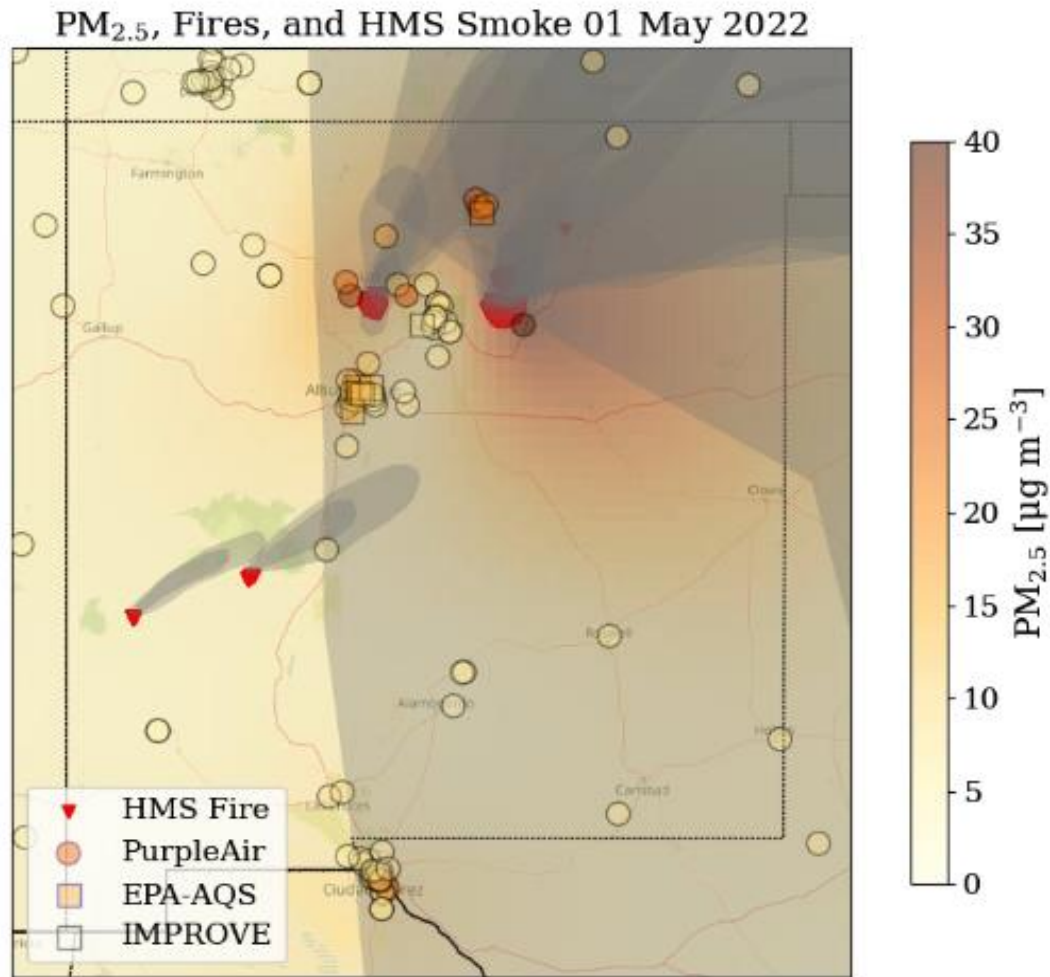
Two largest wildfires in state history:

- Calf Canyon/Hermits Peak Fire
- Black Fire

Susceptible to dust storms



Rapid response project to quantify smoke $\text{PM}_{2.5}$ in New Mexico using low-cost sensors and satellite data.



Chris Uejio

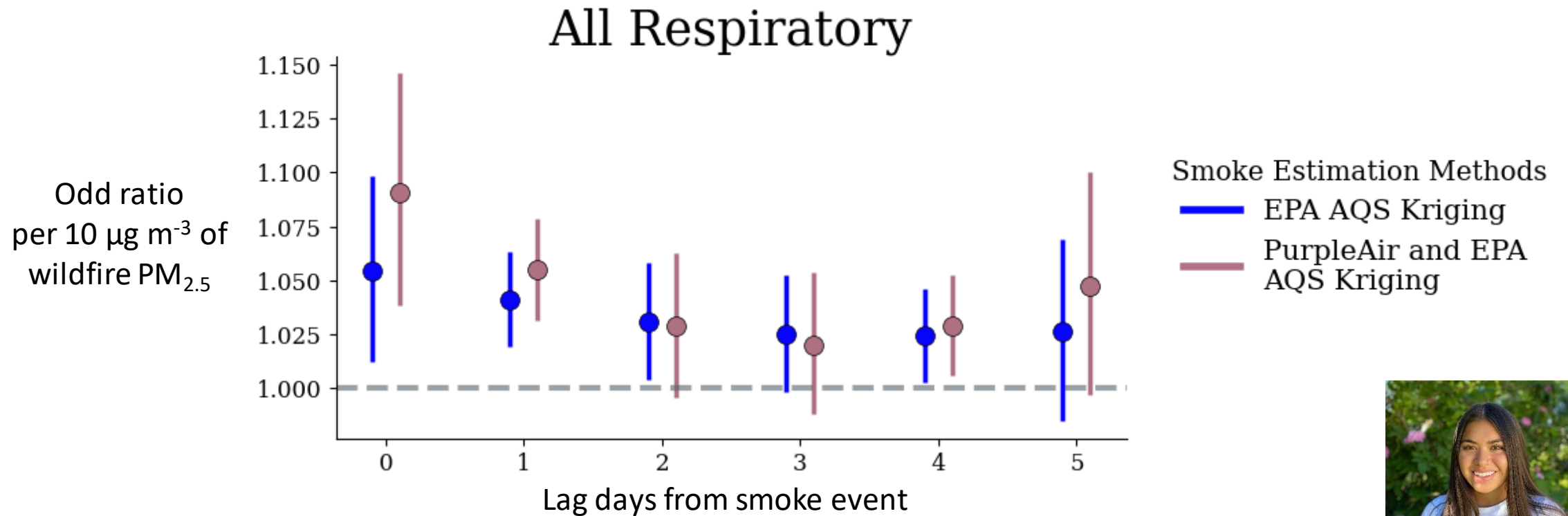


Bonne Ford



Partners: New Mexico Department of Health

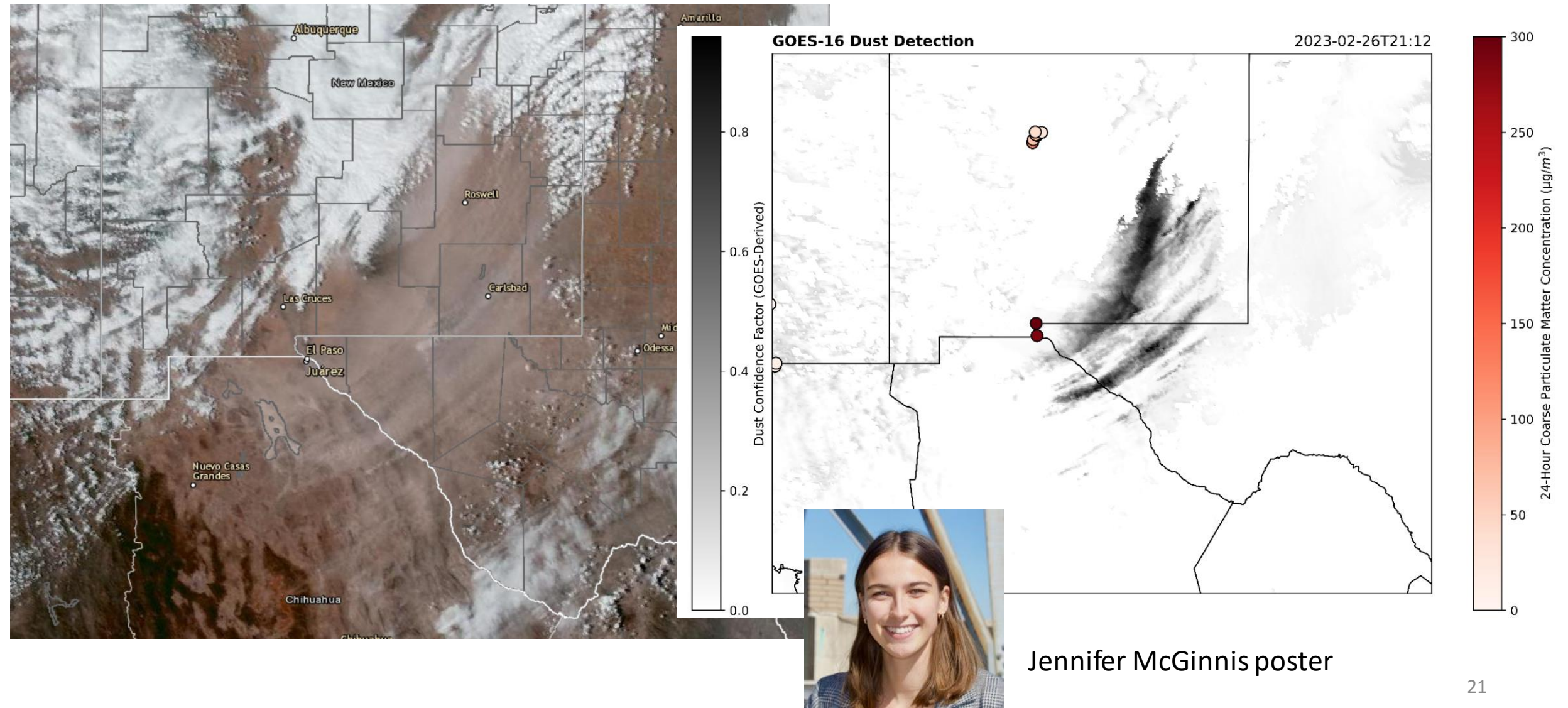
We Collaborated with NM Department of Health to quantify hospitalizations from wildfire smoke.



Olivia Sablan



We are developing techniques to quantify dust aerosol exposure using satellites.



Thanks!