Mobile Precipitation Radar: NOAA will acquire a new mobile radar to measure smoke properties near active wildfires and precipitation events that may cause flash flooding near burn scars. The radar will provide on-site responders and forecasters with detailed precipitation location and intensity estimates.

Upgrades to Surface Observing Systems

Project Lead: NOAA/NWS Office of Observations

Project Funding: $13,500,000

Two partner projects will upgrade and modernize NOAA's NWS Automated Surface Observing Systems (ASOS) and improve the ability of their ceilometers (devices that measure cloud and aerosols in the low levels of the atmosphere) to monitor boundary layer characteristics. ASOS is a national network of automated weather observing systems that form

the foundation of NOAA's surface weather and aerosol observations, which are crucial to fire weather forecasting. By upgrading the network of ASOS units to enhance their ability to collect more atmospheric measurements faster, this project will provide forecasters with more real-time information while also extending the service life of ASOS by an estimated 20 years.

New Fixed-Site Remote Sensing Systems

Project Leads: NOAA/OAR Global Systems Laboratory (GSL), NOAA/OAR Physical Sciences Laboratory (PSL), NOAA/OAR Global Monitoring Laboratory (GML), and NOAA/OAR Atmospheric Research Laboratory (ARL)

Project Funding: $7,320,000

The goal of this project is to construct and deploy four new remote sensing stations in the Western United States to

measure atmospheric conditions in areas commonly affected by wildfires and/or smoke. These systems will measure wind, temperature, and humidity profiles in the atmospheric boundary layer, in addition to trace gasses and aerosols. In addition to monitoring active fires, these systems will provide observations that can be incorporated into forecast models to improve prediction.

Designing and Deploying New Uncrewed Aircraft Systems

Project Leads: NOAA/OAR Global Systems Laboratory (GSL) and NOAA/OAR Chemical Sciences Laboratory (CSL)

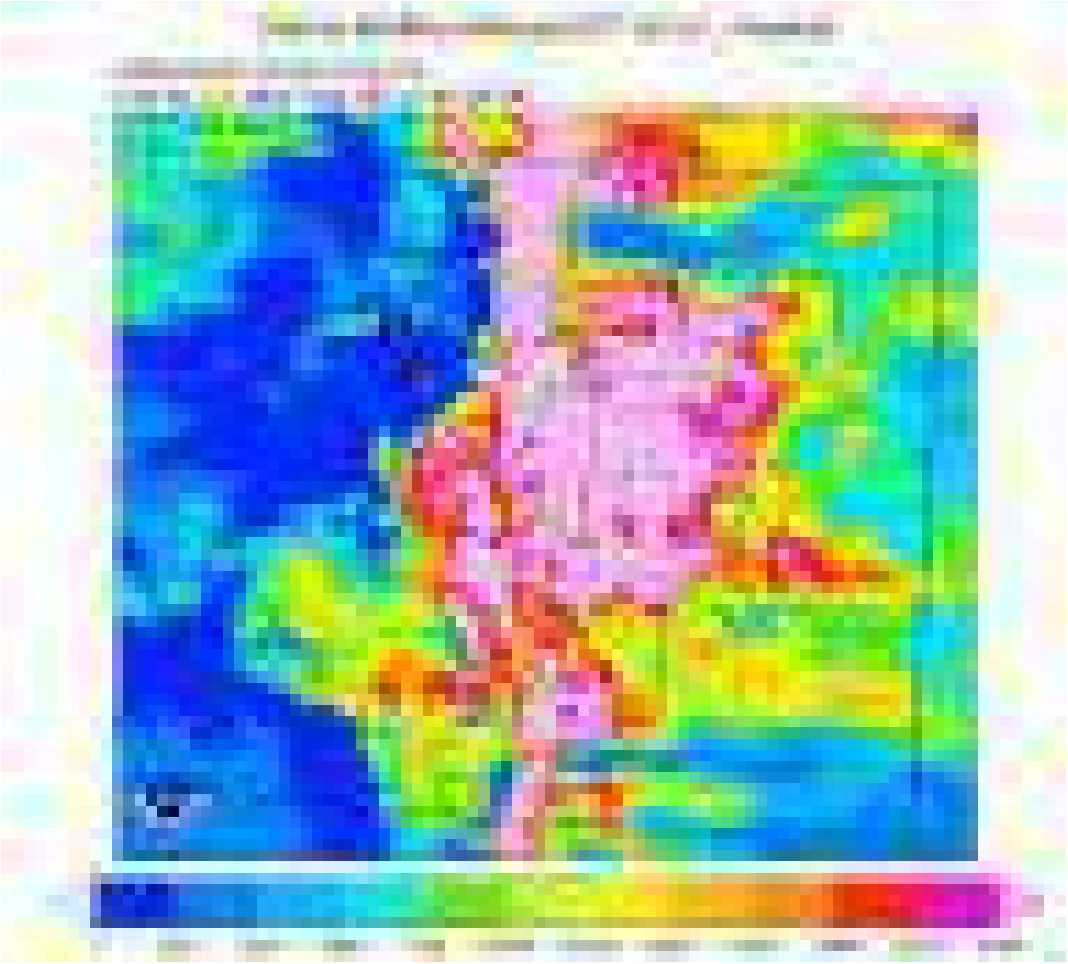
Project Funding: $1,800,000

NOAA will acquire and deploy new Uncrewed Aircraft Systems that can be flown near active fires. These systemscan provide around-the-clock monitoring of fires and atmospheric

conditions, including in areas inaccessible to humans, such as in difficult terrain, heavily wooded areas, and at close range to active fires.

OUTCOME 3: Advance early detection tools and predictive capabilities

Early detection and prediction of fires are crucial to limiting their impacts. Tools that can predict common causes of fires such as lightning and low-humidity/high-wind "fire weather," and accurately model smoke and air quality impacts, are a priority for NOAA.

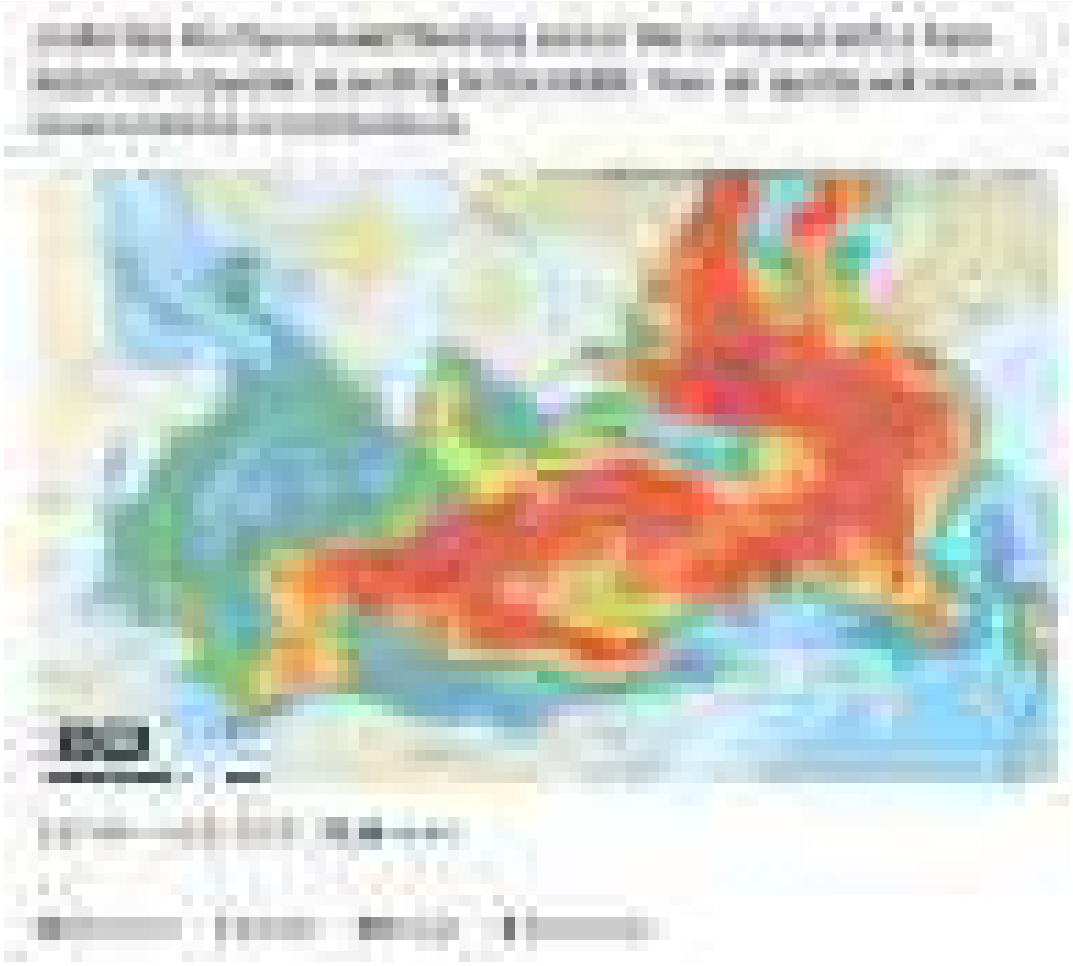


Sustained Development of Short Range Fire Weather Prediction Capabilities

Project Leads: NOAA/OAR Global Systems Laboratory (GSL), NOAA/NWS National Centers for Environmental Prediction (NCEP), National Center for Atmospheric Research (NCAR), and University of Oklahoma

Project Funding: $4,992,000

Short-range fire weather research will be conducted to improve high-resolution, short-term modeling of fire weather, wildfire behavior, and smoke by improving fire weather variable predictions such as wind, temperature, humidity, and more. BIL funds allow NOAA Laboratories and partners to continue development of world-class atmospheric models for years to come.



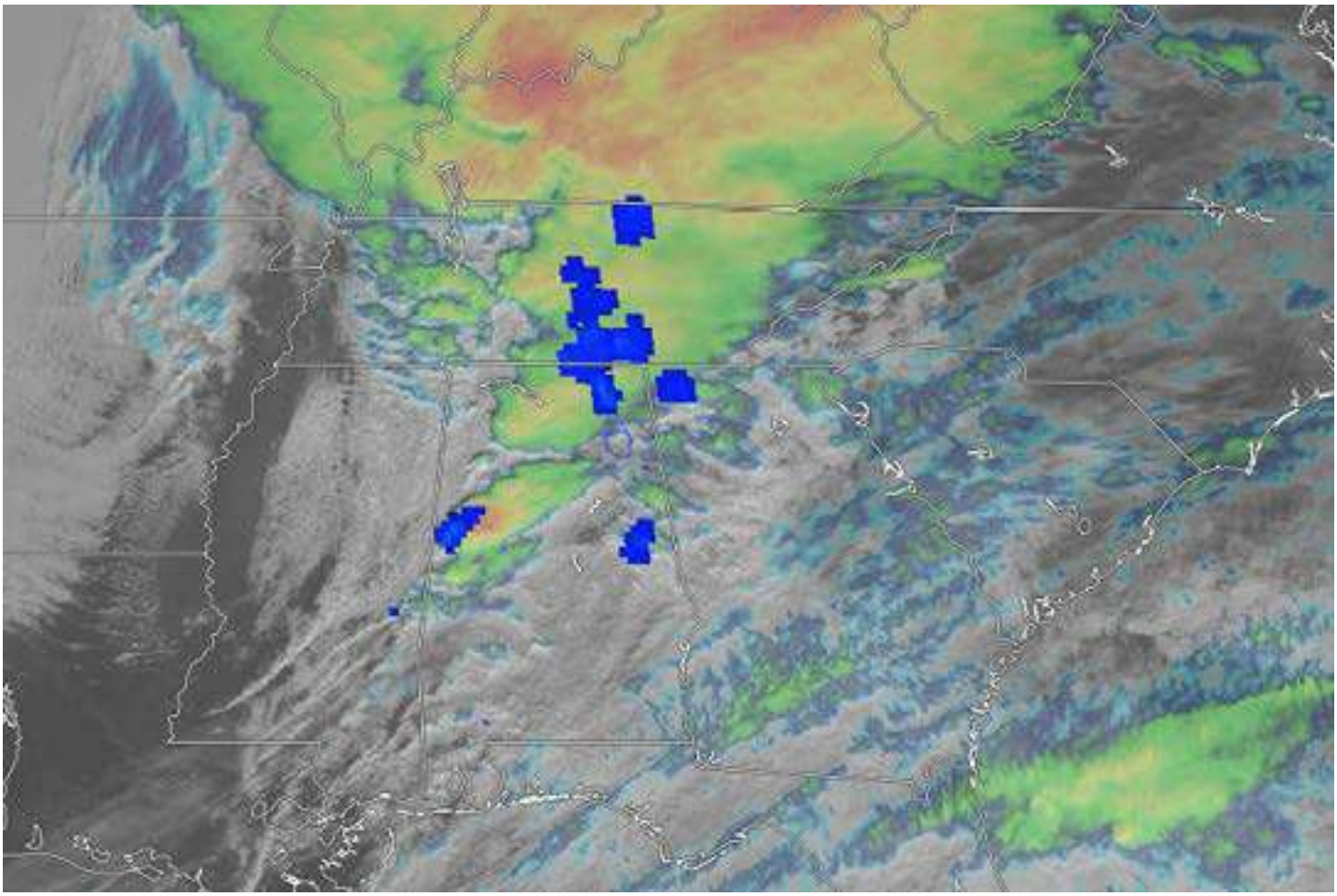
Improving Air Quality Forecasting Using Fire Weather Modeling and Smoke Emissions Data

Project Leads: NOAA/OAR Atmospheric Research Laboratory (ARL), NOAA/OAR Chemical Sciences Laboratory (CSL), NOAA/OAR Geophysical Fluid Dynamics Laboratory (GFDL), NOAA/OAR Global Monitoring Laboratory (GML), and NOAA/OAR Global Systems Laboratory (GSL)

Project Funding: $4,992,000

Air quality forecasting can be improved by combining fire weather modeling with measuring and modeling smoke emissions and other atmospheric chemistry. This approach will allow us to better understand the impact of wildfires on air quality and health. The importance of wildfire-related air quality forecasting made headlines in 2023 as dense smoke

from Canadian wildfires severely impacted major cities in the Northeastern U.S., creating hazardous outdoor conditions.



New and Improved Satellite Products in Support of Wildland Fire Monitoring and Forecasting

Project Lead: NOAA/NESDIS Center for Satellite Applications and Research (STAR)

Project Funding: $2,995,000

NOAA will utilize high-resolution observations, emphasizing satellite data, to develop and improve fire detection and prediction capabilities, including “nowcasts” for operational decision-making just before and during the early hours of a fire. Included in this project is LightningCast, a product designed to produce probabilistic lightning nowcasts and short-term forecasts. Lightning is a leading cause of wildfires in North America and directly led to the 2023 Lookout Fire in

Oregon, which burned over 20,000 acres, the Bayou Sauvage Fire in the U.S.'s largest urban wetland east of New Orleans, and many significant fires in the western U.S. and Canada.

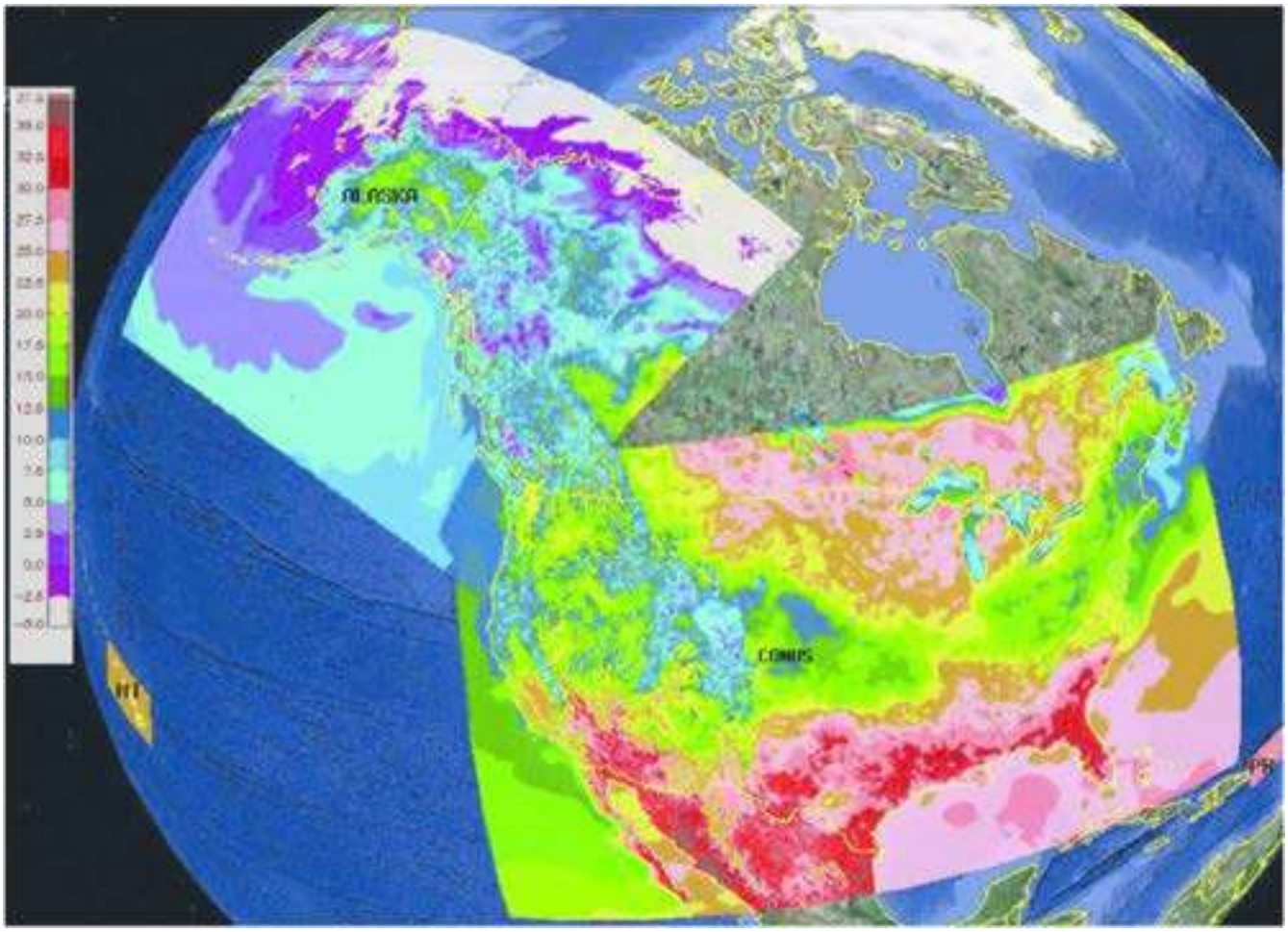
Fire Weather Analysis Using High-Resolution Observations

Project Leads: NOAA/OAR Global Systems Laboratory (GSL), NOAA/OAR Chemical Sciences Laboratory (CSL), and NOAA/OAR Uncrewed Systems Research Transition Office (UxSRTO)

Project Funding: $3,500,000

This project will develop and evaluate methods for assimilating high-resolution measurements from Uncrewed Aerial Systems and other observing systems into fire weather prediction models, and evaluating model performance. Forecast models require observations to understand the true,

near-ground conditions, and the implementation of new techniques is crucial for representing three-dimensional characteristics of important weather variables in the atmosphere.



Support for Sustained Advances to the 3D/4D Real Time Mesoscale Analysis Suite

Project Leads: NOAA/OAR Global Systems Laboratory (GSL) and NOAA/NWS National Centers for Environmental Prediction (NCEP)

Project Funding: $5,392,000

The focus of this project will be high-resolution, real-time modeling, specifically to significantly improve the ability of the Real-Time Mesoscale Analysis to identify rapidly-changing weather situations by integrating fire weather and air quality tools for operational use by the NWS. Through this project,

GSL and NWS will work with their partner research organizations to continue developing high-resolution analysis systems for years to come.

Wildfire Potential Research to Inform Extended Range Resource Planning

Project Leads: NOAA/OAR Physical Sciences Laboratory (PSL) and NOAA/OAR Geophysical Fluid Dynamics Laboratory (GFDL)

Project Funding: $959,000

Research will be performed to better understand the ability of forecast models to predict conditions related to increased fire weather potential at weekly, monthly, and seasonal time scales. Many wildfires, including the devastating 2023 fires in Maui, Hawai'i, are preceded by long-term drought conditions that result in unusually dry soil and vegetation, thus providing more efficient fuel for fire development and spread.

This project is designed to improve our ability to anticipate these long-term patterns.

Providing User-Friendly Access to NOAA Fire Weather Products and Data

Project Lead: NOAA/NESDIS Office of Common Services (OCS)

Project Funding: $1,997,000

NESDIS will develop a cloud-based web portal providing access to fire weather data and products including those of NOAA and the National Interagency Fire Center. Current methods do not adequately meet user needs, such as the ability to search, visualize, and extract decision support information, or download files in preferred formats. This "storefront" of products will demonstrate a substantial improvement in these areas and serve as a prototype and

testbed for a full-featured fire weather data and information system.

OUTCOME 4: Accelerate the development of user-specific decision support tools

One of the most important goals of research is producing results that end-users can implement in their operations. BIL provides support to connect NOAA's cutting-edge research with its users through a new Fire Weather Testbed that allows forecasters to provide feedback to product developers, and new tools designed for use by emergency managers, forestry resource managers, and more.

Fire Weather Testbed

Project Lead: NOAA/OAR Global Systems Laboratory (GSL)

Project Funding: $3,494,000

A new NOAA Fire Weather Testbed has been established to conduct experiments that evaluate and improve experimental fire and smoke products. Innovative new fire-weather products will have a centralized facility where developers and forecasters can fully test and evaluate them in real-life scenarios. The NOAA Fire Weather Testbed will accelerate the development of state-of-the-science products through expert evaluation, and prepare them for a transition into operations.

Applying Artificial Intelligence to Improve Fire Prediction at Weekly, Monthly, and Longer Time Scales

Project Lead: NOAA/NESDIS National Centers for Environmental Information (NCEI)

Project Funding: $1,997,000

Researchers will utilize artificial intelligence to develop an advanced capability to predict wildfire risk and fire behavior using weather forecasts and land-use data. By investigating both long- and short-term conditions before fire outbreak periods, the project will allow us to better understand complex relationships between land cover and weather data, and ultimately deliver a predictive algorithm that assesses fire risk weeks, months, or possibly even years before extreme fire outbreaks.

Probabilistic Fire Weather Guidance

Project Leads: NOAA/NWS Meteorological Development Laboratory (MDL), NOAA/NWS National Centers for Environmental Prediction (NCEP), and NOAA/OAR Global Systems Laboratory (GSL)

Project Funding: $10,983,000

NOAA is investing in probabilistic forecasting to support critical fire-related decision-making by developing new weather model guidance for forecasters, including fire weather predictions, burn scar flash flood and debris flow forecasts, and improved user interfaces for decision support system. Targeted decision support information will be developed in collaboration with partner agencies to support the safety of fire personnel and the public, assess risk, and efficiently allocate resources. A key outcome will be the

transformation of NOAA's operational fire weather forecast models from a deterministic to a probabilistic framework.

Classifying Fire Emissions that Impact Air Quality and Climate

Project Lead: NOAA/NESDIS Center for Satellite Applications and Research (STAR)

Project Funding: $1,997,000

Grant made to South Dakota State University through University of Maryland-College Park

Different types of fires produce different types of smoke and other emissions, which have the potential to impact different vulnerable groups. This project will use 20 years of satellite-derived fire emission data to develop an algorithm that can estimate the types of fuel being burned and their respective

impacts on air quality and human health, so that this information can be identified and communicated in future fire events. Of particular interest is the differentiation between greenhouse gases from prescribed agricultural burns and those from forest land wildfires.

OUTCOME 5: Engage the broader fire weather community

NOAA recognizes that engagement with the broader fire weather community is imperative. New funding opportunities for non-NOAA research organizations, support for community model development, and new social and behavioral science approaches to understand impacts to diverse and

underrepresented communities, are all key components of BIL's wildfire research funding.

Understanding the Human Responses to Fire Weather Products

Project Lead: NOAA/OAR Weather Program Office (WPO) and NOAA/NWS Office of Science and Technology Integration (OSTI)

Project Funding: $2,817,000

Research grants made to San Jose State University and the University of Oregon

This project supports social and behavioral science studies to improve fire weather forecast products and understand how the public responds to them. It involves, in one study, evaluating user feedback on proposed probabilistic fire weather products, including identifying their fire weather

information needs, and then using this feedback to inform Fire Weather Testbed activities. A separate study will take place in four communities recently impacted by fires to better understand formal and informal networks of a community, the perceptions of wildfire risk, and the usefulness of fire weather products and messaging techniques.

Identifying Complex Interactions between Social Infrastructure and Wildfire Risks to Improve Community Adaptive Capacity

Project Lead: NOAA/OAR Climate Program Office (CPO)

Project Funding: $998,000

Research grants made to University of Arizona, University of Colorado, Desert Research Institute, and University of Washington

This project supports two NOAA grants to support collaborative research and community engagement that improve climate adaptation planning and action. These awards will advance actionable knowledge of the interactions between wildfire risk and social infrastructures in order to develop relevant solutions to improve climate resilience and reduce wildfire risk in frontline communities. The studies specifically focus on the long-term wildfire recovery needs of rural frontline communities in Colorado and New Mexico, and advance actionable knowledge of the potential for social infrastructure to mitigate vulnerability to extreme heat and wildfire smoke in Northern Nevada and Central Washington.

WPO Fire Weather Grants and EPIC

Project Lead: NOAA/OAR Weather Program Office (WPO)

Project Funding: $3,994,000

Research grants made to University of Colorado, Colorado State University, National Center for Atmospheric Research, and Texas Tech University

This project awards multiple new grants that fund fire weather-related research in short-range weather and air quality prediction and evaluation. This work will enhance NOAA's fire weather and smoke forecasting capabilities while also supporting forecast innovation within the Unified Forecast System Short-Range Weather Application. The project will develop a coupled fire-atmosphere model, a UFS smoke model, a deep learning model predicting the probability of extreme fire weather and fire behavior, and an air quality model, in coordination with the Earth Prediction Innovation Center (EPIC).

A year-round threat

Wildfires have been a natural, cyclical, and seasonal event in many Western states for thousands of years, but Earth's shifting climate has more recently turned fire into a year-round threat. Year after year, wildfires fill the nation’s skies with smoke, threaten lives, destroy homes, paint the hills black with burn scars, pollute water supplies, disrupt economies, and alter the landscape for generations.

By helping build and deploy new observing systems, advance high-resolution forecast models, and accelerate the transition of experimental products to operations, BIL’s investment in NOAA’s fire weather research will help ensure that NOAA continues to build a Fire-Ready Nation.

Visit our new web hub, noaa.gov/wildfire . Here, you can learn more about NOAA’s fire weather science and products, including:

- Monitoring and forecasting
- Supporting wildfire incident management
- NOAA fire weather research

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