# Decadal climate variability in high Arctic Lake sediment records in East-Svalbard obtained by X-ray fluorescence core scanning method

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### 1. Background







The Arctic is subject to large decadal climate variations in precipitation and temperature associated with regional atmospheric and ocean circulations. These anomalies are recorded in lake sediments that represent continuous archives for past climate variability. The goal is to better understand environmental signals preserved in lake sediments. We aim to correlate elemental composition of selected lake deposits with recorded climate oscillations and environmental signal in the lakes since the time of isolation from the sea by isostatic uplift. The increase in organic matter content at the top of the core is the result of high productivity episodes and eutrophication due to recent warming that has occurred primarily in the last few decades.



# 2. Fieldwork SEES 2022

Polar amplification in response to global warming causes the Arctic region to warm much faster than the global average. During the Science Expedition Edgeøya Svalbard in July 2022 (SEES), a multi-disciplinary team of scientists collected samples of flora, fauna, archaeological sites, water samples, and sediments. The expedition goals were:

• Observe ongoing environmental change, use new technologies and expand datasets

• Bring scientists, policy makers and politicians together to improve scientific collaboration

Engage next generation polar researchers

Improve international cooperation

The lake coring goal is to reconstruct past climate change by applying a multi-proxy approach (e.g.: pollen, biomarkers, sea-ice) on different records from sites on Barentsøya and Edgeøya. As main result we aim to construct a composite record of lake Andsjøen from the data of SEES 2015 and 2022.



Sieving leaf remaints for age determination via radio carbon dating





Sharing my research and climate related concerns to the Dutch news



4. Results



We used the X-Ray Fluorescence (XRF) line scanner from the Royal Institute of Sea Research (NIOZ) on Texel for piston core segments (0.2 mm resolution) and handheld XRF from the University of Utrecht (0.5 cm resolution) for samples from the Gravity core. As such, the bulk sediment geochemical composition is analysed to determine decadal climate variability/trends associated to changes in the lake water chemistry and sedimentary processes in the lake catchment. For instance, by analysing major, minor, and trace metals, bottom water oxygenation, reducing conditions, productivity, airborne particles provenance, and pollution can be reconstructed.

30°E









## 5. Lessons I have learned

- To take my own responsibility in the climate change issue, even as a climatologist. However, as a scientist you are required to provide objective information.
- It is important to achieve success in the outreach to the public (not only to the science community).
- Multi-disciplinary research increases awareness and support from different social parties.

### 6. To be continued...

This research will contribute to our knowledge on relative sea-level changes by dating the isolation of the lake basins and examining the potential link with climatic oscillations to reconstruct atmosphere and ocean dynamics on a global scale. Furthermore, we will explore the collected data and carefully select suitable element ratios and elements which we can use as a specific environmental indicator. If you want to read more about my experiences or just curious for more polar paradoxes, photos, videos, and stories about the (paleo)climate research I have done and some other adventures before and after the expedition on Svalbard, please read the following articles and travel blog ©





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