SPATIAL SCALING OF DIATOM DIVERSITY IN DUTCH PEATLANDS: COMPARISON OF THREE ECOLOGICALLY CONTRASTING SYSTEMS.

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Diatoms are widely used in ecological monitoring because of their high sensitivity to environmental disturbances, but knowledge on the spatial patterns in diversity is scarce. In general, the similarity in species composition between ecological communities is typically decreasing with increasing distance. For macroorganisms, this phenomenon is often quantified using distance decay relationships and species area relationships (SAR) and is often explained by the occurrence of environmental gradients and the spatially limited dispersal capacity of the species involved. In recent years, a debate arose whether microorganisms such as diatoms exhibit similar patterns. Available studies show that generalizations across all unicellular organisms studied so far are unwarranted as they exhibit wide variability.

The present study attempts to identify the mechanisms that generate diatom distribution patterns according to chemical and hydromorphological gradients by the comparison of three peatland areas in The Netherlands: Wormer and Jisperveld, Oostzanerveld and Naardermeer.

The sampling scheme follows a spatially explicit design along six kilometers sampling tracks. Distance decay relationships were analyzed using Bray Curtis similarity indexes to quantify variation in beta diversity and Mantel tests to determine significant relationships between community variability and environmental or geographical distance. Beta diversity was partitioned in spatial and environmental components and the origin of communities dissimilarities were analyzed through canonical redundancy analysis (RDA).

Preliminary results suggest that decay of community similarity was driven primarily by environmental gradients rather than geographic distance, as is expected for organisms with high dispersal abilities. However, strong environmental heterogeneity could produce steeper species – area relationships providing diatoms with very high turnover rates, even comparable to turnover rates of macroorganisms. Thus benthic diatoms exhibit spatially predictable patterns leading to estimates of the total community composition dissimilarities and diatom diversity over wide areas.

The extrapolation of spatial patterns of diatom communities is expected to provide ecological background for the design of an optimal sampling strategy, number of sampling locations and replicates for biological monitoring.