

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

Juliane Wolter¹, Hugues Lantuit¹, Ulrike Herzs Schuh^{1, 2}, Michael Fritz¹

¹Alfred Wegener Institute for Polar and Marine Research Potsdam

²University Potsdam, Institute of Earth and Environmental Science

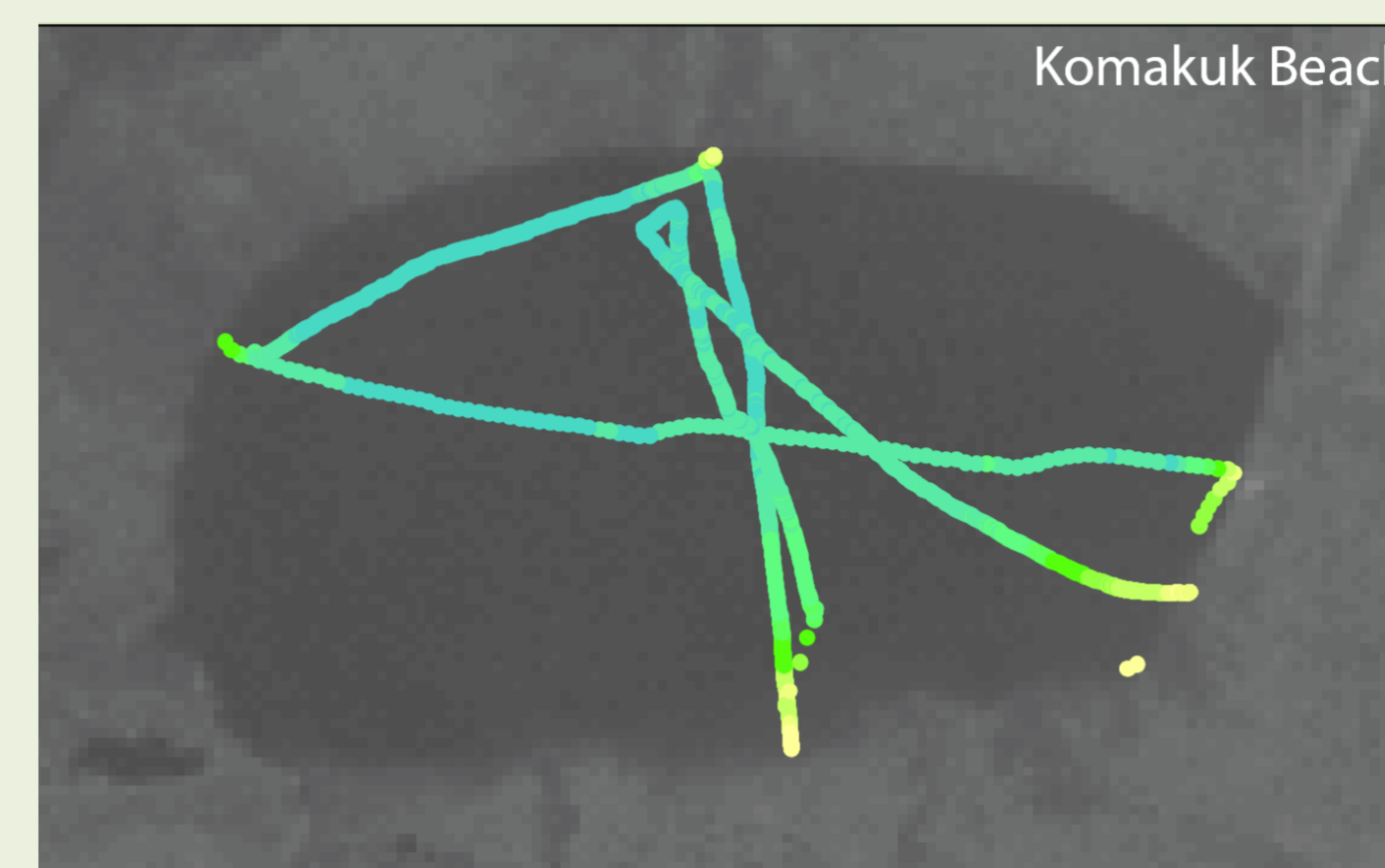


Project aims

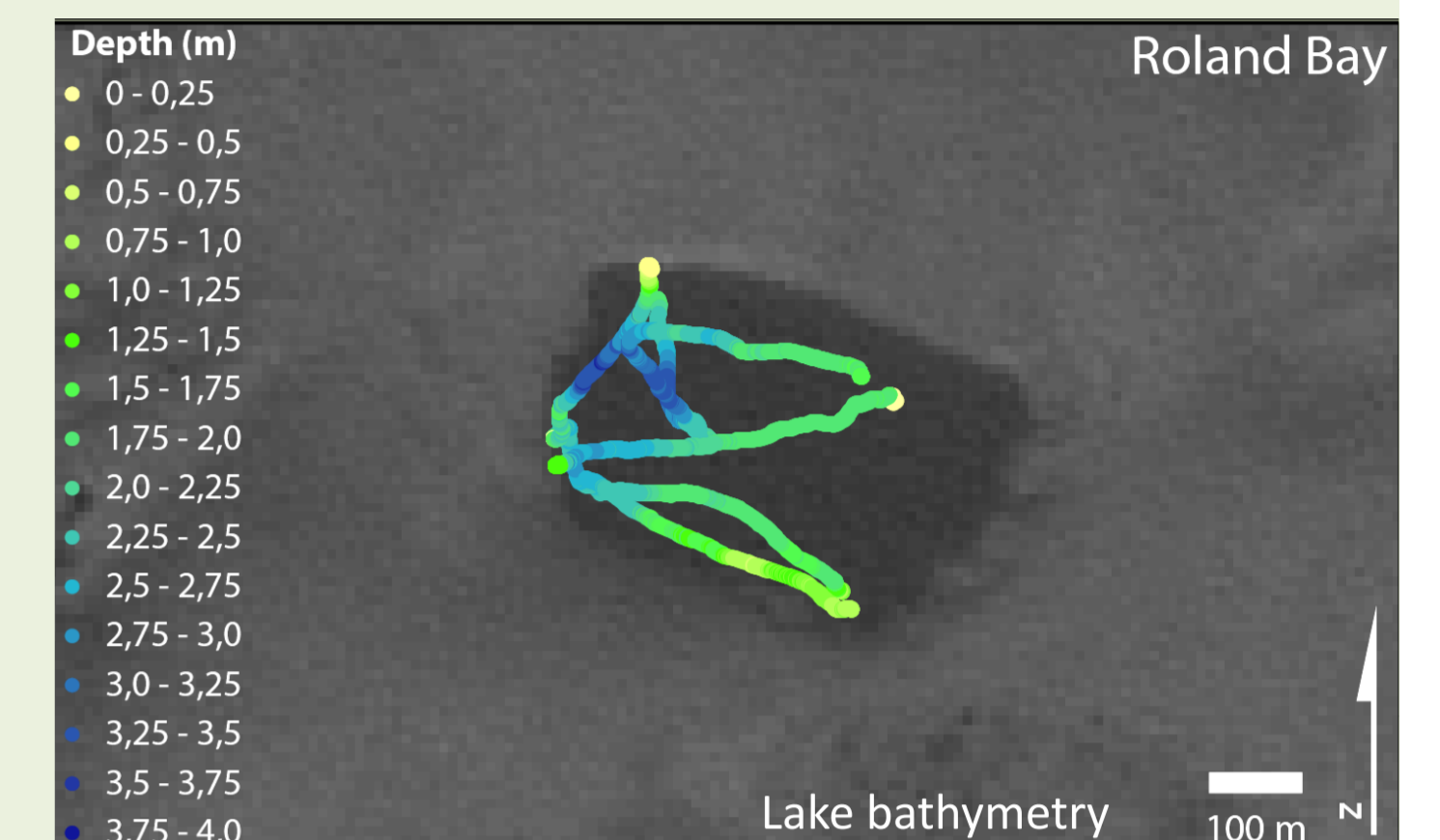
The project is designed to provide a high-resolution reconstruction of absolute temperature amplitudes, precipitation and changes in vegetation communities on the Yukon Coastal Plain for the last 2000 years. It deals with rapid and short-lived climate fluctuations in the area such as the still unconfirmed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

Site characterisation

Komakuk Beach site



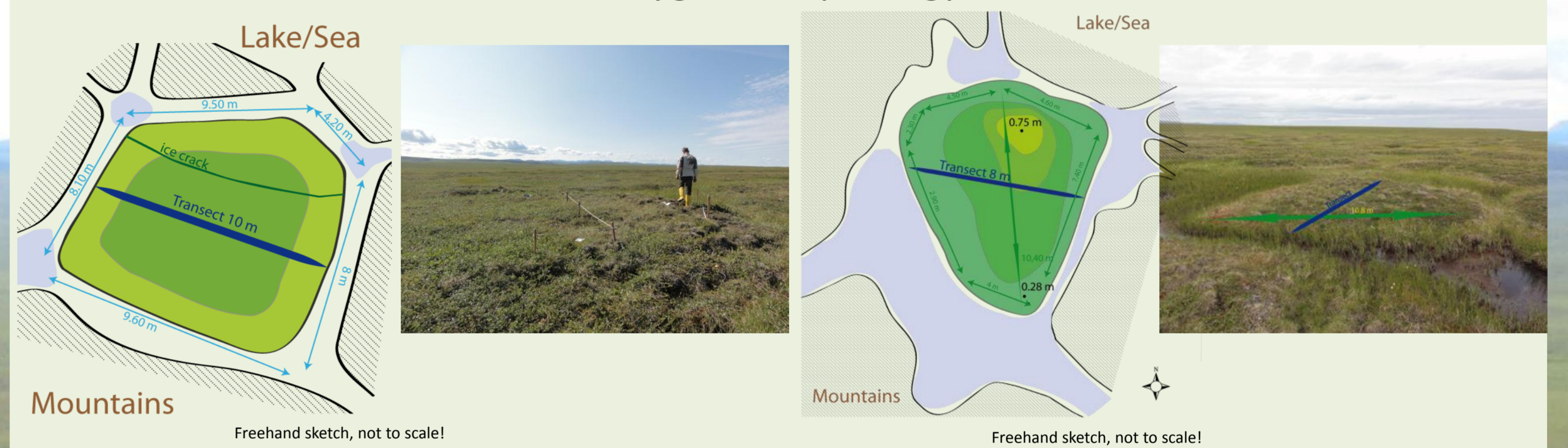
Roland Bay site



No stratification, well-mixed lake water:

pH	6.87 – 7.09	7.46 – 7.67
electrical conductivity	61 – 63 $\mu\text{S}/\text{cm}$	384 – 404 $\mu\text{S}/\text{cm}$
HCO_3^-	23.9 – 25.9 mg/l	114.4 – 118.8 mg/l

Polygon morphology



Polygon vegetation

Centre: *Betula glandulosa*, *Salix* sp., *Ledum decumbens*, *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Rubus chamaemorus*, mosses, grasses, sedges
Elevated centre: *Betula glandulosa*, *Salix* sp., *Eriophorum vaginatum*, *Vaccinium vitis-idaea*, *Polygonum bistorta*, *P. viviparum*, *Stellaria longipes*, *Hierochloë alpina*
Ridges: *Betula glandulosa*, *Salix* sp., *Eriophorum vaginatum*, *Ledum decumbens*, *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Rubus chamaemorus*, lichens, mosses, grasses, sedges
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 – 5.40
electrical conductivity	56.7 – 77.8 $\mu\text{S}/\text{cm}$	98.1 – 102.1 $\mu\text{S}/\text{cm}$

Interstitial water

pH	3.88 – 5.73 (centre to ridge)	3.63 – 4.55 (margin to centre)
electrical conductivity	75.1 – 212.7 $\mu\text{S}/\text{cm}$ (ridge to centre)	90.3 – 464.0 $\mu\text{S}/\text{cm}$ (centre to margin)

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.

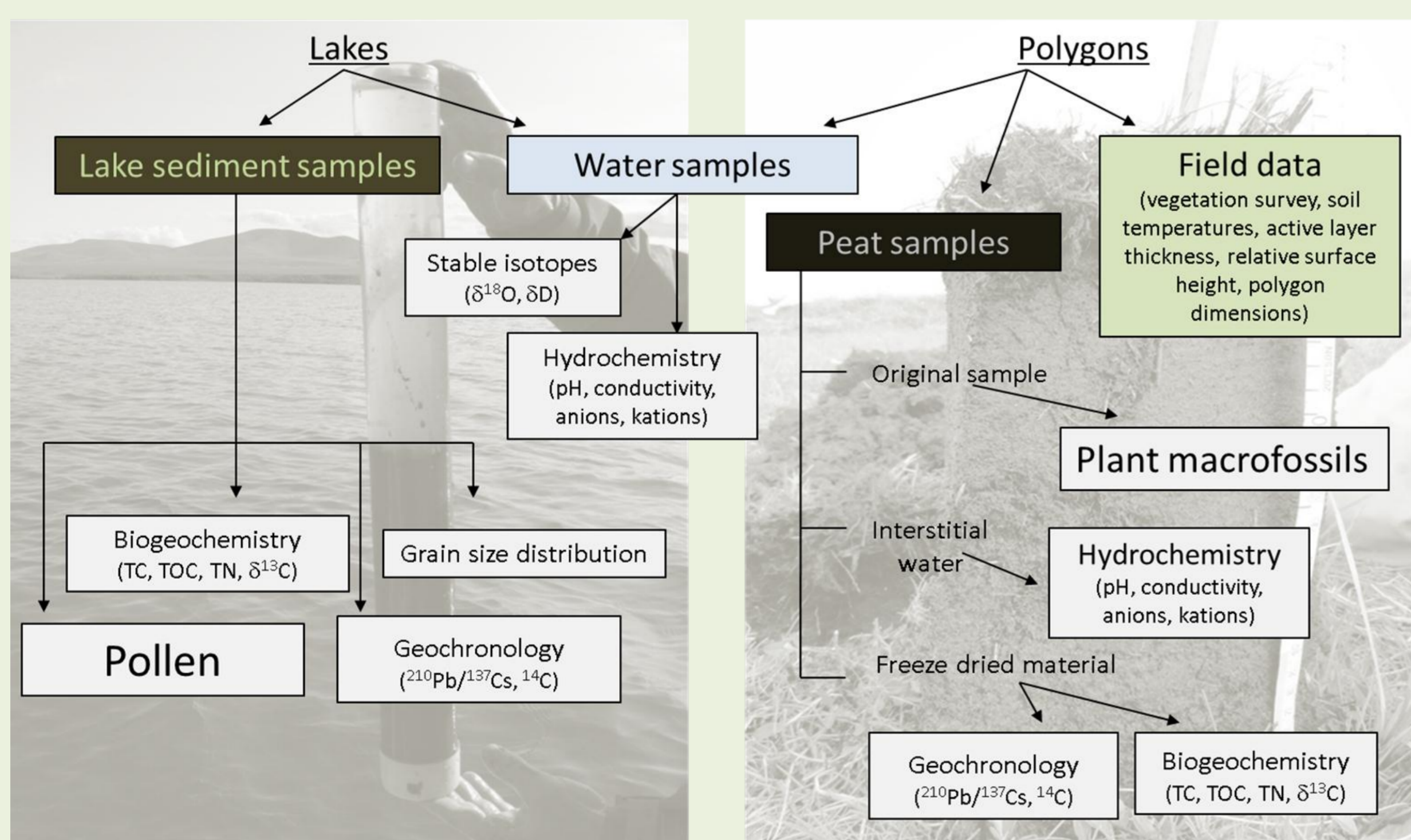


Fig. 2 Summary of sample material types and analyses

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.