LA-UR-23-11-24306

Capability Snapshot

Los Alamos NATIONAL LABORATORY

Environmental Biosensing

Earth and Environmental Science Division

Applications

- New signatures for identifying activities of interest using environmental, biological or geophysical systems as sensors
- Remote monitoring of nuclear proliferation and weaponization without on-site sensors
- Climate action monitoring and verification
- Remote sensing of subsurface storage conditions and leakage for safeguards and energy solutions
- Next generation, cost-effective, covert sensing capability for sponsor needs
- New solutions and detection methods for fracture

Partners and Sponsors

- National Labs (Pacific Northwest, Oak Ridge, Lawrence Berkeley, Brookhaven)
- Universities (Texas A&M, University of California System, Cornell)
- Sponsors (NNSA-NA24, NA22, DOE-OS)

Contact Information

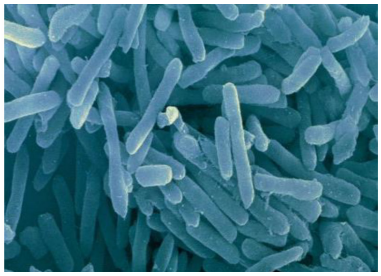
licensing@lanl.gov

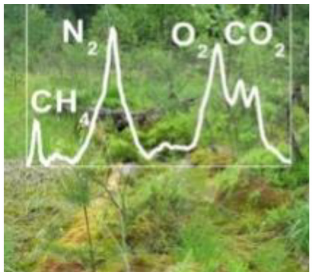
Overview

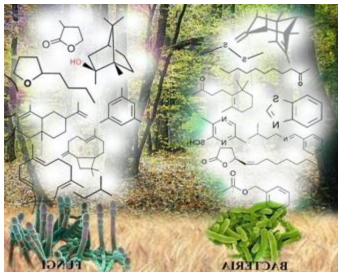
- Experimental manipulation and identification of plant responses to pollutants, pathogens and environmental changes
- Hyperspectral analysis of plant growth and stress markers
- Spectral analyses of environmental change and greenhouse gas emissions
- Plant-Environment interactions:
  - » microbiome genetic analyses and manipulations
  - » Soil biogeochemistry
  - » Epigenetic markers
- Radiological Greenhouse
- Climate-controlled growth chambers
- LICOR Photosynthesis, CO_2, N_2O, CH_4, O_3, NOx, VOC, and aerosol particle analyzers
- Ecosystem and plant disease modeling

Projects

- **DOE-BER:** SFA “Microbial carbon cycling in terrestrial ecosystems”
- **NA241:** Ecosystem functional signatures for proliferation detection
- **LDRD:** Fluxnet Signatures: Ecosystem functional signatures for remote proliferation detection; Optimization of arid systems for carbon negative agriculture and Bio-CCUS; Plant pathogen forecasting for a carbon-neutral future and food security







NNSA National Nuclear Security Administration

Richard P. Feynman Center for Innovation

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Capability Snapshot

Los Alamos NATIONAL LABORATORY

Environmental Security

Earth and Environmental Science Division

Applications

- Impacts on streamflow availability and temperature
- Coastal flooding salinization and erosion modeling
- Assessments of coastal landscape security due to sediment erosion, deposition and land subsidence
- Freshwater, sediment and nutrient fluxes through river networks
- Remote sensing – detecting coastal and surface water changes
- Coastal infrastructure susceptibility to sea-level rise

Partners and Sponsors

- National Labs (Lawrence Berkeley, Oak Ridge, Pacific Northwest, Sandia)
- Universities (University of Alaska Fairbanks, Texas A&M, University of California System)
- DOE-OS, DOD-SERDP, NNSA-NA, Intelligence Community

Contact Information

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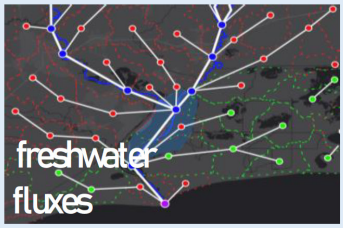
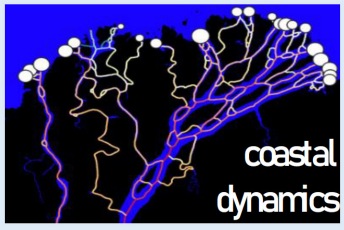
Overview

- Extreme event modeling
- Coastal land-water-vegetation modeling
- Ecosystem dynamics modeling
- River and watershed (streamflow) analysis and modeling
- Global geospatial and remote-sensing data analysis
- ML/AI models of hydrological and riverine processes
- MPAS-Q
- Advanced Terrestrial Simulator (ATS)

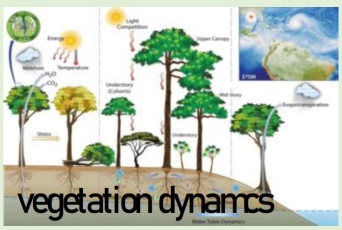
Projects

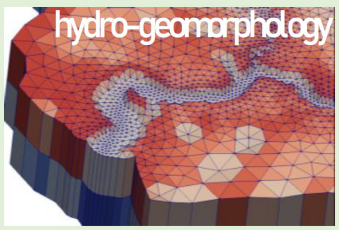
- **ICoM:** research focused on improving the predictive understanding of coastal evolution among natural and human systems using integrated modeling approach (https://icom.pnnl.gov/)
- **Veins of the Earth (VotE):** a global, river-centric, geospatial data platform with the largest collection of streamflow observations in existence (the platform is designed for serving data to AI streamflow models)
- **NGEE tropics:** Developing a global dynamic vegetation models to better predict ecosystem response to environmental changes





remote sensing and data fusion





ecosystem modeling

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