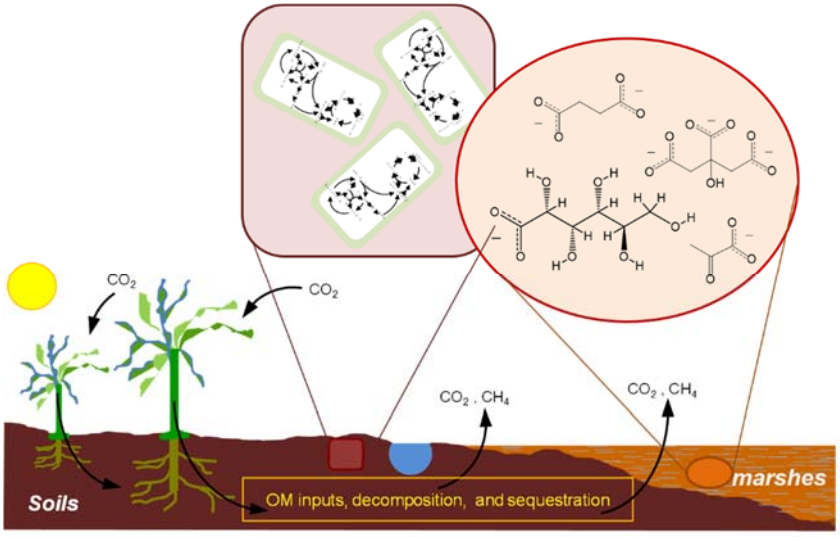
Metabolomics-Guided Tracking of the Chemical and Biological Journeys of Organic Nutrients and Contaminants

Presented by Dr. Ludmilla Aristilde
Department of Biological and Environmental Engineering, Cornell University

Thursday, June 23rd, 10:30-11:30am
SFEI Main Conference Room, 4911 Central Avenue, Richmond, CA 94804



The emerging field of metabolomics presents analytical methods for the comprehensive characterization of small-molecule metabolites in biological systems. Exploiting the connections between biological activities in our ecosystems and the environmental journeys of organics, my research group employs a metabolomics-based approach to understand processes in our natural soils and waters important to ecosystem and public health. This talk will focus on two applications of our approach: **(1)** molecular monitoring of dissolved natural organic matter (NOM) sources and transformations and **(2)** determining perturbations in beneficial soil microbiota exposed to herbicide formulations. We have developed metabolomics-guided methods for sensitive elucidation and quantitation of molecular profiling in aquatic NOM samples. Dissolved NOM, a complex assembly of organic remnants from plant and microbial biota, plays a crucial role in important processes that control the quality of our water supplies such as the genesis of harmful disinfection by-products during water treatment, organic nutrient inputs in the proliferation of heterotrophic aquatic biota, and binding and transformation of contaminants. Our methods have allowed us to monitor dissolved NOM molecular transformation through natural and engineered water systems. We have also employed a metabolomics-enabled approach to determine the sub-lethal and lethal responses of beneficial soil bacteria to glyphosate-based herbicide formulations. The extensive application of these herbicides to our agricultural soils has raised concerns about their potential adverse effects on beneficial soil microbiota important to soil health for crop productivity. We are able to capture small and large perturbations in metabolic pathways inside bacterial cells that are precursors to the biosynthesis of DNA, proteins, and important plant hormones. Through this approach, we aim to develop a predictive framework for identifying the non-recoverable tipping point response of sensitive microbial organisms to herbicide and related contaminants. Finally, the talk will highlight the overall research portfolio of my group in applying metabolomics-guided approaches to track the chemical and biological journeys of organic nutrients and contaminants.

Remote Access: https://join.me/sfei-conf-cw1
Launch the join.me app (https://join.me/app) and enter meeting code: sfei-conf-cw1
Join the audio by phone: +1.415.655.0381, access code: 943-326-397#