NOAA Air Resources Laboratory

The Air Resources Laboratory (ARL) is a research laboratory within the National Oceanic and Atmospheric Administration (NOAA). ARL is headquartered in Silver Spring, Maryland with divisions in Idaho, Nevada, and Tennessee. ARL's mission is to provide atmospheric information and data to decision-makers and the science community in order to improve the Nation's ability to protect human and ecosystem health.

What We Do

ARL conducts research and development in the fields of air quality, atmospheric transport and dispersion, and climate change. Key capabilities include the development, evaluation, and application of air quality models; improvement of approaches for predicting atmospheric dispersion of hazardous chemicals and materials; research on surface energy budgets and climate variability and trends; and advancement of the understanding of and ability to predict the behavior of the planetary boundary layer (the layer of the atmosphere closest to the ground).

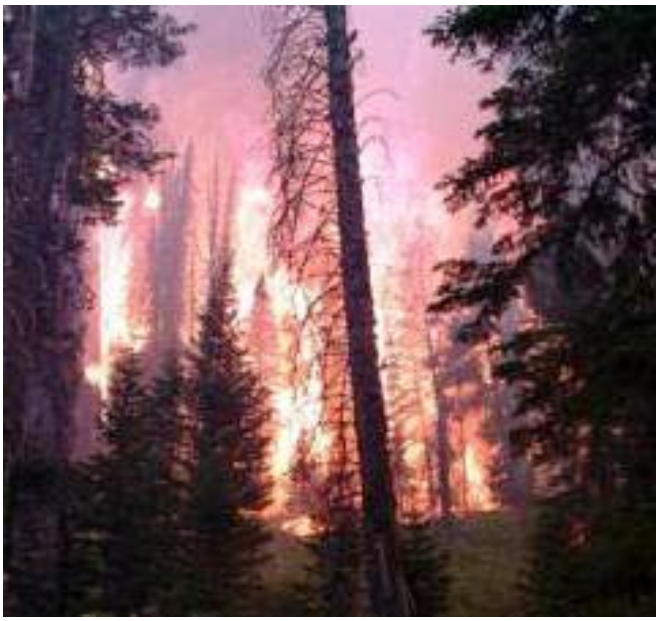
An example of poor urban air quality
Los Angeles smog: Photo by Ben Amstutz

Air Quality

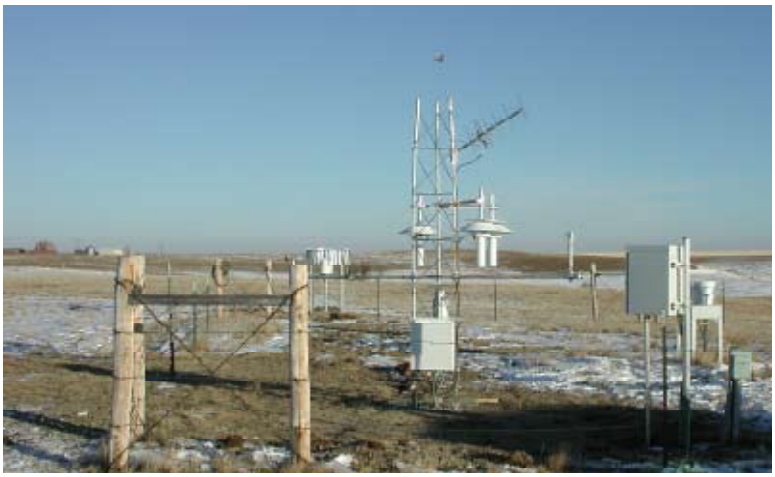
ARL monitors and models air quality and deposition of pollutants to the Earth's surface to enhance assessments of changes in the atmospheric environment and to improve predictions of such changes. A primary focus of ARL's air quality research is on understanding the interaction between the atmosphere and the underlying land and water surfaces and biological systems.

Atmospheric Transport and Dispersion

ARL's dispersion research encompasses modeling and field observations to improve prediction of the atmospheric transport of hazardous chemicals and materials. ARL develops, improves, and tests dispersion models for air quality and emergency response applications, including volcanic eruptions, forest fires, nuclear accidents, and homeland security incidents. Field observations involve the design and evaluation of high resolution surface observing networks and analysis of data.



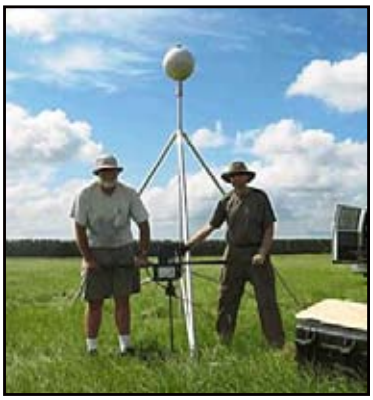
Forest fires release smoke and gases and chemicals, such as mercury, into the air. Photo: NOAA



A U.S. Climate Reference Network Station located at the Fort Peck Reservation in Poplar, Montana. Photo: NOAA

Climate

ARL provides essential information and tools for decision-makers to understand how and why climate has changed and what changes might occur in the future. ARL's climate research includes observing climate variability and change and assessing regional climate impacts. For instance, ARL designs, builds, operates, maintains, and analyzes observing systems to provide the Nation with sound, reliable data about temperature and precipitation trends.



NOAA scientists setting a ground anchor for an Extreme Turbulence Probe deployed in advance of Hurricane Ivan. Photo: NOAA

Planetary Boundary Layer

Underlying ARL's activities in air quality, dispersion, and climate is world-class expertise in assessing and predicting the behavior of the planetary boundary layer. This supports many of ARL's activities described above, including measurements of deposition of pollutants to the ground and development and operation of meteorological networks (mesonets). In addition, ARL develops specialized technologies, such as an instrument to measure winds and turbulence in hurricanes.

Why Our Research is Important

Air pollution, airborne hazards, and climate change each can lead to significant health, environmental, and economic consequences. Poor air quality contributes to tens of thousands of premature deaths annually; accidental or intentional release of a hazardous chemical or agent can cause serious health, safety, security, and ecological concerns; and changes in our climate can effect water availability, air quality and weather.

ARL's research and development capabilities serve a wide range of customers whose missions relate to atmospheric science, emergency response, air and water pollution, and climate change. ARL transitions its products and services to operations in NOAA's National Weather Service and the National Climatic Data Center, the U.S. Department of Energy, the Department of Homeland Security, the U.S. Environmental Protection Agency, and many other groups.

A Bit of History…

In the 1940s, with the emergence of the nuclear age, it was clear there was need to understand and predict the transport, dispersion and fallout of radioactive material. ARL was first established in 1948 as a Special Projects Section of the U.S. Weather Bureau, now known as the National Weather Service, to provide meteorological expertise for this critical research. One of the Section's early tasks was using weather charts and radioactive samples collected by aircraft to estimate the location of the Soviet Union's atomic bomb test range.

For More Information

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