

Postglacial climate change in Northern Europe: focus on Chironomid-based reconstruction of summer temperatures

Summary

The subject of the PhD project „Postglacial climate change in Northern Europe: focus on Chironomid-based reconstruction of summer temperatures” is closely connected with the personal research funding team grant (PRG323) led by S. Veski „Tracking the time-lags of species response to environmental change using palaeo-proxy data and modelling (TrackLag)”. The PhD project is planned to start in September 2020.

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, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

Sedimentary records of different organism groups are widely used to reconstruct changes in past climatic conditions (Veski et al 2015; Väliranta et al 2015, Laumets et al 2014). Palaeoecological proxies (pollen, macrofossils, aquatic biota, geochemical and isotope data) provide empirical archives of past climate change. The sub-fossil organism remains deposited in lakes and bogs provide a record of past terrestrial and aquatic environment, many of which can today be used to quantitatively reconstruct the environmental conditions. Several regional- to continental scale palaeo-climate reconstructions have been published based on pollen-climate calibration datasets (Mauri et al., 2014). A considerable amount of palaeo-climate (temperature and precipitation) reconstructions based on different proxies, such as chironomids (Heiri et al 2014), diatoms (Weckström et al 2006), tree-rings (Linderholm et al 2014), stable isotope records (in particular 18O) from speleothems (Sundquist et al., 2007), and from lake sediments (Hammarlund et al., 2002) have been published during last decades. However, above mentioned studies rarely utilize more than one palaeoclimate proxy source and are therefore susceptible to the shortcomings associated with the specific organism group. New, multiproxy records produced from the low data coverage areas and development of multiproxy dataset would provide basis for more solid and trustable results. The current PhD project will focus on Chironomid-based reconstructions, one of the most useful palaeoclimate indicators (Battarbee 2000) as a part of a multi-proxy study (Mackay et al 2003). The new palaeoclimate reconstructions can then be used as an independent variable to validate the vegetation reconstructions of past conditions and to calibrate models in order to more realistically represent spatial and temporal patterns of future changes tracking the time-lags of species response to environmental change using palaeo-proxy data and modelling.

This PhD project will:

1. Compile a dataset and evaluate the availability and potential of Chironomid remains preserved in sedimentary basins as climate proxies using published materials.
2. Collect and perform multiproxy palaeoecological analysis of sedimentary records with a focus on Chironomid-based reconstruction of summer temperatures from low data coverage areas in Northern Europe over the entire post-glacial period (ca 14700 years)
3. Collect a Chironomid training set of low data coverage areas in Northern Europe.
4. Use gained information to reconstruct the post-glacial climate and incorporate the results in multi-proxy studies of past environmental change.

The position is available for a 4-year period and your **key tasks** as a PhD student at TALTECH are:

- To manage and carry through your research project
- Attend PhD courses
- Write 3 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 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 have experience working with palaeo datasets, and a basic knowledge of palaeo-reconstruction techniques, and GIS based spatial modelling.

Qualifications

The applicants should fulfill 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, Ecology)
 - English language proficiency at a minimum of IELTS band 6.5 with no component score below 6.0, or equivalent level
- Specific candidate requirements
 - highly motivated earth science graduate, keen to work on a multi disciplined project, good communicative skills, proactive and independent work, affinity with working in the field
 - emphasis will also be laid on previous publications (if any) and relevant work experience
 - previous experience or proven interest in the research field of earth sciences
 - drivers' licence (optional)



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