Dr. Yang Lin

Leveraging Long-Term Research Networks to Advance Ecosystem Science

Long-term research networks provide valuable data, analytical tools, experimental sites, and collaborative opportunities to answer challenging questions in ecosystem science, especially on large spatial and temporal scales. In this presentation, I will reflect on my experience initiating, sustaining, and publishing collaborative research in several long-term research networks. Specifically, I will introduce a synthesis project in which we leveraged data from the National Ecological Observatory Network (NEON) to evaluate ecological tipping points. I will also discuss an empirical study exploring the response of soil carbon storage to nutrient enrichment using sites from the Nutrient Network (NutNet). Lastly, I will summarize the lessons I have learned using three Rs, respectful, responsible, and responsive.

Dr. Julie Meyer

Applied Microbial Ecology for Improved Ecosystem Function in Florida's Coral Reef

Florida's economy rests on the value of its natural resources, whether for agriculture, tourism, or simply for quality of life. While most people appreciate the beauty of our natural and agricultural ecosystems, few may appreciate the invisible teeming masses of microorganisms that play crucial roles in the function of these ecosystems, including decomposition and recycling of nutrients and complex interactions with plants and animals that impact host and ecosystem health. Work in the Meyer lab focuses on improving the function of Florida and greater Caribbean marine ecosystems through a better understanding of their microbial communities. Our current projects include investigating stony coral tissue loss disease, developing probiotic treatments to improve coral health, investigating changes in coral microbiomes under low oxygen stress, and using model anemones to investigate microbiome changes under multiple stressors.

Dr. Sarah Strauss

Small but mighty: how microbes help agroecosystems function

Despite their small size, soil microorganisms play critical roles to ecosystem functions. Consortia of microorganisms, called biological soil crusts or biocrusts, on the soil surface can influence both nutrients and soil moisture within an agroecosystem. We have used nitrogen (N)-fixation and soil nutrient measurements, amplicon sequencing, qPCR, and ^{15}N labeling experiments, to examine how the composition of these biocrusts influence both the functions of the biocrust as well as the impact of these biocrusts on the underlying soil microbiome and crop nutrient availability. These agroecosystem biocrusts contained N-fixing cyanobacteria and had similar compositions to natural ecosystem biocrusts. Despite regular fertigation throughout the year, biocrusts in citrus and grape agroecosystems fixed N at rates similar to natural arid and mesic biocrusts, though rates varied by season, soil moisture content, and crop management. The biocrusts had significantly greater microbial carbon and phosphorus content compared to non-crusted soils and impacted other microorganisms in the upper rootzone, particularly the fungal and nitrifier components. Microbiome changes in soil under the biocrusts contributed to altered carbon and N cycling and nutrient availability to crops which was confirmed through a field study tracing ^{15}N from biocrust to uptake by citrus trees *in situ*. Overall, the microorganisms of these biocrusts have the potential to impact agroecosystem functions through improving soil nutrient conditions, impacting other microbial composition and functions, and support crop growth.