Terrestrial Wetland Function and Resilience

WETLAND FUNCTION SFA

Science Focus Area

What Is the Terrestrial Wetland Function and Resilience SFA?

The Wetland Function SFA aims to develop a mechanistic understanding of how climatic conditions affect terrestrial wetland ecosystem function, particularly carbon dynamics, with the goal of advancing predictive models at multiple scales. Researchers will integrate experiments, observations, and modeling to accomplish SFA goals.

Research Goals

- Determine when and how heterogeneity must be considered when scaling wetland ecosystem function in models.
- Identify generalized response functions of greenhouse gas emissions that can apply to multiple hydrogeomorphic wetland types.

Why Study Terrestrial Wetlands?

Climate change is intensifying hydrological regimes around the world, which will greatly impact the ecological and biogeochemical function and resilience of wetlands, including the production, consumption, and release of greenhouse gases. Wetland systems are currently not well represented in Earth system models (ESM). Development and inclusion of new mechanistic and process-based representations of wetlands are necessary to improve the accuracy of ESM predictions.

U.S. Department of ENERGY | Office of Science
Biological and Environmental Research Program

The Environmental System Science (ESS) program within the U.S. Department of Energy's (DOE) Biological and Environmental Research (BER) program supports research to provide a robust and scale-aware predictive understanding of terrestrial ecosystems, watersheds, and coastal systems.

19 RESEARCHERS

4 POST DOCS

9 COLLABORATORS

Research Design

The SFA is structured around three overarching themes that organize research according to spatial/temporal scales and modeling approaches. Theme 1 advances understanding of fine-scale hydro-biogeochemical mechanisms that control carbon cycling and greenhouse gas emissions in wetland soils. Theme 2 identifies above- and belowground processes and interactions affected by these mechanisms. Theme 3 incorporates newly discovered emergent properties, underrepresented processes, and mechanistic understanding into fine- and intermediate-scale models that could be integrated with the land component of ESMs.

Research Location

SFA research is conducted at the Cottonwood Lake Study Area in North Dakota within the Prairie Pothole Region (PPR), a depressional wetland complex with diverse hydro-biogeochemical drivers. The SFA will expand to additional sites, assessing wetland variability and testing model applicability both within and beyond the PPR.

More Information

ESS Program
ess.science.energy.gov

All images courtesy Argonne National Laboratory

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