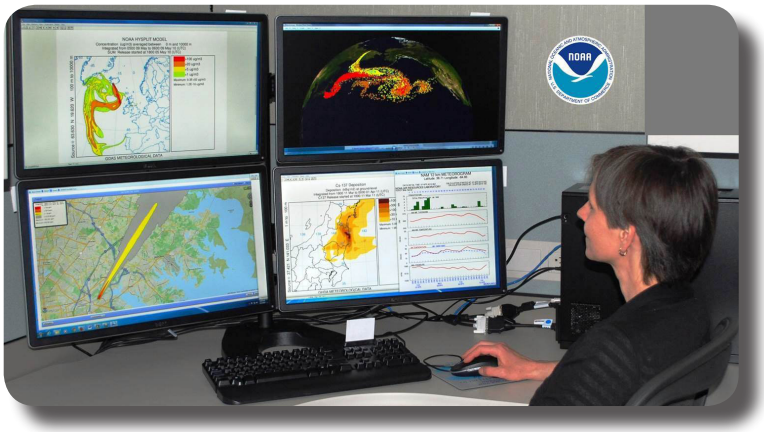
Air Resources Laboratory

Atmospheric Dispersion Research

State-of-the-Art Modeling and Data to Better Predict the Fate of Harmful Airborne Material

The accidental or intentional release of chemical, biological, or nuclear agents, as well as ash associated with volcanic eruptions, can have significant health, safety, national security, economic, and ecological implications. The Air Resources Laboratory (ARL) has an Atmospheric Dispersion Research Program that provides critical modeling and observation data to understand how, where, and when chemicals and materials are transported through the atmosphere. Having this understanding is essential for emergency managers and the aviation industry to respond appropriately and minimize or prevent disaster.

A highly-valued research tool, developed by ARL, is the HYSPLIT modeling system. HYSPLIT is designed to support a wide range of simulations related to the atmospheric transport and dispersion of pollutants and hazardous materials, as well as the deposition of these materials to the Earth's surface. Some of the applications include tracking and forecasting the release of radioactive material, volcanic ash, wildfire smoke, and hazardous chemicals. ARL regularly improves, tests, and distributes HYSPLIT to thousands of users around the world. Operationally, the model is used by NOAA, primarily the National Weather Service through its National Centers for Environmental Prediction, and at local Weather Forecast Offices.



Examples of HYSPLIT Model simulations. Photo: NOAA

In addition, ARL developed and maintains a web-based system providing rapid access to HYSPLIT dispersion simulations and supporting information. See www.ready.noaa.gov for more information.

ARL performs routine maintenance at one of the high-resolution meteorological stations located at the top of Big Southern Butte in Idaho. Photo: NOAA

ARL also operates and maintains high-resolution meteorological observing networks (e.g., stations typically 10 miles or less apart, compared to 100 miles or more apart for the national weather observing network) to capture small-scale air flows that can have a significant impact on how and where airborne chemicals and materials are transported. ARL evaluates how this high-resolution information can be incorporated into NOAA's large-scale weather models to improve predictions of surface wind fields.

Often complex terrain, water bodies, and man-made structures distort the wind fields that carry airborne materials. To improve and evaluate dispersion models, ARL conducts short-term field studies on atmospheric flows in different types of conditions. This provides basic information required to ground truth dispersion models used for emergency response applications.

For More Information, Contact:

National Oceanic and Atmospheric Administration
Air Resources Laboratory
NCWCP, R/ARL, Rm. 4204
5830 University Research Court; College Park, MD 20740
Phone: 301.683.1365
www.arl.noaa.gov

Last Updated 1/2017