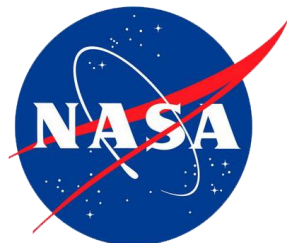


Wildfire in Alaska and its impact on air quality and public health

Jingqiu Mao

University of Alaska Fairbanks

In collaboration with Jun Wang's group (U of Iowa), Pawan Gupta's group (NASA), Micah Hahn's group (U of Alaska Anchorage), Loretta Mickley (Harvard)



UAA Institute for
Circumpolar Health Studies
UNIVERSITY of ALASKA ANCHORAGE

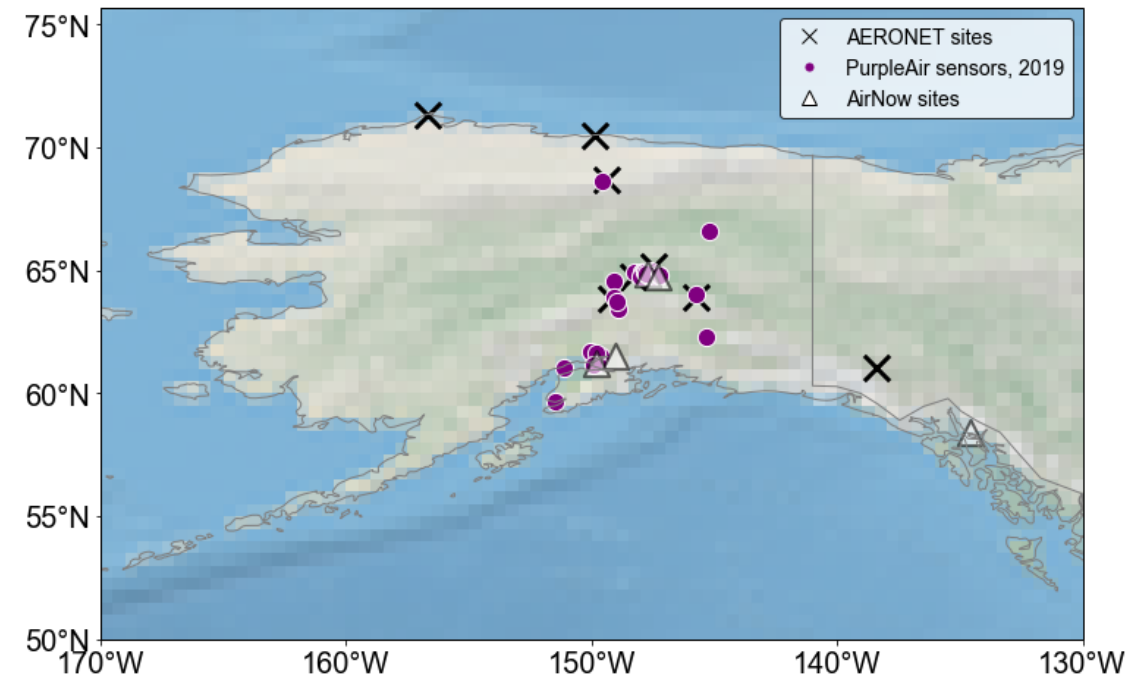
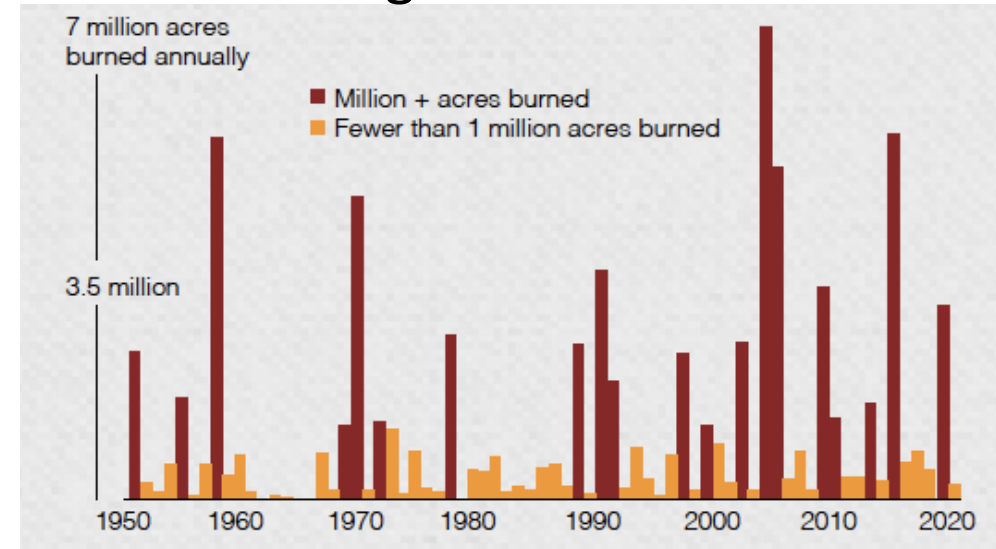


Harvard John A. Paulson
School of Engineering
and Applied Sciences

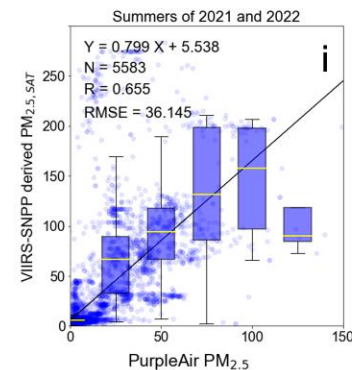
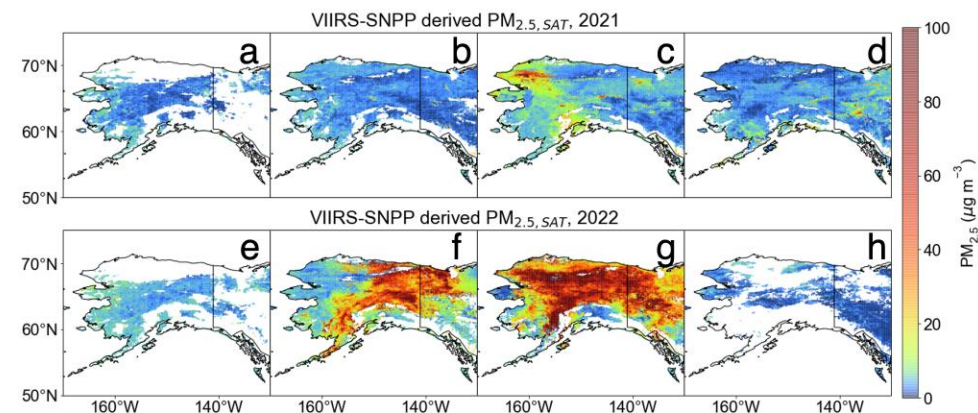
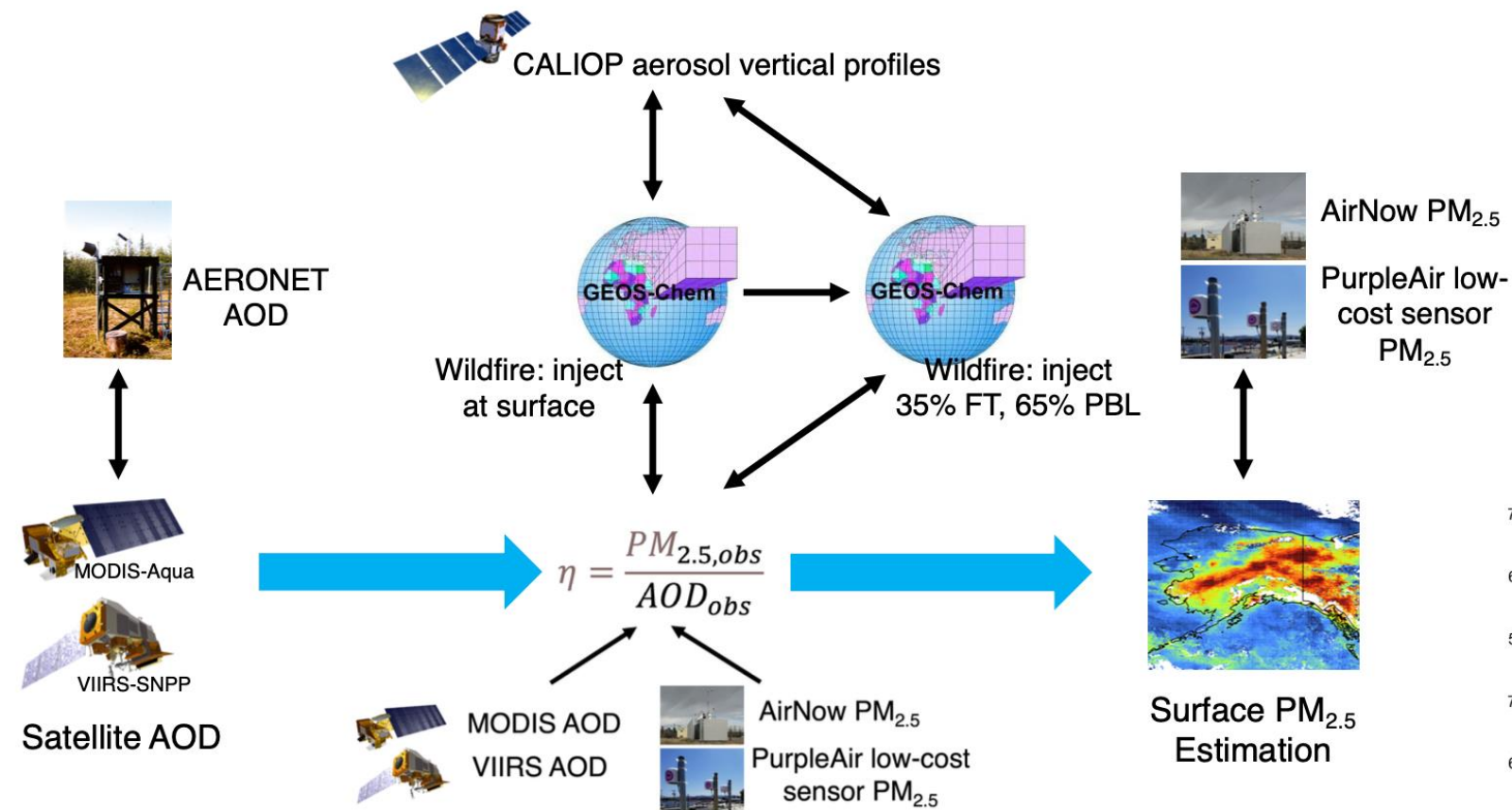
Alaska wildfire accounts for a major fraction of burning areas in US



Burning area in Alaska



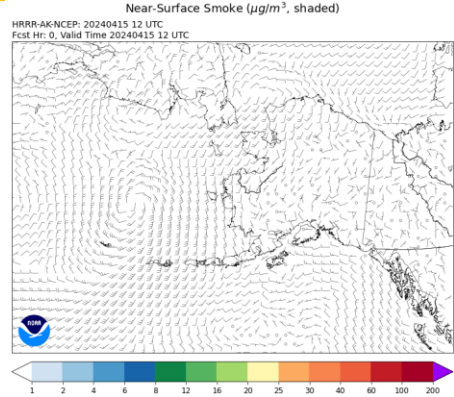
A quick and direct method to estimate daily surface PM_{2.5} during wildfire season



In collaboration with Pawan Gupta (NASA), Jun Wang (U of Iowa)

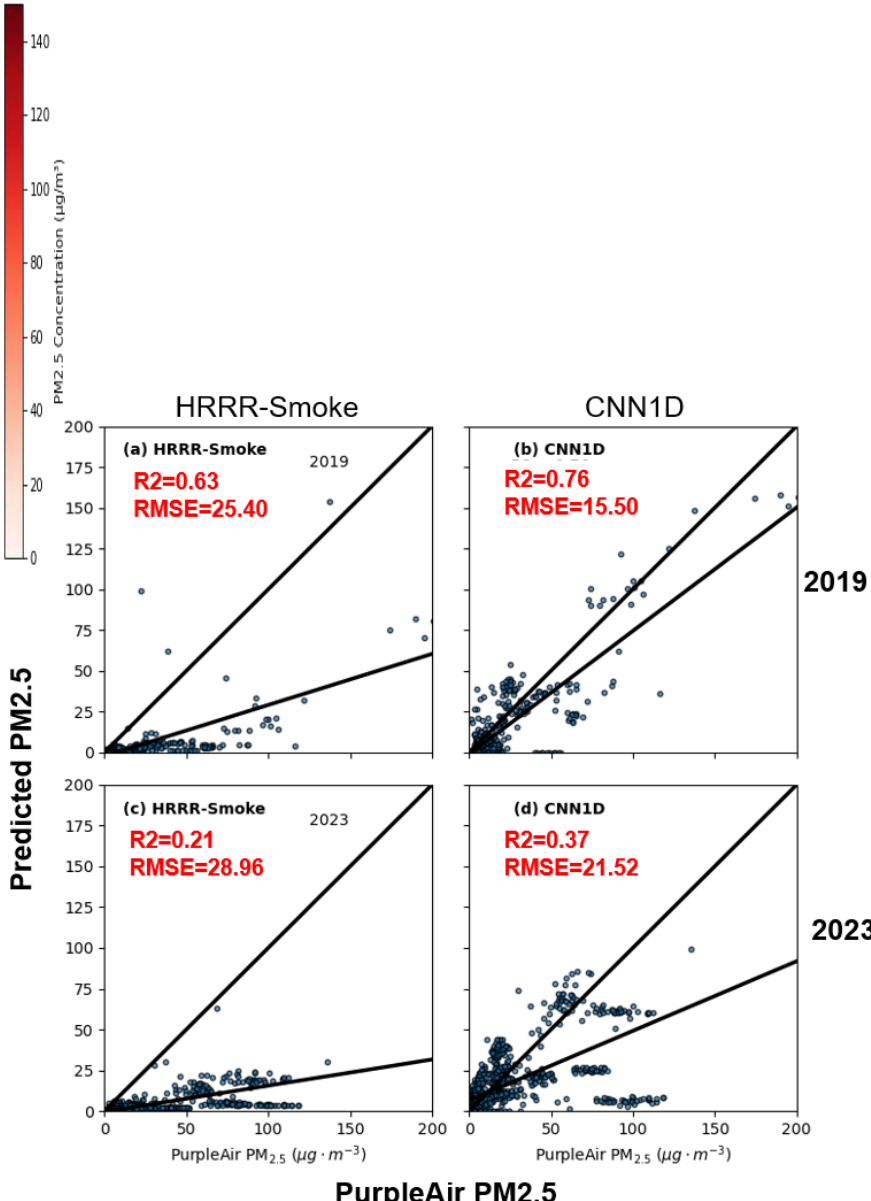
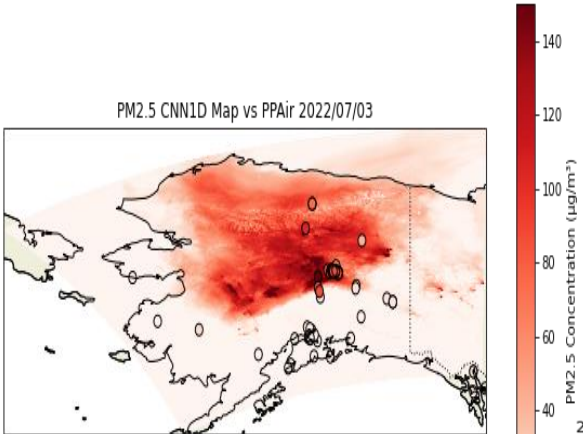
Use Machine Learning to Reconstruct Historical Surface PM_{2.5} in Summer Alaska

HRRR-Smoke **Hourly**
Forecasts (3 x 3 km)



1. Use Convolutional Neural Network (CNN) to build ML model between HRRR variables and PurpleAir PM_{2.5}

2. Apply the trained Machine Learning model to the entire domain to generate the PM_{2.5} map

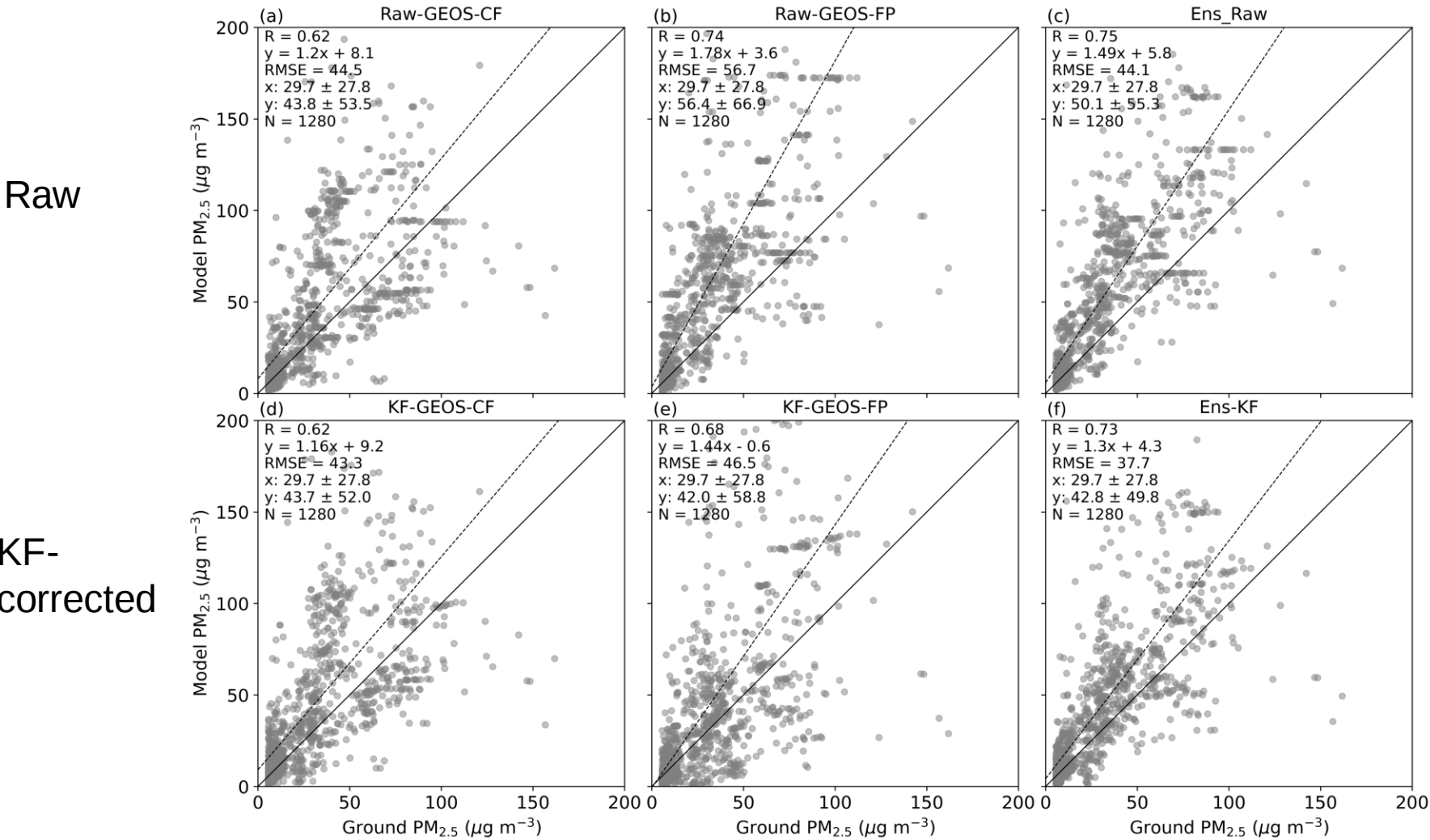


Please see Zhiwei Dong's poster

In collaboration with Pawan Gupta (NASA)

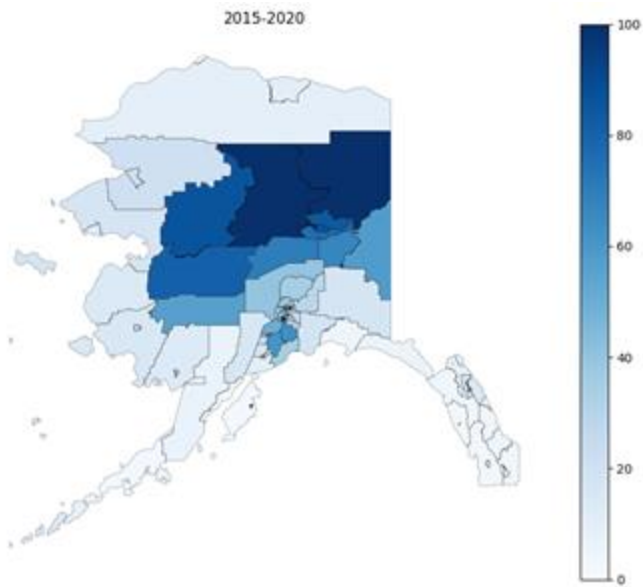
Use ensemble Kalman filter (KF) and Purple Air data to correct forecast bias

Ensemble of GEOS-CF and GEOS-FP (07/04-07/18/2022)

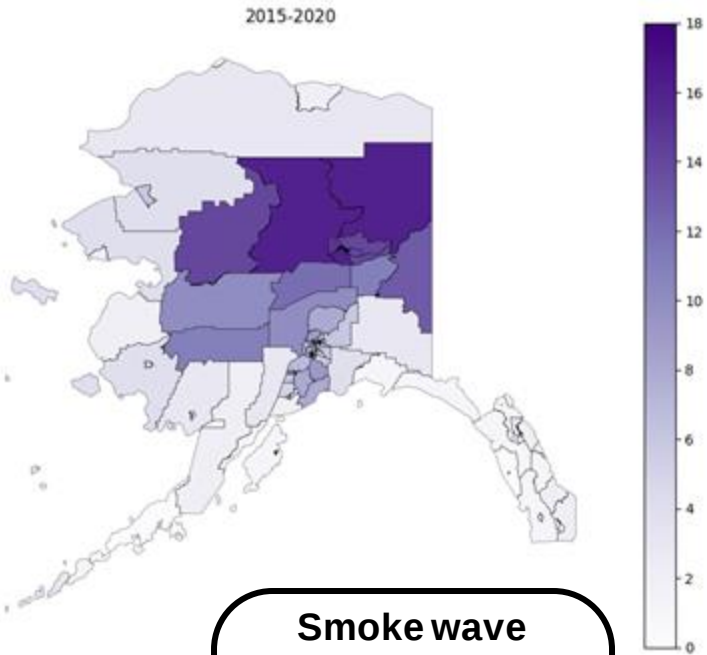


Develop Wildfire Smoke Metrics using GEOS-Chem and Purple Air data

Number of Days with $>9 \text{ ug/m}^3 \text{ PM}_{2.5}$ (May-September)

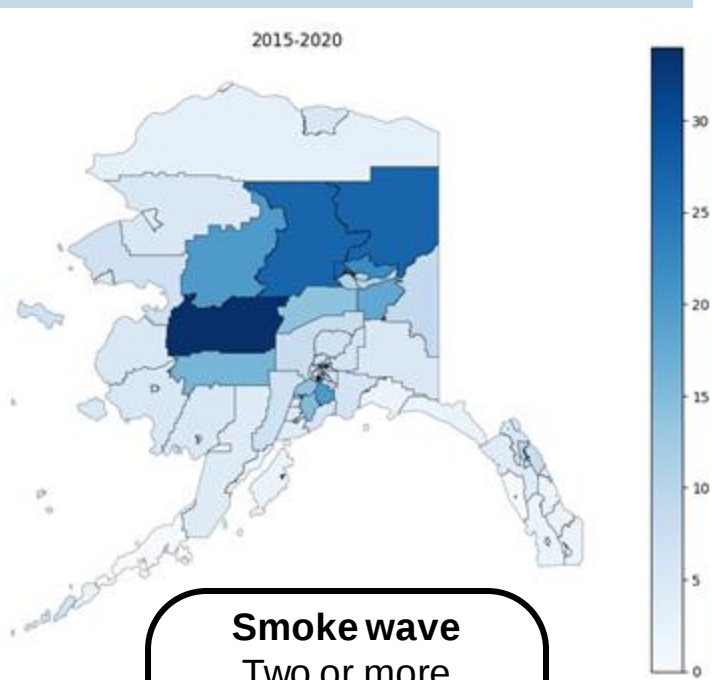


Number of Smoke Waves



Smoke wave
Two or more consecutive days with WFS $\text{PM}_{2.5}$ over 9 ug/m^3 (Moderate or worse air quality)

Length of Longest Smoke Wave

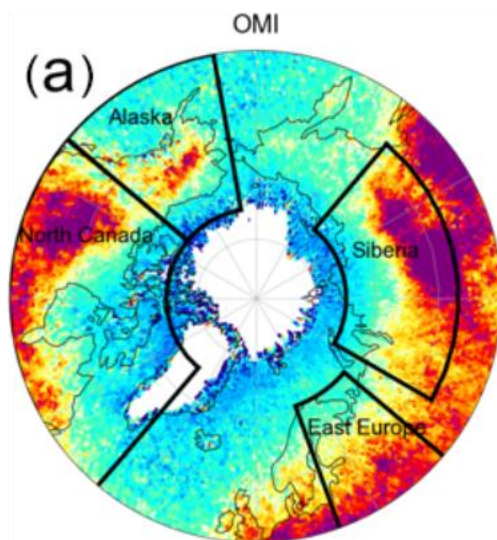


Smoke wave
Two or more consecutive days with WFS $\text{PM}_{2.5}$ over 9 ug/m^3 (Moderate or worse air quality)

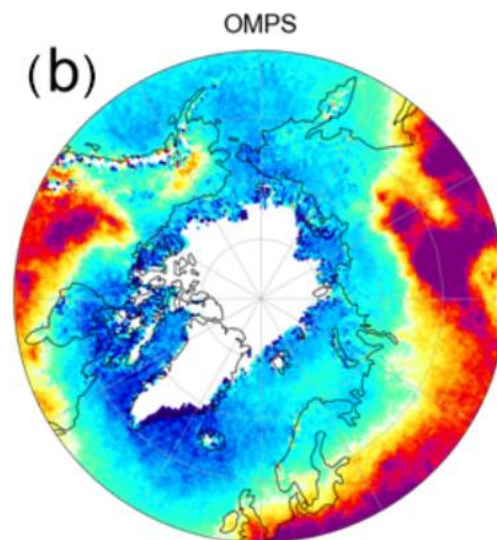


Wildfire drives HCHO interannual variability at northern high latitude

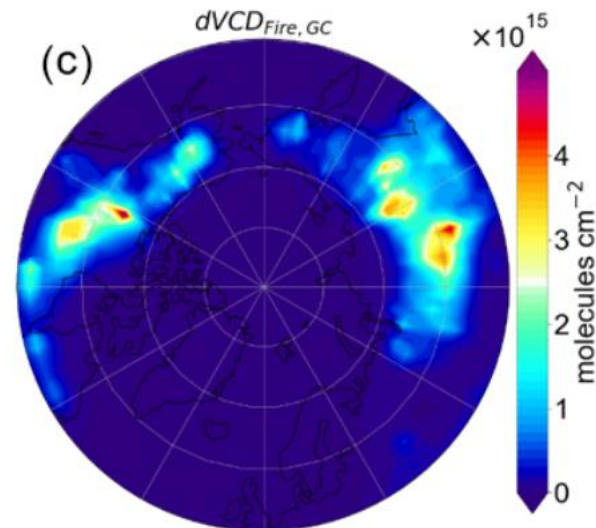
OMI HCHO VCD in
2012-2019 summers



OMPS HCHO VCD in
2012-2019 summers



Model calculated HCHO VCD
due to wildfires



(Zhao et al., 2024, ACP)

Website: Alaska Wildland Fire Information Map Series



UAF helps present air quality data for Alaska wildfire website

Getting information about where wildfire smoke is headed in Alaska has become easy for the public, thanks to collaboration between the University of Alaska Fairbanks and the Alaska Fire Service.

[Read more](#)



PM2.5 forecasts from GEOS-FP have been included in **Alaska Wildland Fire Information website** (operated by **GINA**) to provide air quality forecasts to the public in Alaska and received positive feedbacks during the fire season of 2023.