Title: Soil microbial feedbacks on soil organic matter formation and transformations− from the lab bench to global models.

Abstract:

Earth’s carbon (C) cycling is strongly regulated by soil organic matter, the largest terrestrial store of C globally. Soil microbial communities— their structure, biotic and abiotic interactions, and metabolic functions— directly impact the accumulation and mineralization of soil organic matter. Yet, knowing how microbial communities and their associated traits shape soil organic matter dynamics and the environmental conditions in which these traits are manifested is a grand challenge. This limits our ability to successfully manage microbial communities for soil organic matter accumulation and to predict soil C responses to disturbances and land use change. Using experimental case studies and the Earth System Model, MIMICS, I will discuss how microbial community structure and metabolism influence how organic matter is formed, its chemistry and long-term storage potential. In turn, I will examine how perturbations such as laboratory manipulations, water-logged soils, and agricultural management alters soil organic matter dynamics through their influences on the soil microbial community.