Soil microbial responses under drought and heat extremes

Background:

Global change is reshaping precipitation patterns, leading to longer periods of drought and more intense precipitation events. These drying and rewetting effects influence the structure and activity of soil microbial communities, which play a key role in performing essential ecosystem functions, such as litter decomposition and nutrient cycling through shifts in their extracellular enzymatic activities. Therefore, studying the resistance of soil microorganisms to these stress events and understanding how drought and soil moisture pulses (under the influence of climate warming) affect soil ecosystem functions is crucial for maintaining healthy soils.

Key questions:

- How soil moisture history influences the response and soil enzymatic activity of soil microorganisms to drying and rewetting events?
- What is the response of soil microbial activity to an interaction effect of drought and heat extremes?

Methodology:

Using soils from an ongoing outdoor experiment (since 2023), equipped with rain-out shelters and heaters to simulate different components of global change, we will take samples from 20 mesocosms in which the soil has been exposed to drought (8 weeks per year) and heat extremes (periodic heat waves of +10°C). This project will run for 3 to 4 months, during the drought and rewetting period of the long-term experiment. Students with enthusiasm to learn and perform soil enzymatic activity measurements, microbial biomass and necromass, and other chemical soil analyses should consider this project. It will further help students understand how climate change experiements are carried out.

Key readings:

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