Environmental Sciences

The Environmental Sciences Division is an interdisciplinary R&D organization with more than 60 years of achievement in local, regional, national, and international environmental research. Researchers focus on complex challenges such as clean and available water and biological carbon dioxide capture and storage in soils. Our vision is to expand scientific knowledge and develop innovative strategies and technologies that will strengthen the nation’s leadership in creating solutions to help sustain Earth’s natural resources.

Addressing Fundamental Challenges

Our scientists conduct research, develop technology, and perform analyses focused on biodiversity and sustainable systems, Earth systems science, and informatics and data discovery for the environmental sciences.

- **Atmospheric Radiation Measurement (ARM) data science and integration**—Providing data and computing capabilities to advance understanding of atmospheric radiation and cloud physics
- **Biodiversity and ecosystem health**—Developing methods to quantify and mitigate threats to biodiversity and ecosystem services
- **Biogeochemical dynamics**—Increasing understanding of how biogeochemical cycles contribute to broader environmental patterns
- **Bioresource science and engineering**—Creating tools to advance understanding of bioresource sustainability and utilization
- **Earth systems modeling**—Advancing predictive understanding of interactions among earth’s physical, biological, ecological, and human systems
- **Ecosystem processes**—Improving predictive understanding of earth’s changing ecosystems through experiments and integrated modeling
- **Environmental risk and energy analysis**—Examining human health, economic, and environmental dimensions of energy alternatives
- **Plant–soil interactions**—Understanding and predicting dynamic interactions among plants, microbes, and the surrounding soil in response to environmental change
- **Remote sensing and environmental informatics**—Providing integrated data products, analytics, and systems to advance environmental sciences
- **Water resource science and engineering**—Using multidisciplinary research and engineering to advance water resource science and solutions
- **Watershed systems modeling**—Developing integrated models for water and waterborne constituents in watersheds

“Our researchers advance understanding of the natural world from the molecular to the global scale in Earth system science.”

*Eric Pierce, Director, Environmental Sciences Division*
Unique Research Capabilities

Atmospheric Radiation Measurement (ARM) Data Center—Delivering integrated computing and data on atmospheric radiation to inform climate research models

Aquatic Ecology Laboratory—Understanding aquatic ecosystem interactions to develop technologies and solutions that will sustain energy and water resources

Biogeochemical Transformations at Critical Interfaces—Examining exchange and feedback processes occurring at critical interfaces that control mercury biogeochemical fate and transformation

Climate Change Science Institute—Integrating expertise in measurements, data, and simulation to improve understanding and prediction of a changing climate

ORNL Distributed Active Archive Center (ORNL DAAC) for Biogeochemical Dynamics—Providing scientists and stakeholders with access to biogeochemical and ecological data and models

Next-Generation Ecosystem Experiments (NGEE Arctic)—Advancing predictive understanding of the structure and function of the Arctic terrestrial ecosystems in response to climate change

Spruce and Peatland Responses Under Changing Environments (SPRUCE)—Assessing the response of northern peatland ecosystems to increases in temperature and exposures to elevated atmospheric CO₂ concentration

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