Functional ecology of alpine wetlands

Nutrients, mosses & microbes under a changing snowpack



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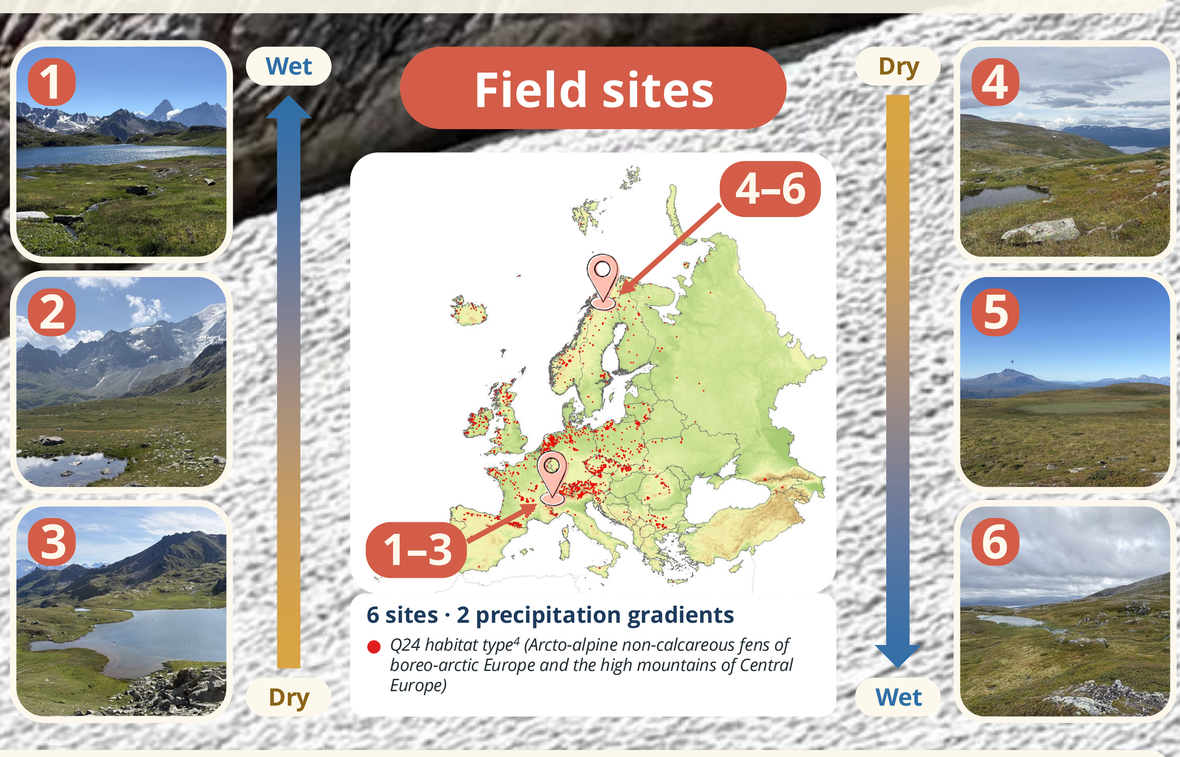
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Why alpine wetlands?

Alpine wetlands provide critical watershed functions and biodiversity[1], yet the **soil properties** characterising them, and their importance in this ecosystem, remain unknown.

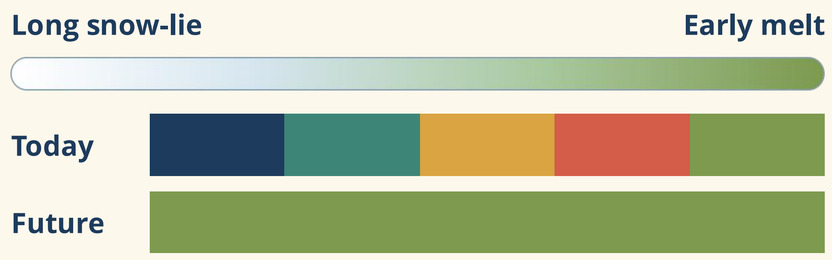
Cryptogams (mosses + lichens) are major components of alpine wetlands and host **diverse microbial communities**[2], but we know little about their composition, structure or role in **ecological functions**.

Snow cover in the Alps is **declining**, with shorter snow seasons[3]. Revealing the **functional diversity** of alpine wetlands is required to predict the **resilience** of these systems in the face of change.



Structured by snow

How long snow lies, and when it melts, sets water, nutrient and temperature conditions across a wetland. We capture this through **topographic position** and **melt timing**. We expect **bryophyte + microbial diversity to be structured by snow**, and to become **homogenised** as snow is lost.



Q1 · Nutrient cycling

What are the key functional processes associated with nutrient cycling?

HOW

Lab analysis of soil properties in alpine wetland vs adjacent grassland.

WE EXPECT

Wetland soils hold more C and N than adjacent grassland.



SNOW LINK

Does snowmelt timing shape nutrient release?

Q2 · Moss traits

How well do bryophyte functional groups (BFGs) reflect what wetland mosses do?

HOW

Inventory every moss at one wetland, assign species to BFGs[5] and test their traits across seasons.

TRAITS[6]

water-holding · carbon regulation · architectural · chemical





SNOW LINK

Do moss traits shift with snow-lie and season?

Q3 · Moss microbiomes

What microbial communities live in typical wetland bryophytes?

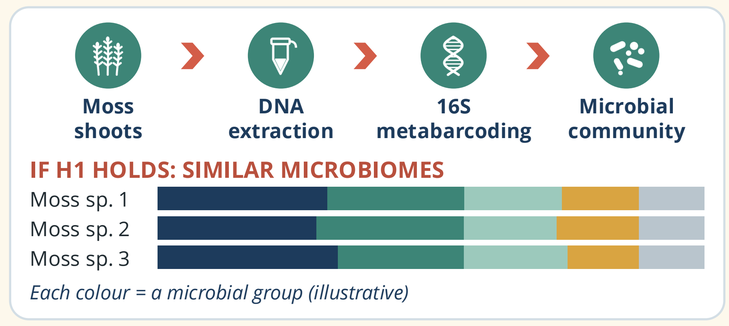
HOW

DNA extractions on bryophytes; link microbiomes to moss species + physiology.

WE EXPECT

H1 microbiomes largely shared across moss species.

H2 moss physiology helps shape microbial communities.



SNOW LINK

Microbial diversity structured by snow, homogenising as it declines.

Snow shapes alpine wetland mosses, microbes and soil. Measuring how allows us to predict what happens as snow declines.

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References

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