

Lake-sediment-pollen based vegetation reconstruction in North Eastern Europe – focus on early landuse signals

Summary

The PhD project uses postglacial sedimentary pollen and NPP analysis to reconstruct terrestrial landcover, land use and regional climate patterns in North Eastern Europe. The PhD topic focuses on the evolution of peoples and cultures on the eastern coast of the Baltic Sea since their first arrival following the retreating continental ice margin. The student will work in an exceptional level group specialised on palaeoecological studies. Furthermore, through multidisciplinary cooperation the project offers possibilities to combine pollen-based datasets with other palaeoecological proxies, eDNA and sedaDNA analysis results and archaeological knowledge base. The novel datasets will be analyzed in a temporal, spatial and ecological context using state-of-art techniques allowing to map the interactions of human cultures and populations with abiotic (climate) and biotic (flora, fauna) factors.

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| Research field: | Earth sciences |
| Supervisors: | Prof. Dr. Siim Veski Anneli Poska |
| Availability: | This position is available. |
| Offered by: | School of Science Department of Geology |
| Application deadline: | Applications are accepted between June 01, 2024 00:00 and June 30, 2024 23:59 (Europe/Zurich) |

Description

Supervisor: Anneli Poska

Co-supervisor: Siim Veski

The subject of the PhD project "Lake-sediment-pollen based vegetation reconstruction in North Eastern Europe – focus on anthropogenic land cover change" is closely connected with the personal research funding team grant (PRG1993) led by Siim Veski PRG1993 "Postglacial Ecosystem Response to Episodes of Rapid Climate Change [PERE]" (1.01.2024–31.12.2028) and Center of Excellence (CoE) "Estonian Roots: Centre of Excellence for transdisciplinary studies on ethnogenesis and cultural diversity" TK215U7. The PhD project is planned to start in September 2024.

Sedimentary records of different organism groups are widely used to reconstruct changes in past environmental and climatic conditions. Palaeoecological proxies (pollen, macrofossils, aquatic biota, geochemical and isotope data) provide empirical archives of past climate, and natural and anthropogenic environmental changes. The sub-fossil remains of pollen, NPP and sedaDNA stored in lakes (and bogs) provide a record of past terrestrial and aquatic environments can today be used to quantitatively reconstruct the terrestrial landcover and land use at high spatial and temporal detail.

Within this project several lake sediment cores will be micropalaeontologically analysed to find signs of early human presence, traces of cultivation of cereals and other crops, slash-and-burn agriculture and human interference with the natural forest. Generated proxies will be processed applying state-of-art quantitative reconstruction methodologies.

The PhD project focusses on postglacial sedimentary pollen and NPP and regional climate patterns in North Eastern Europe (Baltic area) and through multidisciplinary cooperation between PERE and CoE offers possibilities to combine own datasets with other fields of palaeoenvironmental research at Taltech and eDNA and sedaDNA research at TÜ. In connection with the CoE the PhD topic focuses on the evolution of peoples and cultures on the eastern coast of the Baltic Sea since the first arrival of people after the Last Glacial Maximum, analyzed in a novel areal and ecological context, allowing to map the interactions of human cultures and populations with abiotic (climate) and biotic (flora, fauna) factors.

Responsibilities and tasks:

- Systematize the existing datasets of palaeoecological proxy remains preserved in Taltech in cooperation with CoE database manager;

- Collect and perform palaeoecological analysis of sedimentary records with a focus on pollen-NPP-based quantitative land cover, land use and climate reconstructions from North Eastern Europe over the post-glacial period;
- Use gained information in combination with above described complementary resources to reconstruct the post-glacial environmental change, with special focus at anthropogenic impact.

The PhD position is available for a 4-year period and the key tasks as a PhD student at TalTech are:

- To manage and carry through your research project
- Attend PhD courses
- Write and publish 3 high-quality scientific articles and your PhD thesis
- Teach and disseminate your research
- To stay at an external research institution for a few months, preferably abroad
- Work and teach for the department

The study will be conducted using new and existing sediment cores with a variety of multi-proxy data from European and Baltic locations, new material will be collected from low data coverage areas in North Eastern Europe. The PhD candidate will participate in fieldwork for collecting sediment samples and training sets. The palaeoecological analysis will be conducted in TalTech Department of Geology. The PhD candidate will be expected to work with microscope, compile palaeoproxy based datasets, learn palaeo-reconstruction techniques, and conduct GIS based spatial modelling.

The applicants should fulfil the following requirements:

General admissions criteria

- a good BSc and MSc degree from an internationally recognised university in an Earth Science discipline (Geology, Quaternary geology, Palaeoecology) or relevant subject area (Limnology, Palaeolimnology, Physical geography, Ecology, Biology or Archaeology).
- English language proficiency at a minimum of IELTS (or comparable) band 6.5 with no component score below 6.0, or equivalent level if not decided otherwise.

Specific candidate requirements

- highly motivated graduate,
- keen to work on a multi-disciplined project
- good communicative skills
- proactive and independent work.
- previous experience in pollen identification
- working with palaeo datasets and a basic knowledge of palaeo-proxy based reconstruction techniques and statistical analysis
- previous publications (if any) and relevant work experience; previous experience or proven interest in the research field of earth sciences will be an advantage.



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