

ABSTRACT

Understanding wildfires requires an interdisciplinary approach due to the complex feedbacks between weather, climatic conditions, and air quality processes. The NOAA Global Monitoring Laboratory (GML), Global Systems Laboratory (GSL), Air Resources Laboratory (ARL), and Physical Sciences Laboratory (PSL), with CIRES participation, have partnered to build four fixed boundary layer observation facilities and two CLAMPS (Collaborative Lower Atmospheric Mobile Profiling Systems) mobile units equipped with similar instruments. In addition, The GML GRAD group is preparing the SMOLDER (Situational Measurement and Optical, Detection of fire Emissions and Radiative impacts) mobile monitoring unit that will include aerosol, radiation, meteorological, and air quality monitoring instruments. Research area highlights associated with these mobile facilities includes: tracking smoke plumes, aerosol/smoke detection, smoke impacts on surface radiation, plus satellite and model evaluations. Recognizing the increasing threats of wildfire and its potential negative impact on communities, the FY22 Bipartisan Infrastructure Law (BIL) Provision 15 provided funding for "observation and dissemination of infrastructure used for wildfire prediction, detection, and forecasting." In addition to several other fire weather initiatives, NOAA Research is using funding from the BIL to help fill the fire weather observation gap specifically in complex terrain where weather is more unpredictable.

Understanding wildfires requires an interdisciplinary approach due to the complex feedbacks between wildfires, **Climate**, **Weather**, and Air Quality processes.



Tracking Smoke Plumes



We can **track** the evolution of smoke as it is transported across the U.S. using the NFAN and SURFRAD networks.

GML will establish four permanent research sites in climate diverse regions, two mobile CLAMPS facilities, and one air quality mobile facility (SMOLDER) for deployment in complex terrain where wildfire-weather information is most needed.



Research Highlights



Global Monitoring Laboratory Wildfire Research Aerosol/Smoke, Radiation, and Clouds

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Facilities and Observations



Wildfire Weather Mobile CLAMPS Facilities • Deployable radiation, ceilometer, thermodynamic profiling and flux tower systems \circ PM₁₀, PM₂₅, PM₁ and GHG (CO, CO₂, CH₄, $H_2O)$

• Doppler Wind Lidar

SMOLDER Air Quality Mobile Facility (Situational Measurement and OpticaL Detection of fire Emissions and Radiation impacts) • Deployable radiation and ceilometer In-situ (NFAN) and column aerosol optical properties; PM_{10} , $PM_{2.5}$, PM_{1} \circ Trace gases including O_3 , NO, CO, and CO,