



Air Resources Laboratory

Field Research Division

Idaho Falls, Idaho

Who We Are

The Field Research Division (FRD) of the Air Resources Laboratory is located in Idaho Falls, ID. The Division is composed of talented meteorologists, engineers and technicians well known in the field of atmospheric dispersion. Originally a part of the U.S. Weather Bureau, FRD was created in 1948 for the purpose of describing the meteorology and climatology surrounding the area of the National Reactor Testing Station, now known as the Department of Energy's Idaho National Laboratory (INL). As the name implies, FRD scientists conduct much of their research in the field, not only in Idaho but all around the world.

What We Do

FRD conducts experiments to better understand and predict the atmospheric boundary layer (the air layer closest to and most influenced by the ground) through studies of atmospheric transport and dispersion of particles and gases, and air-surface exchange processes. FRD develops new technologies and instrumentation to carry out its mission. In a cooperative agreement with the U.S. Department of Energy, FRD capabilities are used to support INL with meteorological measurements, mesoscale modeling and forecasts, and atmospheric dispersion modeling for accidental chemical and radiological emergencies at INL.

Division Activities:

Atmospheric Tracers

FRD is a pioneer in atmospheric tracer experiments, which date back to the 1960s. Tracer experiments involve the controlled release of a non-toxic gas at low concentrations and the subsequent tracking and measurement of the gas as it is transported and dispersed by the atmosphere. This "tracer" mimics the dispersion characteristics of an actual toxic gas release, thereby permitting evaluation of toxic gas dispersion models. FRD's most recent focus is on conducting tracer studies to understand wind flows in cities. This is important, for example, to national security if a toxic gas should be released during a terrorist event. Additionally, these tracer studies help air quality regulatory agencies understand dispersion of vehicle emitted pollution into neighborhoods near high-traffic roadways.



Meteorological tower on the summit of Big Southern Butte. INL mesonet, Photo: NOAA

Meteorological Instrumentation and Mesonets

FRD has decades of experience designing, developing and deploying both permanent and temporary meteorological instrumentation, as well as establishing and operating mesonets (networks of meteorological monitoring towers and associated sensors). In a mesonet, instrumentation is carefully selected to permit a coordinated remote collection of data from the various sensors. Temporary mesonets are used in support of short-term air quality and tracer dispersion studies, while permanent mesonets are used for long-term support of regulated facilities and for climate studies.

Radar Wind Profiler and Sodar

FRD maintains two types of unique portable remote sensors (a radar wind profiler and two mini-sodars) that are used to acquire wind profiles in the atmospheric boundary layer. Radar wind profilers use radar pulses whereas sodars use pulses of sound to measure wind profiles. The radar profiler and sodars are used to support field experiments such as atmospheric tracer or air quality studies.



Deploying a tracer sampler in New York City. Photo: NOAA



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

Extreme Turbulence Probe

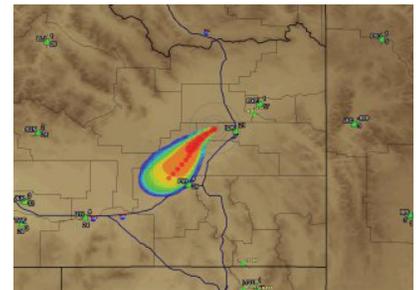
FRD has developed and deployed a new type of turbulence sensor called the Extreme Turbulence Probe (ET Probe). The ET Probe is an innovative stationary sensor, adapted from aircraft probes, and designed to make accurate measurements in very high winds (hurricane force) and heavy rain without being damaged. ET Probe prototypes have been proven in Hurricanes Frances and Ivan, where high fidelity measurements of hurricane eye-wall turbulence were recorded for the first time without being impeded by rain.

Smart Balloons

FRD develops and deploys autonomous Smart Balloons that remain aloft for weeks at a time while maintaining a constant low-level altitude and carrying a full payload of meteorological and air quality sensors. Smart Balloons travel with air pollution plumes and simultaneously measure and continuously report dynamic chemical transformations and concurrent meteorological parameters. The balloons are also being used to determine hurricane inflow properties to help improve hurricane intensity forecasts.

Modeling

FRD has been developing and testing transport and dispersion models since the 1960s as a part of its collaboration with the INL. The Division applies a mesoscale meteorological model and two types of transport and dispersion models to help emergency managers determine where an accidental or intentional release of a hazardous material is moving and how fast the concentration is decreasing. Managers can then determine who is at risk so that appropriate evacuations can be instituted, if necessary. Managers can also determine from which direction emergency personnel should approach to avoid exposure themselves.



Example of a HYSPLIT model concentration isopleth map displayed using an ARL Rapid Response Tool for a theoretical release scenario in Southeastern Idaho.

Why It Is Important

FRD's science helps its customers better understand the atmospheric boundary layer, including the dispersion of chemical, biological, and nuclear agents in order to determine appropriate emergency actions or policy responses. FRD's science helps air quality managers become better informed about how and where air pollution is moving and what populations may be affected. Using this science-based information, air quality controls and regulations can be improved. ET Probes are helping improve forecasts of hurricane movement and intensity to increase the safety of residents living in hurricane-prone areas. At the local level, FRD's science specifically helps ensure the safety of INL personnel and neighboring residents.

Our Partners

- U.S. Department of Energy
- Idaho National Laboratory
- State of Idaho-INL Oversight Program
- U.S. Environmental Protection Agency
- Defense Threat Reduction Agency
- U.S. Department of Homeland Security
- Environmental Science and Research Foundation
- National Weather Service Forecast Office in Pocatello, Idaho
- University of Utah
- Idaho State University

How to Contact Us

FRD is located in Idaho Falls, which is in the Upper Snake River Plain of Southeastern Idaho.

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FRD Facility, Photo: NOAA