Effects of plant functional diversity on the ecosystem responses to forest harvesting

PETR BALDRIAN

Institute of Microbiology of the CAS

Forests maintain the global carbon balance and play an important economic role in raw materials. This project will analyze and compare the functioning of forest soil microbiomes following various tree harvesting schemes. Understanding these effects is critical because harvested forest stands may become temporary carbon sources through greenhouse gas emissions.

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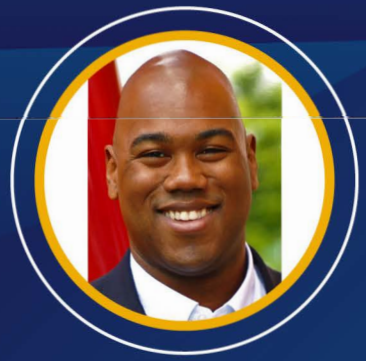
Plastic Degrading Microbial Communities from Insect Larvae Guts



MARK BLENNER & KEVIN SOLOMON

University of Delaware

Insect microbial consortia degrade plastics more rapidly than microbial isolates. While several bacterial members of these communities have been isolated, the full set of microbes and their specific pathways responsible for biodegradation have not been elucidated. This research will examine the role for microbial interactions in plastic degradation.

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Understanding contributions of agricultural dust to vertical profiles of ice-nucleating particles in the central Great Plains

SUSANNAH M BURROWS

Pacific Northwest National Laboratory

Researchers aim to advance scientific understanding of the impacts of agricultural dust on ice-nucleating particle concentrations available to clouds, their seasonality, and their vertical distribution in the convective boundary layer.

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Temporal Dynamics of Microbial Traits Driving Divergent Patterns of Carbon Flow During Surface Litter Decomposition

MARIE ELIZABETH KROEGER

Los Alamos National Laboratory

Climate change projections show that microbially driven surface litter decomposition rates will increase with rising temperatures as more carbon is released into the atmosphere and less is stored in soils. This project will build a foundation of research to identify microbial effect traits that create substantial variations in carbon cycling.

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Investigation of the Aerosol Impact on the Surface-Atmosphere Interactions

ALEXANDER LASKIN

Purdue University

This project will provide a physicochemical description of individual atmospheric particles by conducting systematic studies of composition and physical properties of airborne particles and their deposits in the snowpack.

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A day in the life of Chlamydomonas and its neighbors: Systems analysis of a microbial phototroph-heterotroph symbiosis

SABEEHA SABANALI MERCHANT

University of California, Berkeley

Phytoplankton rely on the sun for energy but change their metabolic strategy at night. This project will exploit a system with reduced complexity, established reference organisms with well-described physiologies, and a suite of methodologies to improve understanding of trophic interactions and diel patterns.

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Belowground genotype-phenotype controls on nitrogen use efficiency of a sorghum bioenergy crop

LAURA KELSEY MEREDITH

University of Arizona

Plant-microbe interactions drive nitrogen transformations in soil. This research will address critical barriers to observing rhizosphere nitrogen transformations in real-time by using below-ground measurements of volatile metabolites. The project will provide a detailed understanding of inter-organismal interactions that drive nitrogen transformations and loss in soils.

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Investigating interactions between soil microbial communities and soil organic matter dynamics along climate and vegetation gradients

JESSICA R MIESEL

Michigan State University

Organic matter in soils is critical to nutrient cycling and climate change. As the primary agents of decomposition, soil microbes are key to soil organic matter turnover. The project uses NEON soil samples, utilizing EMSL and JGI facilities to better understand the mechanisms controlling soil organic matter persistence within and across ecosystems.

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Beneficial Partners: Context Dependent Mycorrhizal Resource Exchange in Bioenergy Cropping Systems

ERIN ELAINE NUCCIO

Lawrence Livermore National Laboratory

The plant microbiome critically impacts plant health and productivity. This project will examine the resource exchange between Panicum hallii, a model grass species related to the bioenergy flagship plant switchgrass, and two mycorrhizal fungi, demonstrating how drought alters the benefit of fungi to the plant host.

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Tracking the degradation of fresh particulate organic matter in permeable riverbed sediments using FT-ICR-MS and metagenomic/transcriptomic sequencing

ERIC EUGENE RODEN

University of Wisconsin, Madison

This project combines Fourier-transform ion cyclotron resonance mass spectrometry with metagenomic/transcriptomic sequencing and metabolomics to track the transformation and degradation of fresh, photosynthetically derived particulate organic matter in permeable riverbed sediments influenced by hydrologically-driven transport of solutes and colloidal particulate organic matter.

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Follow the methane: Assessing the contribution of methanogenesis-derived carbon to higher trophic levels

EMIL RUFF

Marine Biological Laboratory

Wetlands are the largest natural source of the greenhouse gas methane. This project investigates the microbiome of insect burrows in freshwater sediments and studies aerobic methanotrophy in the burrow walls. The project will assess the path of methane carbon through the food web and the contribution of bioirrigation to methane removal.

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Functional and structural analysis of microbial expansin-related proteins that transform lignocellulosic biomass

EMMA RUSI MASTER

University of Toronto

Bringing together functional genomics, structural biology, and materials science techniques, this project will evaluate the untapped potential of microbial expansin-related proteins on lignocellulose organization for production of bio-based chemicals and materials.

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Illuminating soil biogeochemical responses to press and pulse disturbances in a coastal ecosystem

JIANQIU ZHENG

Pacific Northwest National Laboratory

Coastal ecosystems are highly dynamic systems undergoing high rates of natural variability and anthropogenic changes. Researchers will use EMSL and JGI resources to attain molecular-level understandings of biogeochemical transformations that underpin emergent ecosystem functions, which can then be captured in process models to advance the predictability of the Earth system.

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Resolving taxon-specific contributions to nutrient cycling in soil microbial communities through stable isotope enabled multi-omics

AMY ZIMMERMAN

Pacific Northwest National Laboratory

Combining multiple omics approaches, this project will quantify taxonomically resolved growth, substrate use, and functional allocation phenotypes, within diverse soil communities, in response to nitrogen source and temperature. This research will contribute to a framework for predicting how shifts in microbial community composition and physiology regulate nutrient cycling in soils.

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