



Photo: Eleonor Ryberg

# Temporal scale changes in species distributions in Store Mosse bog, south-central Sweden

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Northern peatlands are important terrestrial ecosystems in which production exceeds the rate of decomposition, leading to accumulation of organic material (e.g., peat) and carbon over time. *Sphagnum* mosses represent the dominant species in these systems and contribute significantly to carbon sequestration and overall peatland dynamics. As peat accumulates over time it records changes in vegetation and environmental and climatic conditions, producing a paleo-archive that is especially suitable for macrofossil analysis and reconstructions of past vegetation. Since drastic changes in peatland species distributions are expected to occur in the changing climate of the future, improving our understanding of the factors that drive species changes (especially *Sphagnum*) over time is of particular interest as this may affect carbon storage and release.

Species distributions can be analyzed using a range of statistical methods called species distribution modelling (SDM, or niche modelling) which often examines the relationships between species occurrences and spatial variation under specific environmental conditions. Most SDMs therefore tend to be based on contemporary species data and climate variables in

geographic space. This means that the majority of SDMs today have a very limited temporal perspective and thereby lack the ability to capture recent or long-term effects of environmental conditions on species distributions – important aspects to consider since changes in species distributions in response to climate or environmental changes often occur over longer time-scales (e.g., decades to centuries or millennia).

A large component of this project is therefore to incorporate paleo-datasets and peat macrofossils in SDMs, creating so called paleo-SDMs. By incorporating paleo-datasets we can investigate the relationships between climate or environmental conditions and species distributions over time, and in turn assess species responses on longer time-scales. This seminar will give an overview of the methods and findings of the project so far, focusing on the second manuscript where we combined a peat-paleorecord (reaching back to ~10 000 cal yr BP) with past environmental conditions in paleo-SDMs, in order to examine effects on species responses over time in Store Mosse bog (south-central Sweden).

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