How does climate history and land management affect grassland response to drought?

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(2) November- December 2024

Description: Drought is one of the largest threats to grasslands, and extreme droughts are becoming more frequent. Grassland management is an important driver of plant and microbial, with implications for ecosystem functions including carbon and nitrogen cycling. For example, intensively managed grasslands foster more drought-sensitive fungal communities and incorporate less carbon into soil food-webs during drought, compared to extensively managed grasslands. Microbial response to drought is also informed by climate history and drought legacies. However, what is not well known is if grassland management elicits consistent microbial and plant responses to drought across a continental-scale climatic gradient.

In this project, we will address the question: **How does grassland management affect plant and microbial response to drought across a climatic gradient?** We hypothesize that (1) because the historic climate selects for specific plant and microbial communities, the relative drought response will increase as the climate becomes cooler and wetter, and (2) drought effects will be consistently smaller in extensive than intensively managed grasslands due to higher microbial diversity. To address our hypotheses, we will expose monoliths (intact soil and plant communities) from paired extensive and intensive grasslands across a European climatic gradient to drought (or control conditions) in a greenhouse experiment at UvA. We will determine key ecosystem functions at peak drought and after a recovery period. **Your internship would be part of this large, dynamic project and would allow you to choose your focus based on your interests.** For example, focusing on land use and climate history effects on carbon cycling or nitrogen cycling responses to drought.

Main tasks that this project would include:

- Determining drought and land use effects on carbon and nitrogen cycling and soil microbial community functioning:
    - Quantifying gross primary productivity over time in the greenhouse (CO_2 fluxes)
    - Measuring soil carbon and nitrogen fractions (extractions in the laboratory)
    - Determining primary productivity (plant aboveground biomass) and plant community composition
    - Measuring potential extracellular enzyme activity as a proxy for soil functioning
    - Determining decomposition
- Contribute to maintaining the greenhouse experiment (watering)
- Be an active member of the Plant-Soil Ecology (PSECO) group – joining the weekly lab meeting, contributing to other's projects

Interested to know more? Send me an email and we can discuss your ideas and thesis possibilities!