A 300 year pollen record from a subarctic lake on the Yukon Coast, NW Canadian Arctic

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Key Questions

Sedimentary environment

1. Have there been **disturbances** in the sedimentation during the last 300 years?
2. How did **bioproductivity** and **organic matter decay** develop?

Pollen assemblage

3. Is there a change in **vegetation composition**?
4. How did the **regional climate** develop?

Tentative answers

1. Sedimentation uniform between sand peaks
2. Phases of higher organic matter content
3. Change from open tundra to more shrub-dominated vegetation after AD 1900
4. More favourable climate after AD 1900

Refined questions

What caused the peaks in organic matter content and sand?

Are higher contents in carbon and nitrogen caused by increased production or decreased decomposition of organic matter?

Why is the pollen assemblage so stable through time? Will that be changed by higher-resolution counting?

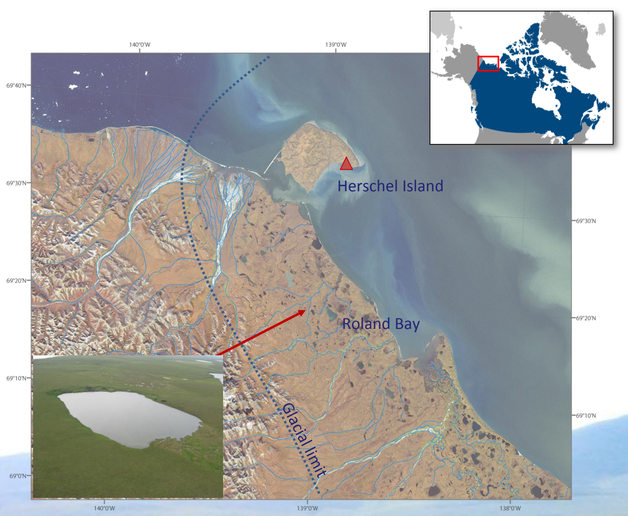


Fig. 1 Map of Yukon Coastal Plain and Herschel Island, showing lake location and western limit of former Laurentide Ice Sheet (map base compiled by Lantuit)

Regional climate variability and associated **changes in vegetation composition** during the last 300 years are still largely unknown for the Yukon Coastal Plain (Fig. 1 shows a map of the region).

A short sediment core from a thermokarst lake is used to reconstruct climate and vegetation as well as the sedimentary environment for the last 300 years using pollen analysis and additional sediment parameters.

Results

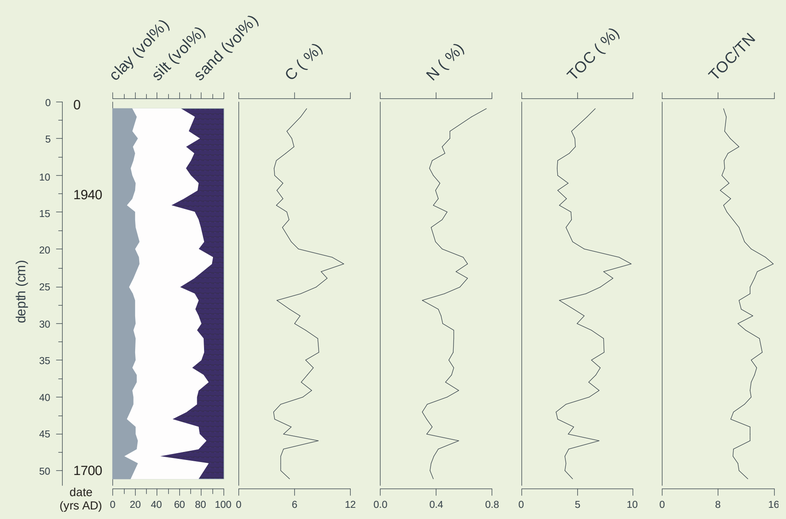


Fig. 2 Stratigraphic diagram showing results of biogeochemical analyses.

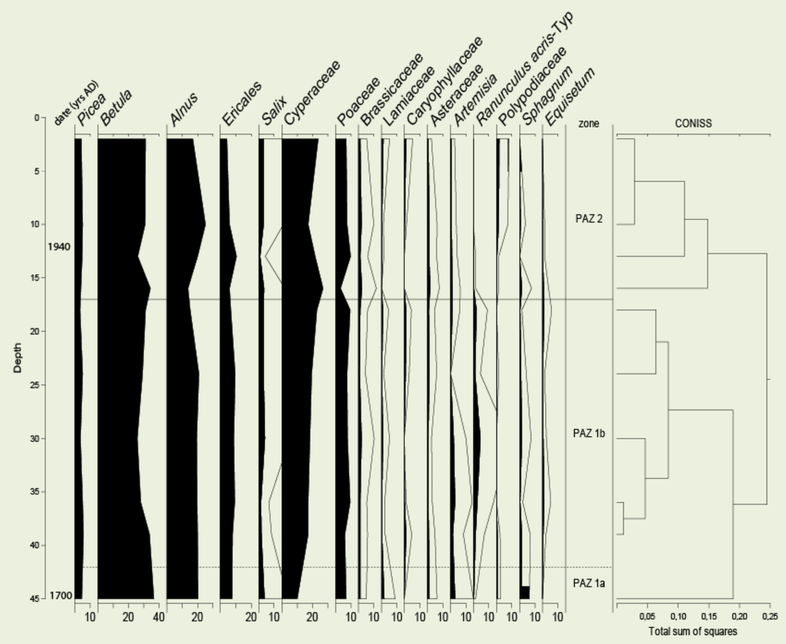


Fig. 3 Stratigraphic diagram showing pollen abundances. CONISS (Constrained Incremental Sums of Squares cluster analysis) was used to identify the pollen zone boundaries. Pollen abundances are presented as percentage data.

shrubs become more confident, herbs decrease

open tundra, some shrubs

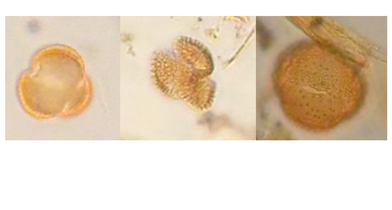
Sedimentary environment

Grain size analysis and the measurement of total carbon (C), total organic carbon (TOC), and total nitrogen (N) give insight into the sedimentary environment at 1 cm resolution. The results are shown in Fig. 2. Organic carbon contents vary between 3 and 10 %, local peaks coinciding with those of N, C, and the ratio of TOC/N. Those peaks mostly follow peaks in sand content.

Pollen record

Fig. 3 shows the results of **pollen analysis**. Two pollen assemblage zones (PAZ) were identified for the short core. PAZ 1 represents the time between about AD 1700 and 1900 and shows a uniform pollen assemblage dominated by shrubs and herbs. Cyperaceae increase through time, and *Ranunculus* and *Artemisia* show minor peaks.

In PAZ 2, starting about AD 1900, non-graminoid herbs decrease and shrubs increase slightly. A **change to a more favourable climate starting about 100 years ago** is a possible explanation for that. Shrubs increase under warmer conditions, while an open landscape is usually associated with cold and dry conditions. So far, the pollen record shows **little variation during the last 300 years**, the counting of further samples, accompanied by more extensive data analysis will give a better insight into the history of climate and vegetation on the Yukon Coast.



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