A SPHEROS ENVIRONMENTAL COMPANY

Applications of Satellite Earth Observations to Air Quality and Health at Sonoma Technology

By Nathan R. Pavlovic

For HAQAST

November 7, 2025

About Sonoma Technology

For 40 years, Sonoma Technology has provided innovative science and technology answers to air quality questions for clients around the world.

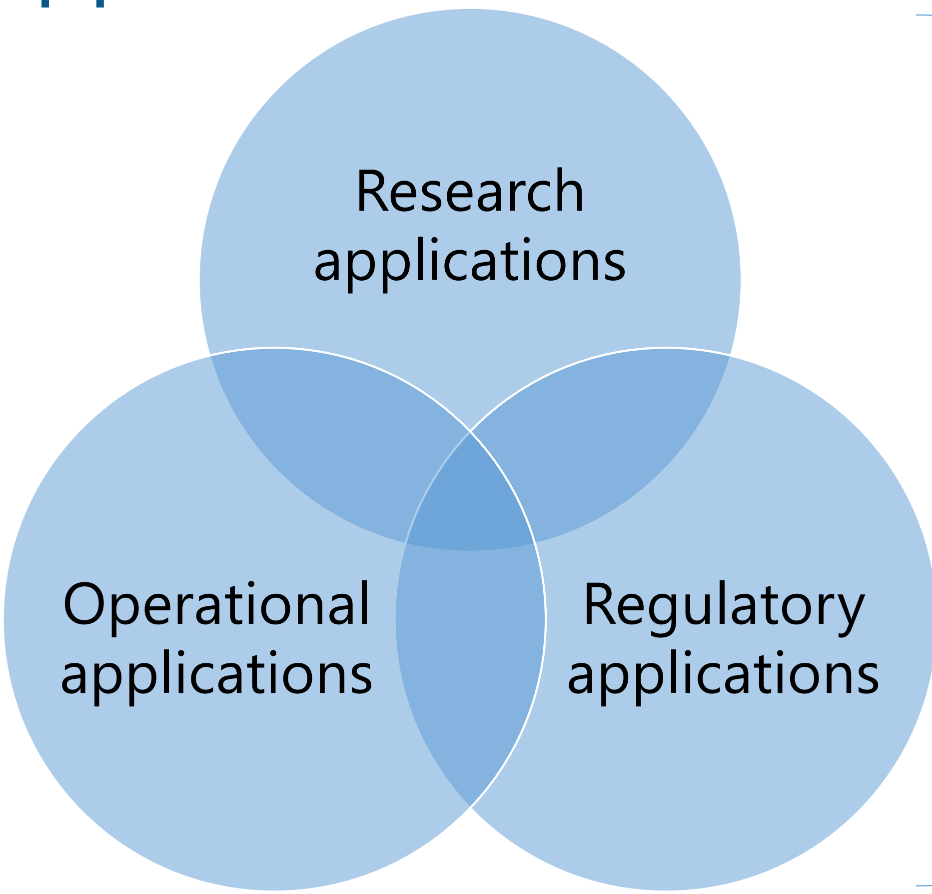
We are a green-certified business with headquarters in northern California and offices in New York, Washington, D.C., and southern California.

Business Areas and Services

Air Quality	Emissions
Meteorology	Fire and Fuels
Transportation	Modeling
Low-Cost Sensors	Forecasting

Our integrated teams of atmospheric and physical scientists, policy and data analysts, engineers, software and database developers, and technical editors work to solve air quality issues.

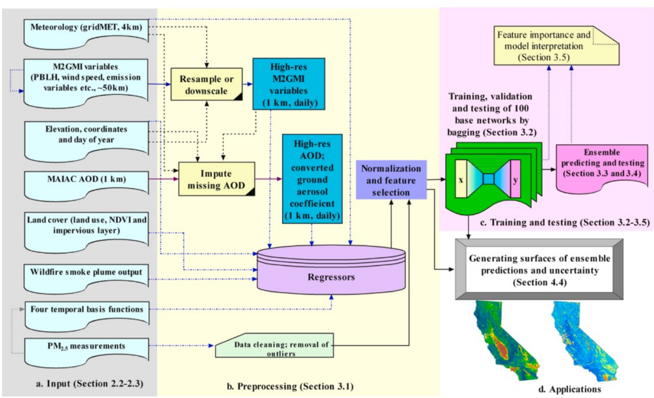
Applications of Earth Observations

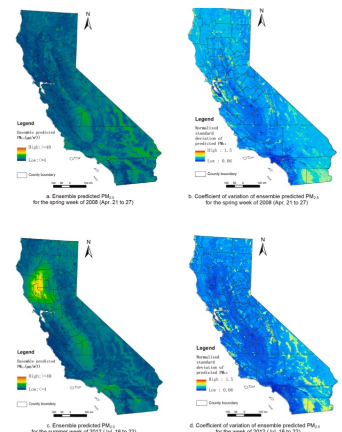


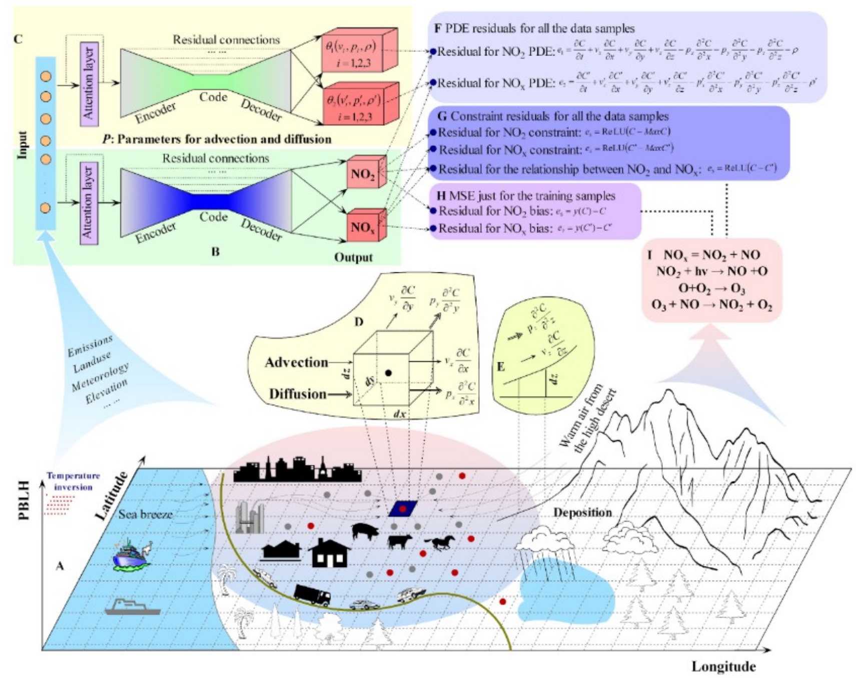
Methods

- Emissions estimation
- Statistical and physical models
- Satellite remote sensing
- Geostatistical analysis
- Data fusion and machine learning
- Data visualization, interpretation, and distribution

High resolution estimation of pollution concentrations



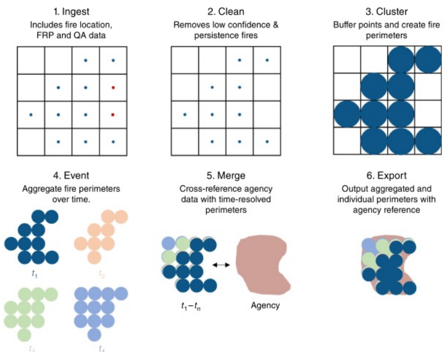


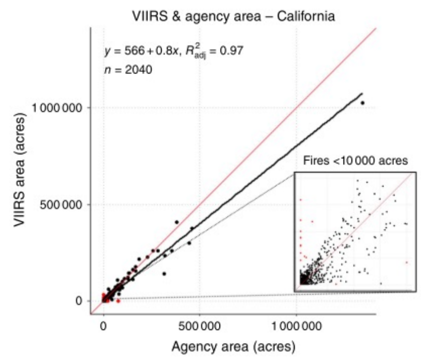


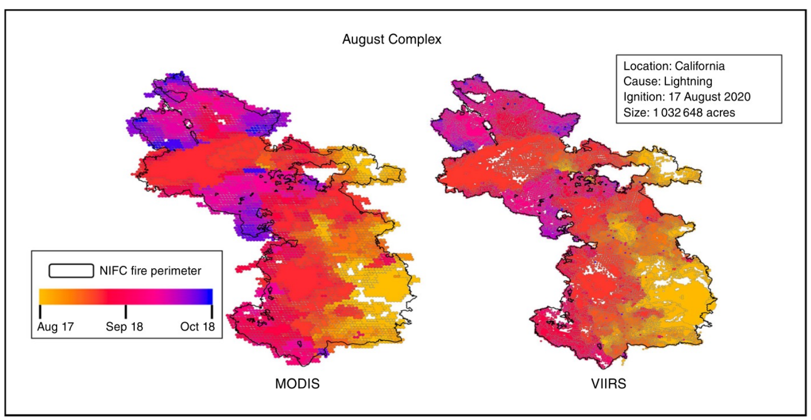
Li, L.; Girguis, M.; Lurmann, F.; Pavlovic, N.; McClure, C.; Franklin, M.; Wu, J.; Oman, L.D.; Breton, C.; Gilliland, F.; et al. Ensemble-Based Deep Learning for Estimating PM2.5 over California with Multisource Big Data Including Wildfire Smoke. *Environ. Int.* **2020**, *145*, 106143, doi:10.1016/j.envint.2020.106143.

Li, L.; Khalili, R.; Lurmann, F.; Pavlovic, N.; Wu, J.; Xu, Y.; Liu, Y.; O'Sharkey, K.; Ritz, B.; Oman, L.; et al. Physics-Informed Deep Learning to Reduce the Bias in Joint Prediction of Nitrogen Oxides. **2023**, doi:https://doi.org/10.48550/arXiv.2308.07441.

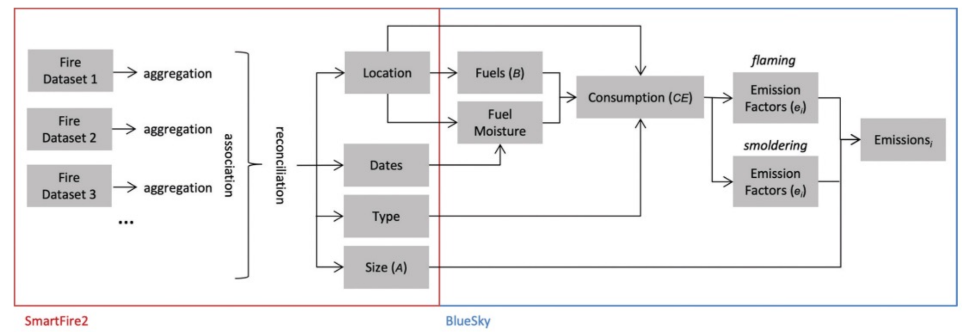
Wildland fire distribution and emissions

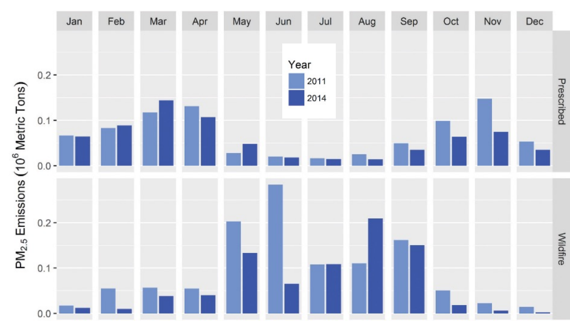


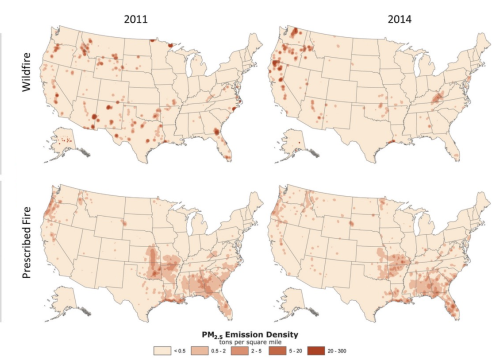




McClure, C.D.; Pavlovic, N.R.; Huang, S.M.; Chaveste, M.; Wang, N. Consistent, High-Accuracy Mapping of Daily and Sub-Daily Wildfire Growth with Satellite Observations. *Int. J. Wildl. Fire* **2023**, *32*, 694–708, doi:10.1071/WF22048.

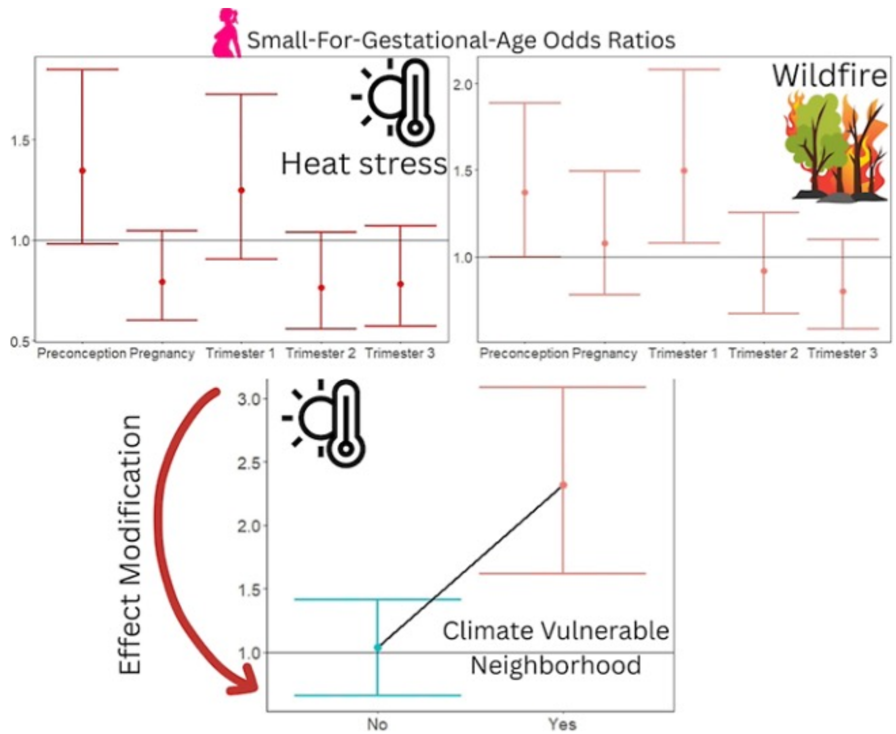




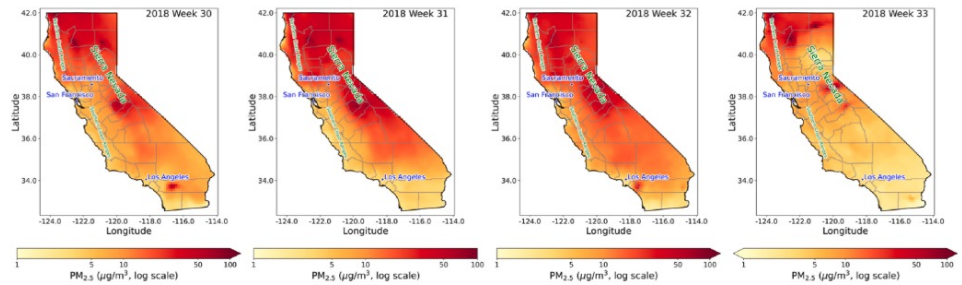


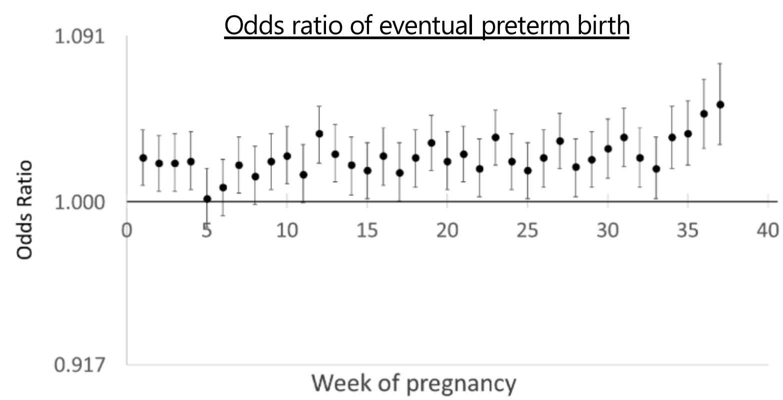
Larkin, N.K.; Raffuse, S.M.; Huang, S.M.; Pavlovic, N.; Lahm, P.; Rao, V. The Comprehensive Fire Information Reconciled Emissions (CFIRE) Inventory: Wildland Fire Emissions Developed for the 2011 and 2014 U.S. National Emissions Inventory. *J. Air Waste Manag. Assoc.* **2020**, *70*, 1165–1185, doi:10.1080/10962247.2020.1802365.

Health effects research



Khalili, R.; Liu, Y.; Xu, Y.; O'Sharkey, K.; Pavlovic, N.; McClure, C.; Lurmann, F.; Yang, T.; Chen, X.; Vigil, M.; et al. Adverse Birth Outcomes Associated with Heat Stress and Wildfire Smoke Exposure During Preconception and Pregnancy. *Environ. Sci. Technol.* **2025**, *59*, 12458–12471, doi:10.1021/acs.est.4c10194.

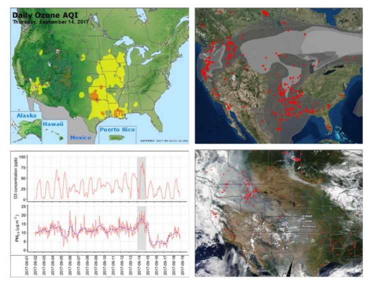




Picciotto, S.; Huang, S.; Lurmann, F.; Pavlovic, N.; Chang, S.Y.; Mukherjee, A.; Goin, D.E.; Sklar, R.; Noth, E.; Morello-Frosch, R.; et al. Pregnancy Exposure to PM2.5 from Wildland Fire Smoke and Preterm Birth in California. *Environ. Int.* **2024**, *186*, 108583, doi:10.1016/j.envint.2024.108583.

Regulatory Applications

Tier 1 and 2 Smoke Exceptional Event Analyses for Louisiana, September 14, 2017

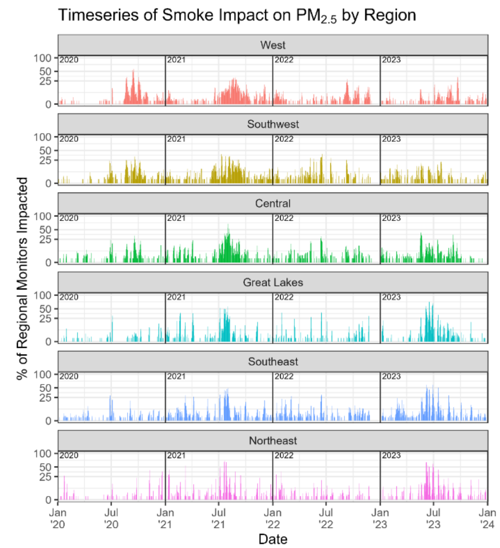


Final Report Prepared for

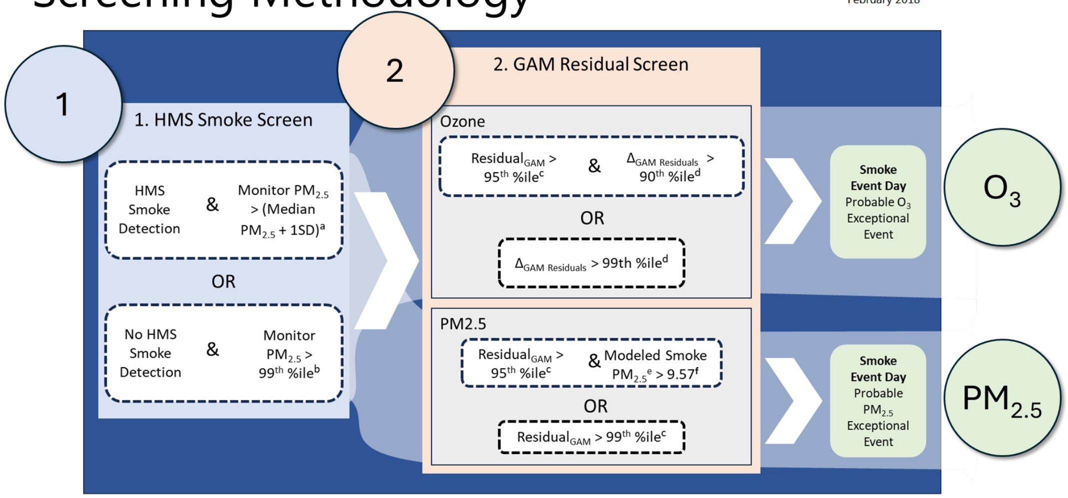
Louisiana Department of Environmental Quality
Baton Rouge, LA

February 2018

STi Sonoma Technology, Inc. Innovative Environmental Solutions

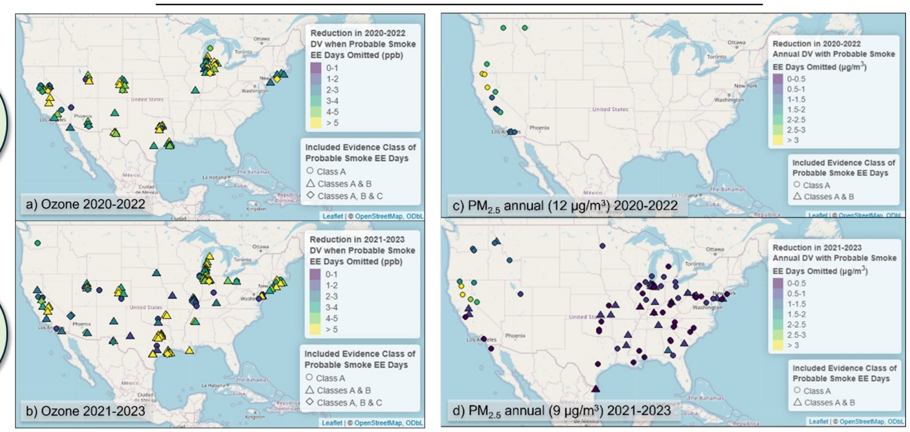


Screening Methodology



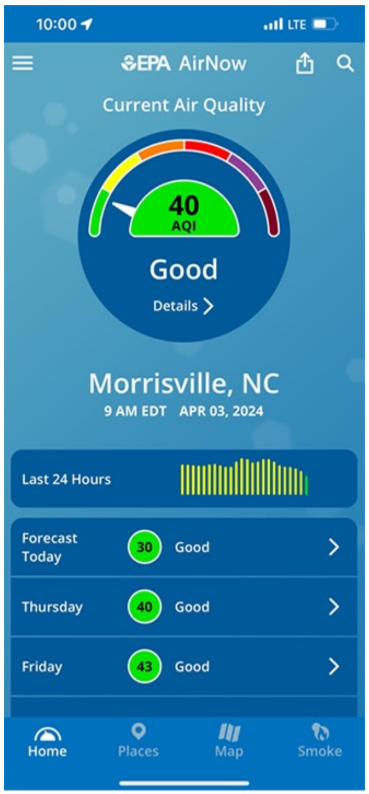
McClure, C. et al., In review, Automated screening method identifies recent probable wildland fire exceptional events for ozone and PM2.5 across CONUS.

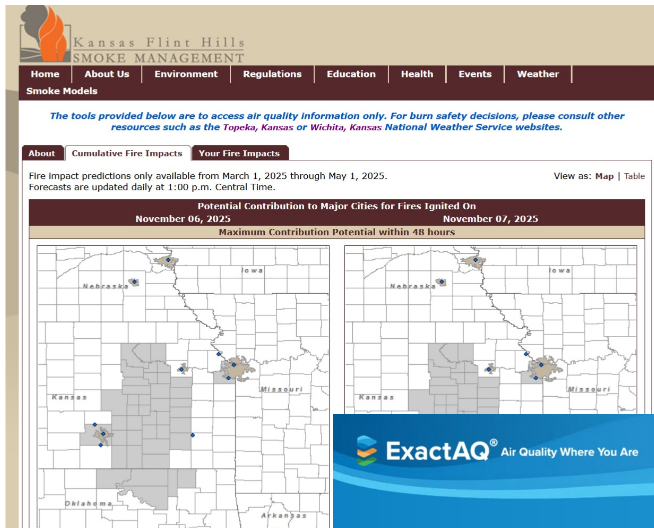
Sites that would gain NAAQS attainment if screened days removed from DV

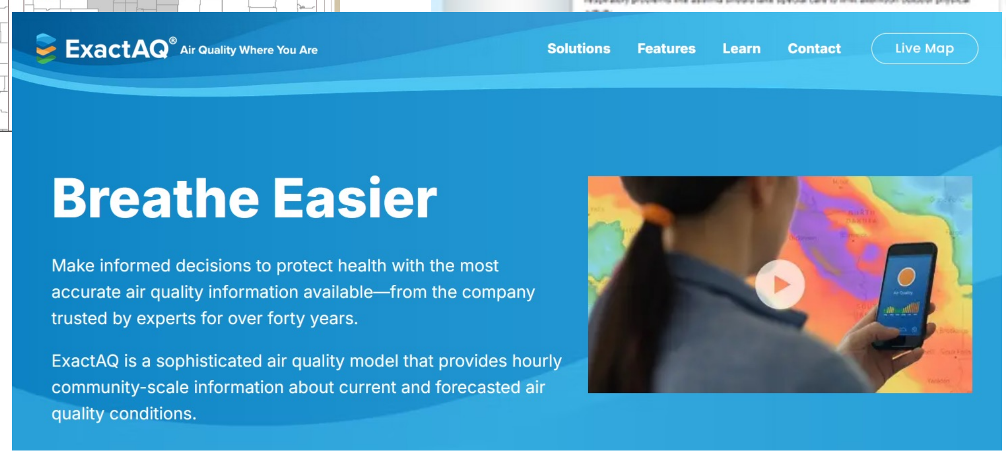


Anderson, A. et al., In review, Impacts and regulatory implications of wildland fire smoke on PM2.5 and ozone concentrations across CONUS from 2020-2023.

Operational Applications







Concluding thoughts

- Satellite data is critical for what we do across a range of activities
- Outputs need to be tailored to objective and processing (formats, storage, compute) is a significant component
- Diverse applications and sectors have different motivations, objectives, and requirements

STi Sonoma Technology

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Nathan R. Pavlovic

Lead Geospatial Data Scientist

npavlovic@sonomatech.com