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Deciphering the signatures of niche adaptation in soil microbial communities

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Soil is perhaps the most complex biological ecosystem, where physical and chemical heterogeneity results in abundant and distinct metabolic and physiological niches for soil microorganisms to survive and thrive. This complexity is apparent in genetic observations of soil microbiomes, however a number of observations suggest that consistent rules of rhizosphere assembly might play out in disparate ecosystems and that generalizable principles might be within reach. Deriving these principles and approaches to evaluate them is a necessary step towards building predictive models of soil microbiome activity and response to manipulation. In this presentation I will discuss several advances in illuminating microbial functional traits in soil and a framework to incorporate this new knowledge into mechanistic models of soil biogeochemistry.