
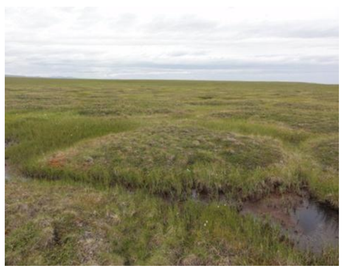

# Climatic and environmental change along the Yukon Coastal Plain during the last 2000 years

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## Project aims

The project is designed to provide a high-resolution reconstruction of absolute temperature amplitudes, precipitation and changes in vegetation communities on the Yukon Coastal Plain for the last 2000 years. It deals with rapid and short-lived climate fluctuations in the area such as the still unconfirmed presence and timing of the Medieval Warm Period and the Little Ice Age and how these climate fluctuations are related to permafrost dynamics.

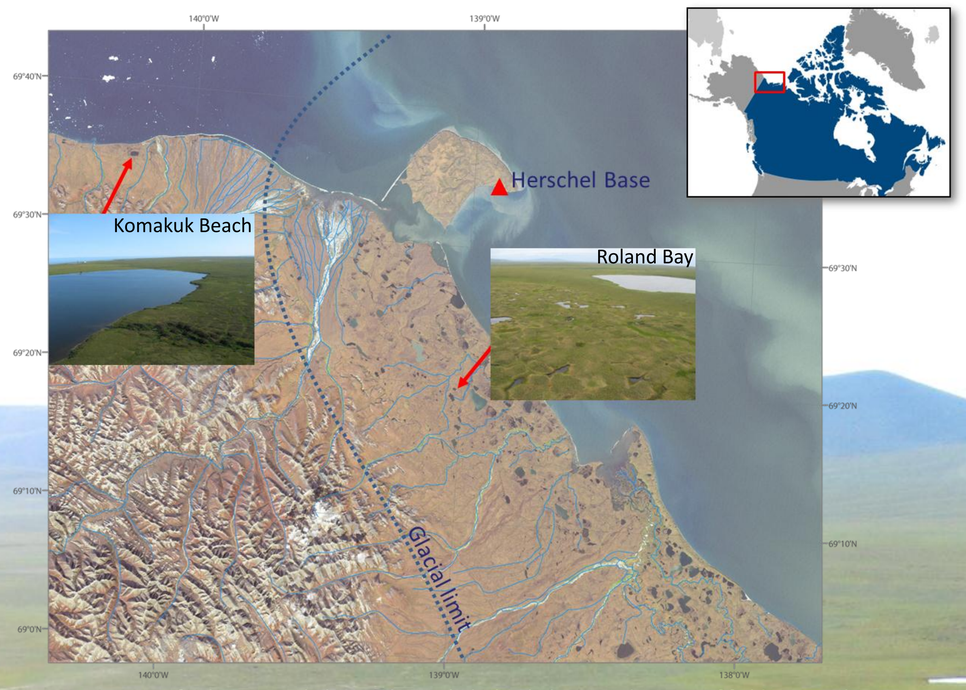



Fig. 1 Map of Yukon Coastal Plain and Herschel Island, depicting location of field sites and western limit of former Laurentide Ice Sheet (map base compiled by Lantuit)

## Material and Methods

In August 2012 two sites on the Yukon Coastal Plain have been visited. At each site a thermokarst lake and an adjacent Polygon mire have been surveyed and sampled. Using those two types of archives gives the opportunity to study both the regional climate signal preserved in the lake sediment and the local development of vegetation and permafrost stored in the peat of polygon mires.

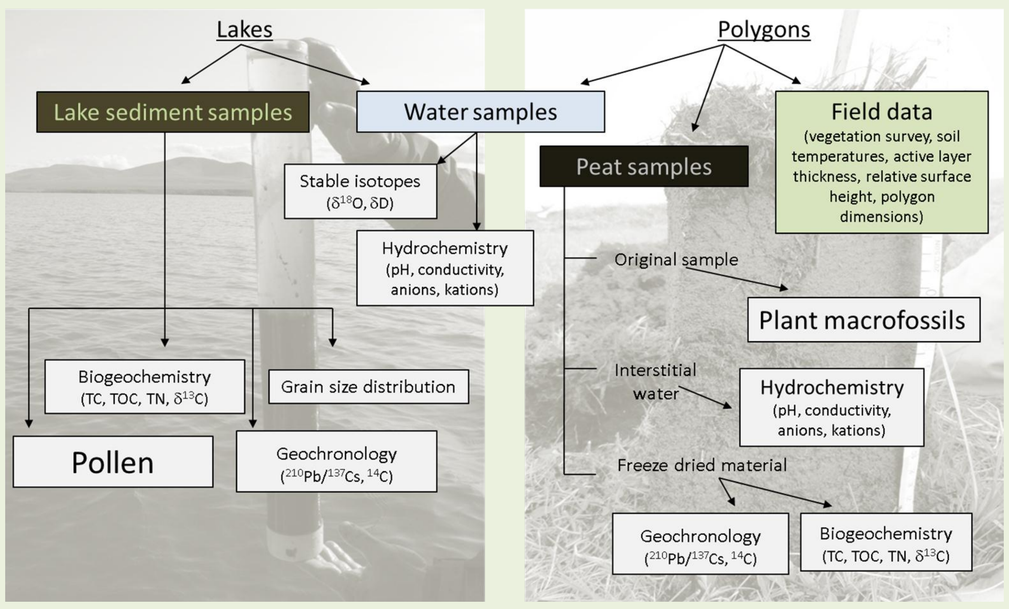
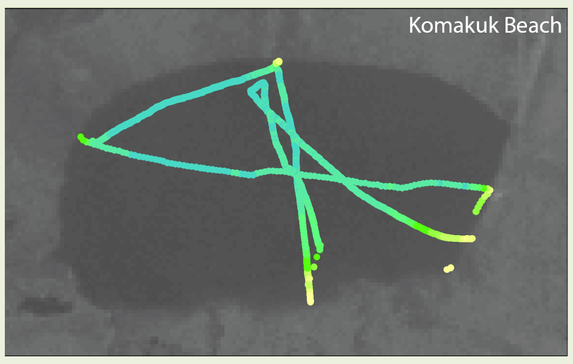


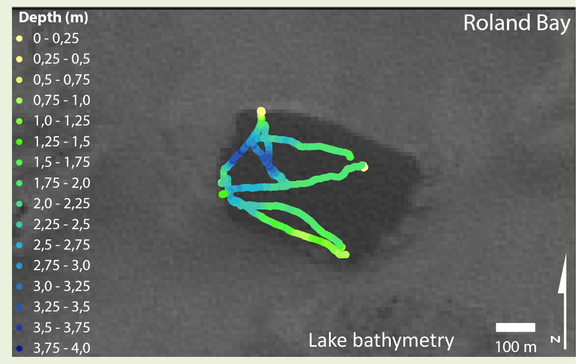

**Fig. 2 Summary of sample material types and analyses**

## Site characterisation

### Komakuk Beach site




### Roland Bay site




No stratification, well-mixed lake water:

| | | |
|---|---|---|
| pH | 6.87 – 7.09 | 7.46 – 7.67 |
| electrical conductivity | 61 – 63.5 µS/cm | 384 – 404 µS/cm |
| $HCO_3^-$ | 23.9 – 25.9 mg/l | 114.4 – 118.8 mg/l |

### Polygon morphology


Freehand scetch, not to scale!


Freehand scetch, not to scale!

### Polygon vegetation

**Centre:** *Betula glandulosa*, Salix sp., *Ledum decumbens*, *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Rubus chamaemorus*, mosses, grasses, sedges

**Ridges:** *Betula glandulosa*, Salix sp., *Eriophorum vaginatum*, *Ledum decumbens*, *Vaccinium vitis-idaea*, Empetrum nigrum, *Rubus chamaemorus*, lichens, mosses, grasses, sedges

**Elevated centre:** *Betula glandulosa*, Salix sp., *Eriophorum vaginatum*, *Vaccinium vitis-idaea*, *Polygonum bistorta*, *P. viviparum*, *Stellaria longipes*, *Hierochloë alpina*

**Margins:** *Betula glandulosa*, Salix sp., *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Dryas integrifolia*, *Rubus chamaemorus*, *Pedicularis lapponica*, *P. sudetica*, mosses, lichens, grasses, sedges

### Interpolygonal pond water

| | | |
|---|---|---|
| pH | 5.47 – 5.97 | 5.38 – 5.4 |
| electrical conductivity | 56.7 – 77.8 µS/cm | 98.1 – 102.1 µS/cm |

### Interstitial water

| | | |
|---|---|---|
| pH | 3.88 – 5.73 (centre to ridge) | 3.63 – 4.55 (margin to centre) |
| electrical conductivity | 75.1 – 212.7 µS/cm (ridge to centre) | 90.3 – 464 µS/cm (centre to margin) |

## Outlook

A detailed palaeoclimatic reconstruction of the last 2000 years will allow the further investigation of the response of vegetation and permafrost to rapid climatic changes. A comparison of the palaeoenvironmental development in the two large landscape units (moraine vs. Beringian landscape) is needed to complete the picture of the Yukon Coastal Plain during the last 2000 years.

The analysis of a typical high-centered polygon and an intermediate form will help understand this typical arctic landform, which is such a common feature on the Yukon Coastal plain.

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