

Climatic and Ecological Impact of Greenlandic Glacial Outwash Plains

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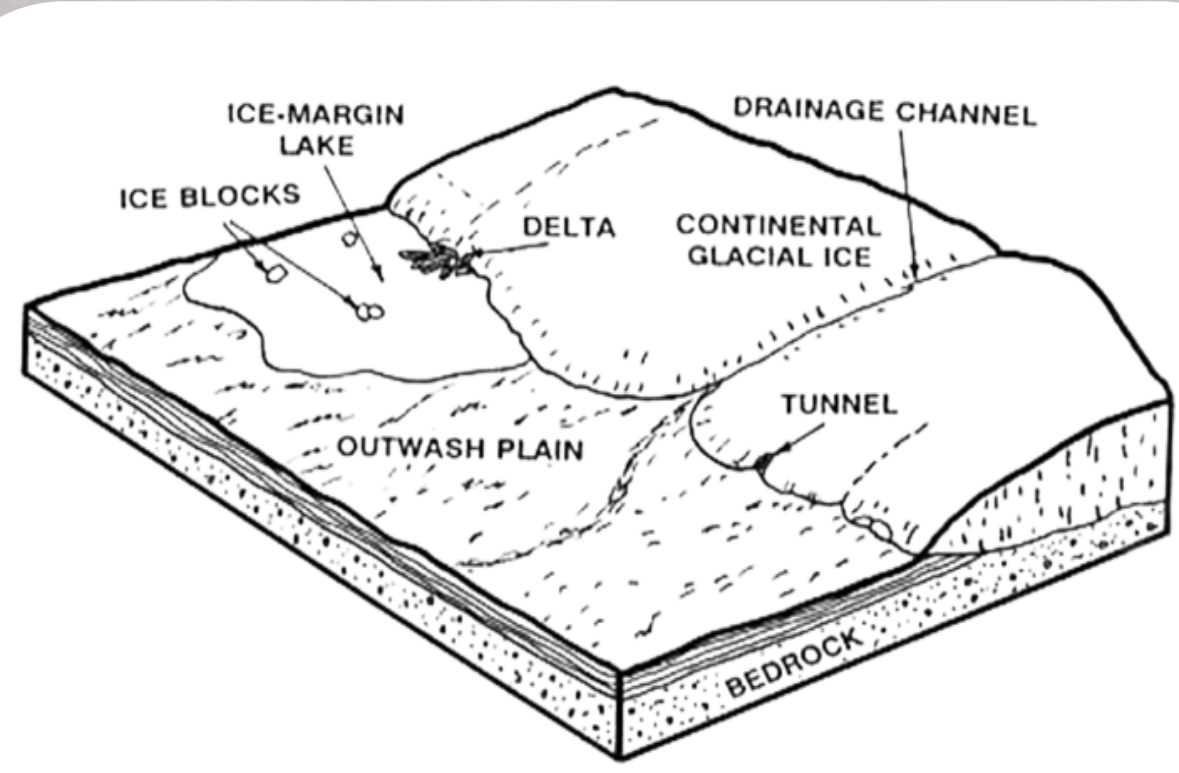


Climate Change in the Arctic

The Arctic warms **two to four times faster** than the global average¹
 Increased glacial and ice sheet retreat in Greenland
Glacial outwash plains are rapidly developing



Glacial Outwash Plains



Receding glaciers uncover new habitats of nutrient poor sediment
 Outwash plains are sites of **greenhouse gas fluxes**²
 Unknown **climatic** and **ecological** impact of these environments

Role of Microbiomes

Microbes can colonise this oligotrophic environment, creating nitrogen and carbon pools that are essential for the establishment of plants³
 Microbial interactions with greenhouse gas fluxes during this development remains largely unknown

What is the role of microbial communities in greenhouse gas exchange and soil development of outwash plains in Greenland?

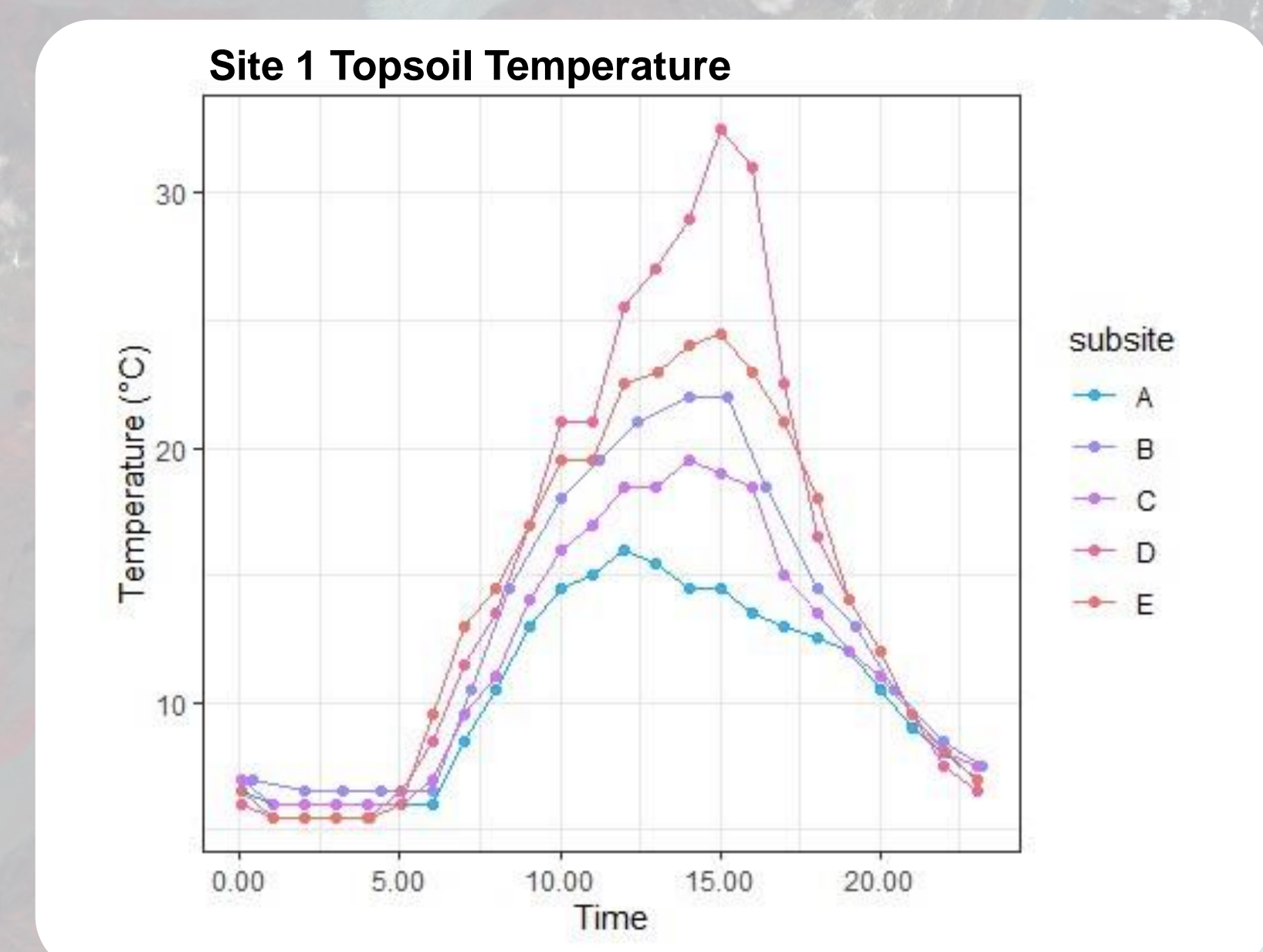


Fieldwork

Sites situated along the chronosequence of the Narsarsuaq glacial outwash plain, South Greenland

Preliminary Results

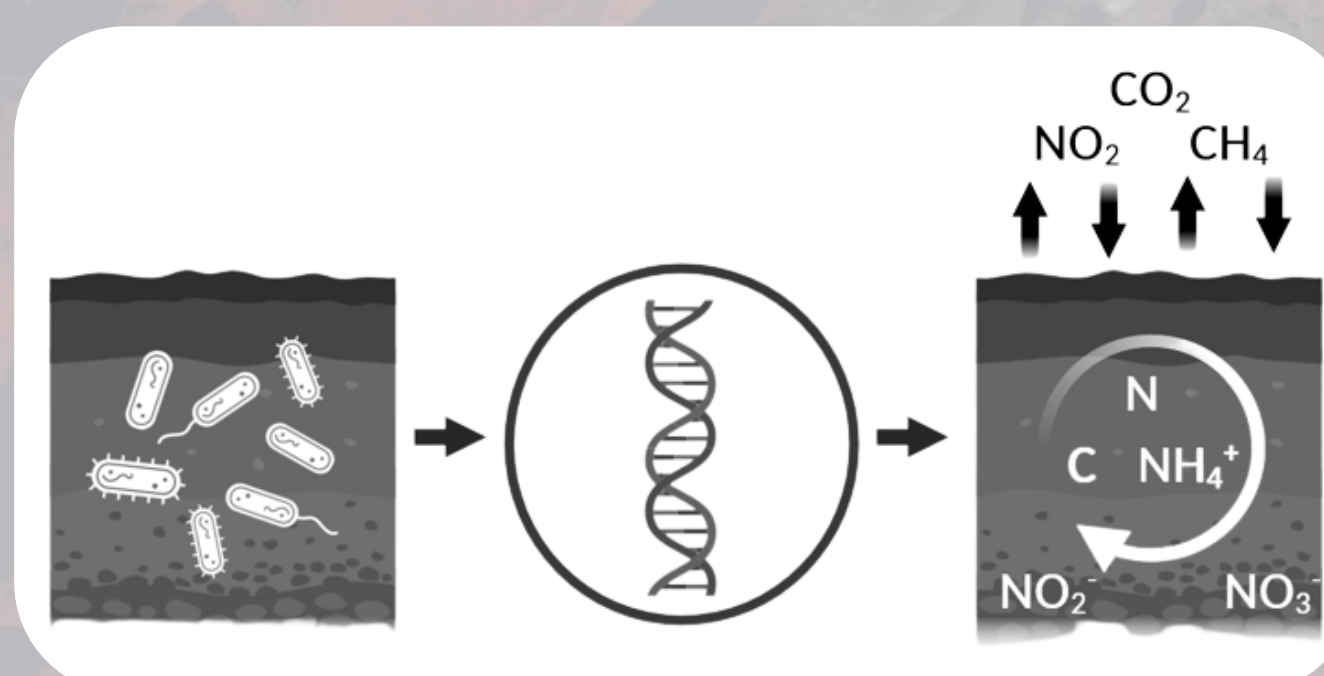
Soil and gas flux sampling
 Diurnal temperature shifts in topsoil of vegetated and non-vegetated sites



Methods

Genetic Analysis

Investigate soil microbiomes through **DNA and RNA analysis**



Metagenomics to characterise community structure and functional potential

Metatranscriptomics to identify active taxa involved in greenhouse gas fluxes

Greenhouse Gas Exchange

How does the soil microbiome interact with **greenhouse gases**, are outwash plains a **source** or **sink**?

Soil **gas flux measurements** from static chambers

Gas chromatography analysis of greenhouse gases; CO₂, CH₄ and N₂O

Soil development

How does the microbiome interact with abiotic factors and nutrient processing within the soil?

Physicochemical analysis of soil TOC, TC, TN, NH₄, NO₂, NO₃, temperature, pH and particle size

Significance

Characterise biogeochemical processes and future trajectories of ecosystem function of glacial outwash plains in Greenland
 Understand the impact of these developing environments in relation to climate change

References

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- Outwash plain diagram credit to Michigan State University, 2023

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