Air Resources Laboratory

Atmospheric Turbulence & Diffusion Division

Oak Ridge, Tennessee

Who We Are

The Atmospheric Turbulence and Diffusion Division (ATDD) is a division of NOAA's Air Resources Laboratory, located in Oak Ridge, TN. ATDD has approximately 40 permanent staff, including personnel from the Independent Environmental Assessment and Verification division of Oak Ridge Associated Universities. Scientists and engineers at ATDD operate two permanent, long-term research stations in Oak Ridge: a site at Walker Branch Watershed and the Chestnut Ridge Environmental Study Site.

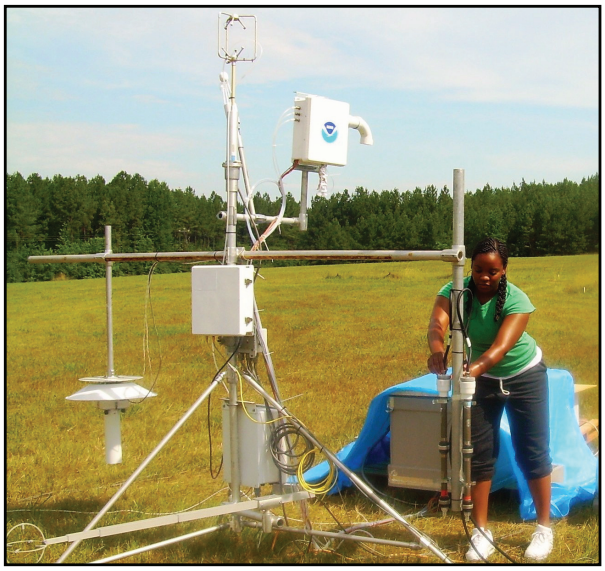
What We Do

ATDD conducts research and development of air quality, climate, and atmospheric dispersion, with an emphasis on understanding and predicting the behavior of the lowest portion of the atmosphere. The main research goals are to develop better methods for predicting transport, dispersion, and air-surface exchange of air pollutants and improve reference-grade measurement of climate change and related physical and chemical processes.

Air Quality Research and Monitoring

Conduct seasonal field studies that will:

- Improve understanding of air-surface exchange of atmospheric compounds, such as ammonia and sulfur dioxide, in sensitive ecosystems;
- Assess measurement techniques for a range of atmospheric species, some of which may alter biodiversity and nutrient balances in forest environments; and
- Support characterization of emissions sources and other key factors that influence air quality in different regions.



ATTD summer intern measuring concentrations of ammonia gas in the air near Duke Forest, NC. Photo: NOAA

ATDD engineers installing a US Climate Reference Network station at Wolf Point, MT. Photo: NOAA

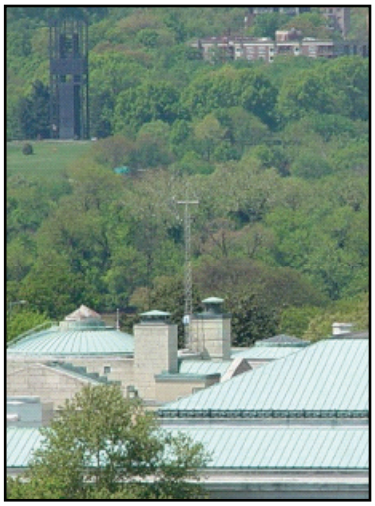
Climate Research and Applications

- Further development of methods for measuring climate parameters with high accuracy and reliability;
- Deploy and maintain national climate observation networks for measuring trends and variability of temperature, precipitation, and other parameters; and
- Improve the understanding of interactions between the atmosphere, the land surface, and plants to improve climate and weather predictions.

Weather and Dispersion Research and Development

Design and develop monitoring systems used to:

- Advance the understanding of small scale atmospheric processes within complex environments (e.g., urban and coastal areas);
- Enhance regional observing systems to address weather monitoring and research needs in order to better analyze and predict the lower atmosphere; and
- Improve weather forecast modeling to support more accurate predictions (e.g., of winds) and more reliable response to homeland security incidents.



DCNet monitoring station located on the roof of the National Academy of Sciences building in Washington, DC. Photo: NOAA

Why It Is Important

Poor air quality significantly degrades the health of many people and costs the Nation billions of dollars annually. Sensitive ecosystems, such as forests and coastal waters, are also affected by poor air quality. ATDD's air quality monitoring supports the development of effective air quality policies and more accurate air quality models to protect human and environmental health.

Comprehensive climate research requires accurate data to assess and predict present and future states of the climate. Full characterization of national and regional climate change signals has been hampered by a lack of high-quality surface measurements of precipitation and air temperature. ATDD's observation and analysis capabilities provide essential understanding of how climate is changing and why.

The accidental or intentional release of chemical, biological, or nuclear agents can have significant health, safety, homeland and national security, economic, and ecological implications. ATDD's atmospheric dispersion research provides critical data and insights that improve predictions of where hazardous materials will go, improving emergency managers' ability to protect first responders and the public.

Our Partners

- Other NOAA offices, especially the National Climatic Data Center and National Weather Service
- U.S. Department of Energy (Oak Ridge Operations)
- Oak Ridge National Laboratory
- Canaan Valley Institute
- U.S. Environmental Protection Agency
- U.S. Department of Homeland Security
- Academic Institutions: Jackson State University, Howard University, Towson University, and the University of Tennessee
- District of Columbia Emergency Management Agency

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ATDD Facility in Oak Ridge, TN; Photo: NOAA