NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

Earth System Research Laboratories

esrl.noaa.gov

The Earth System Research Laboratories (ESRL) is an alliance of four NOAA scientific labs, all located in the David Skaggs Research Center on the Department of Commerce campus in Boulder, Colorado.

Organized under NOAA's Office of Oceanic and Atmospheric Research, ESRL scientists pursue cutting-edge research around the world to continually advance scientific understanding of weather, climate, air quality, water resources, and other components of the Earth system.

The four labs' intersecting missions have generated an extraordinary legacy of accomplishment over the past 50 years. Backed by scientists from cooperative research institutes at the University of Colorado and Colorado State University, ESRL has been an engine of scientific discovery, producing environmental models and products, along with forecasting and decision-support tools to protect life and safety, and support commerce at local to global scales.

Together with its university partners and the nearby National Center for Atmospheric Research, ESRL has helped Boulder earn a reputation as one of the premier global centers for atmospheric research.

Chemical Sciences Lab

Advances scientific understanding of the chemical and physical processes that affect Earth's atmospheric composition and climate.

csl.noaa.gov

Global Monitoring Lab

Researches greenhouse gas and carbon cycle feedbacks, changes in clouds, aerosols, and surface radiation, and the recovery of stratospheric ozone.

gml.noaa.gov

Global Systems Lab

Develops next-generation weather forecast models, decision support tools, visualization systems, and uses high-performance computing technology to support a Weather-Ready Nation.

gsl.noaa.gov

Physical Sciences Lab

Conducts weather, climate and hydrologic research to effectively anticipate and respond to the challenges of hydrologic extremes.

psl.noaa.gov

Jennifer Mahoney, Director, NOAA Earth System Research Laboratories

NOAA's four Earth System Research Laboratories work together to advance scientific observations, modeling, and predictability of weather, climate, air quality, and water resources to strengthen our nation's economy, and to protect life and property.

Better Forecasts and Models

All four ESRL research labs develop products and tools that improve weather forecasts, and advance understanding of climate change. Led by the Global Systems Lab, many ESRL research accomplishments are transitioned to operations at the National Weather Service, whose weather forecasts are arguably the most widely consumed scientific information product in the country today.

Wildfires

Western wildfires are becoming both larger and more frequent, fouling summer skies with smoke from coast to coast. The Global Systems Lab's HRRR-smoke model accurately forecasts where wildfire smoke goes and how it affects weather. The Chemical Science Lab's air quality research instruments analyze harmful constituents in smoke, providing valuable information to public health officials.

Water

Economies of western states are highly dependent on reliable water supplies, but so often nature delivers either too much or not enough water. From atmospheric rivers' extreme precipitation to the searing grip of megadroughts, Physical Sciences Lab researchers explore the weather and climate processes that control the availability of this most precious resource.

Climate

Direct observation of the world is the cornerstone of science. The Chemical Sciences, Global Monitoring and Physical Sciences Labs collect important land, ocean and atmospheric measurements through local and regional field studies, international campaigns, and long-term monitoring programs. A long, detailed data record is critical for understanding climate phenomena and impacts, advancing predictions, and informing decision making.

Outreach

ESRL is co-located in Boulder with four other NOAA organizations all dedicated to NOAA's mission and vision of science, service, and stewardship. Through a coordinated effort more than 17,000 people visit each year for tours, conferences, events, and educational activities. In addition, ESRL hosts competitive internships year-round, recruits at career fairs, attends community events, and connects schools with scientists for in-class experiences.

Contacts for More Information

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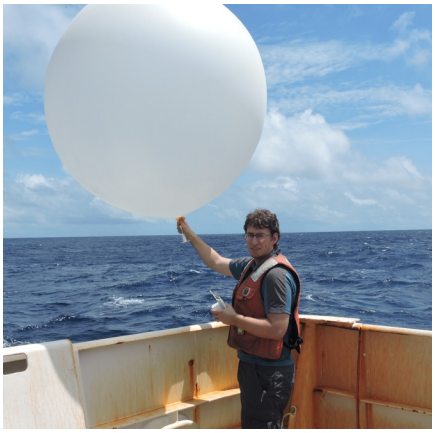

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