

# A Late Holocene palaeoenvironmental lake record from the Yukon Coastal Plain, NW Canada

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# Aim

**High resolution** palaeoecological record  
of the **last centuries** in the subarctic  
tundra of NW Canada

➔ Little Ice Age

➔ Recent warming

# Study area



# The Yukon Coastal Plain

Subarctic



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Subarctic

Treeless tundra

Arctic Ocean

British Mountains



# The Yukon Coastal Plain

Subarctic

Treeless tundra

Arctic Ocean

British Mountains

Continuous permafrost

Unconsolidated sediments







## Tussock tundra

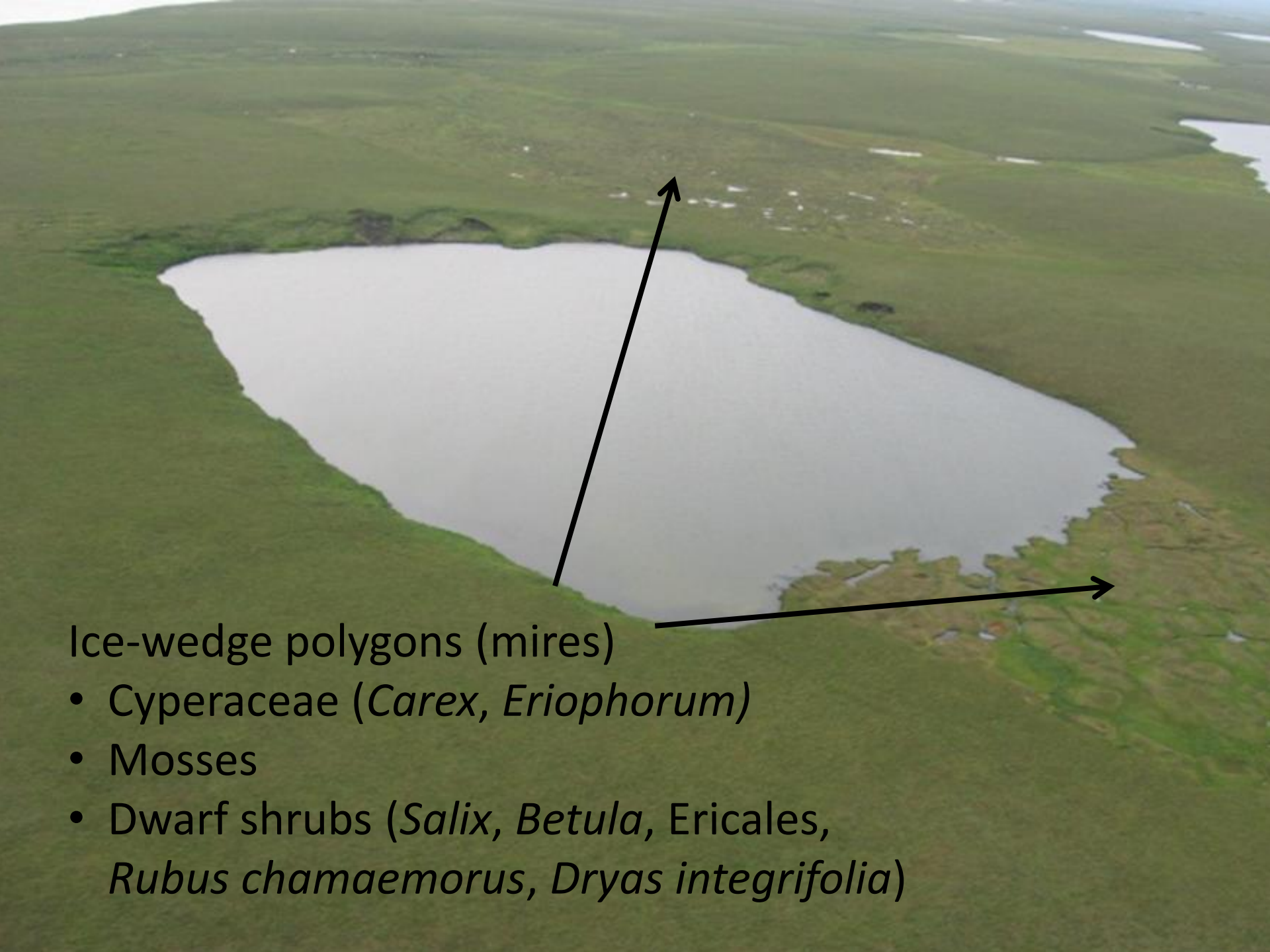
- *Eriophorum* tussocks
- Dwarf shrubs (*Betula glandulosa*, *Salix sp.*, Ericales, *Rubus chamaemorus*, *Dryas integrifolia*)
- Mosses





## Lake-shore vegetation

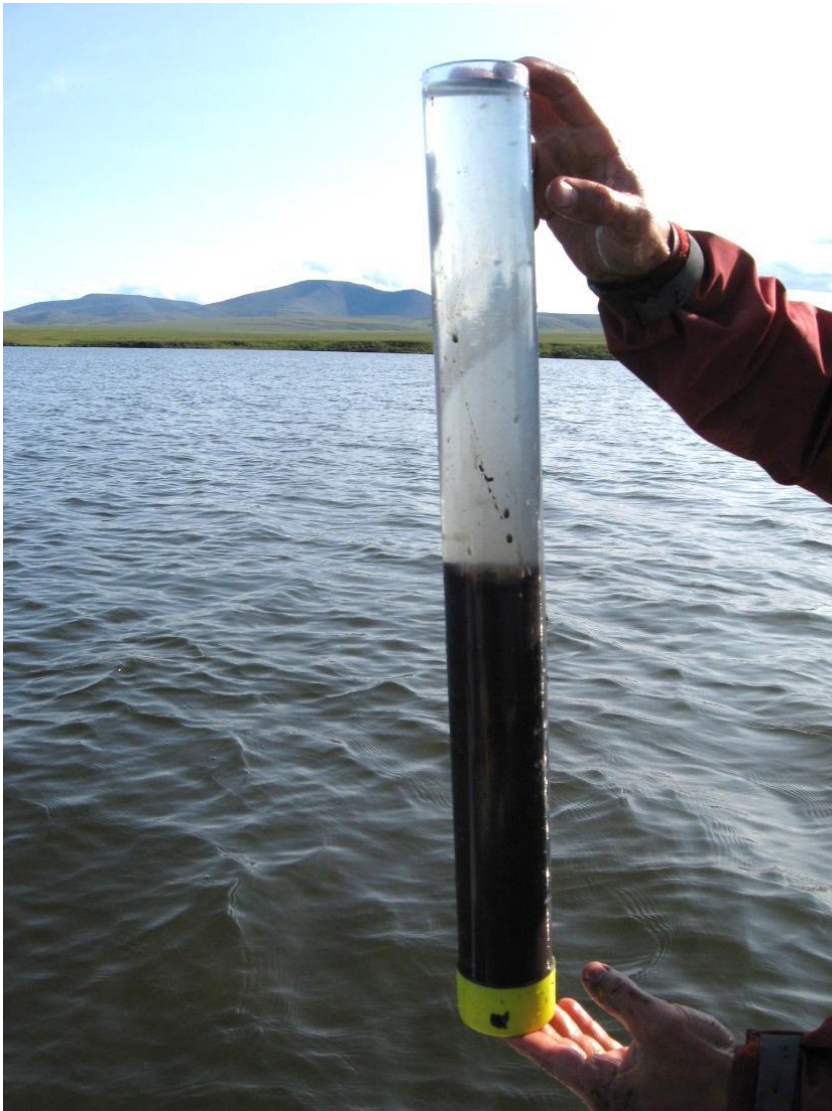
- Shrubs
- Forbs (*Chrysosplenium*, *Petasites*, *Polygonum*, *Ranunculus*, *Rumex*, *Stellaria*,..)
- Cyperaceae (*Carex*, *Eriophorum*)
- Grasses (*Poa*, *Arctagrostis*, *Hierochloë*)
- Mosses



Ice-wedge polygons (mires)

- Cyperaceae (*Carex*, *Eriophorum*)
- Mosses
- Dwarf shrubs (*Salix*, *Betula*, Ericales, *Rubus chamaemorus*, *Dryas integrifolia*)

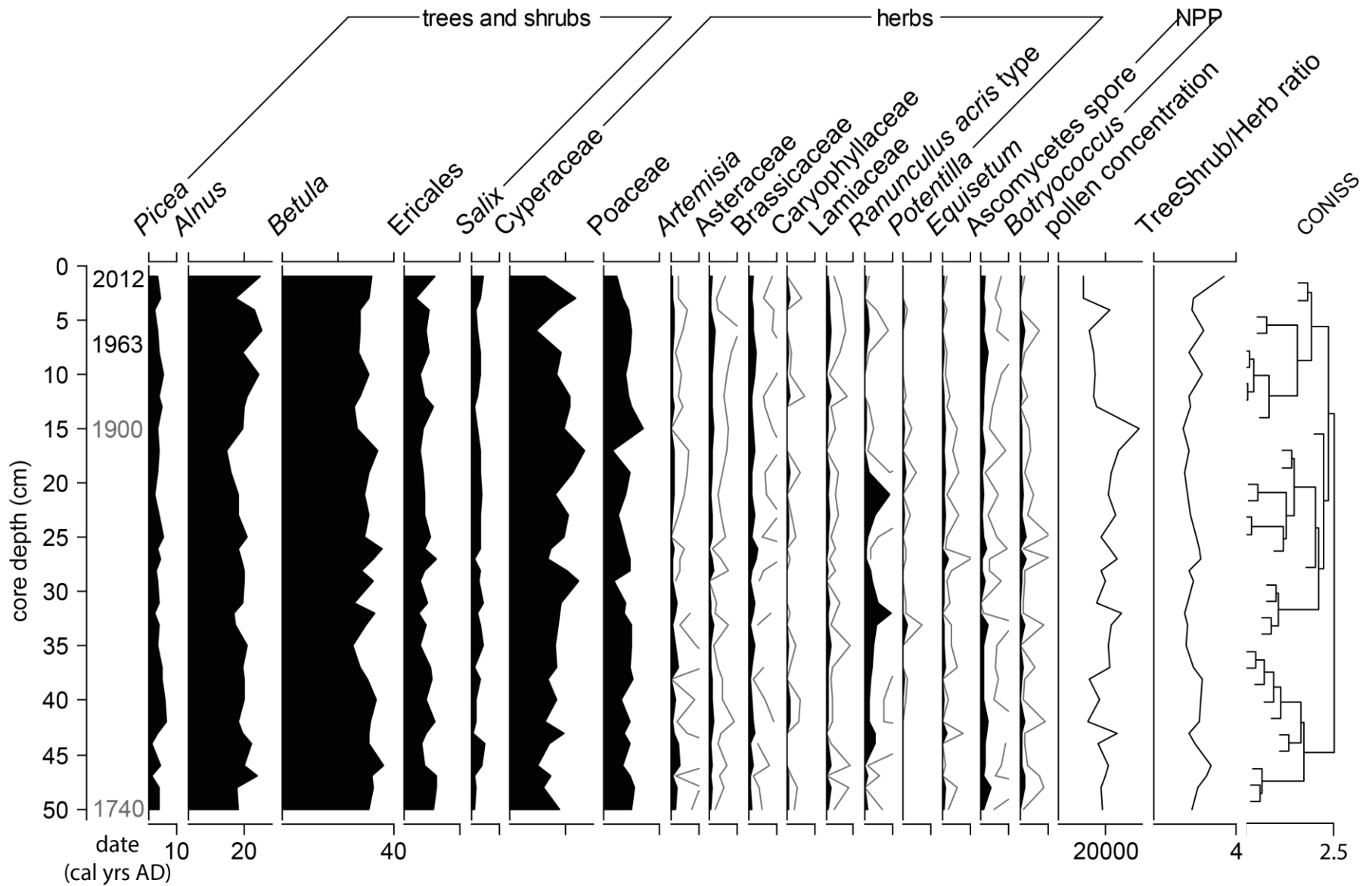
# Methods



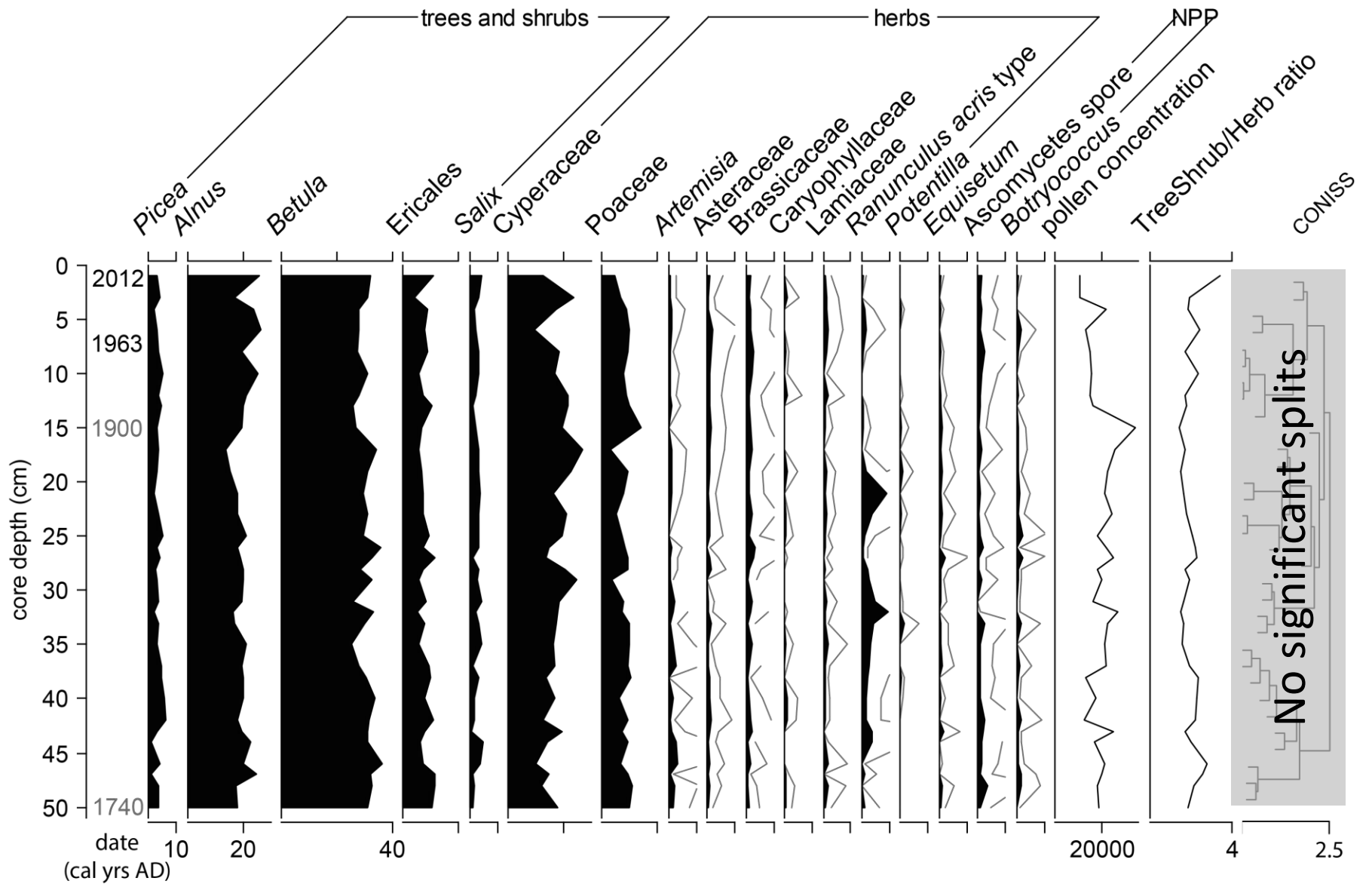
Lake sediment short  
core (49 cm)

- Biogeochemistry: TC, TOC, TN,  $\delta^{13}\text{C}$
- Grain size distribution
- Geochronology:  
 $^{210}\text{Pb}/^{137}\text{Cs}$ , AMS  $^{14}\text{C}$
- **Pollen**

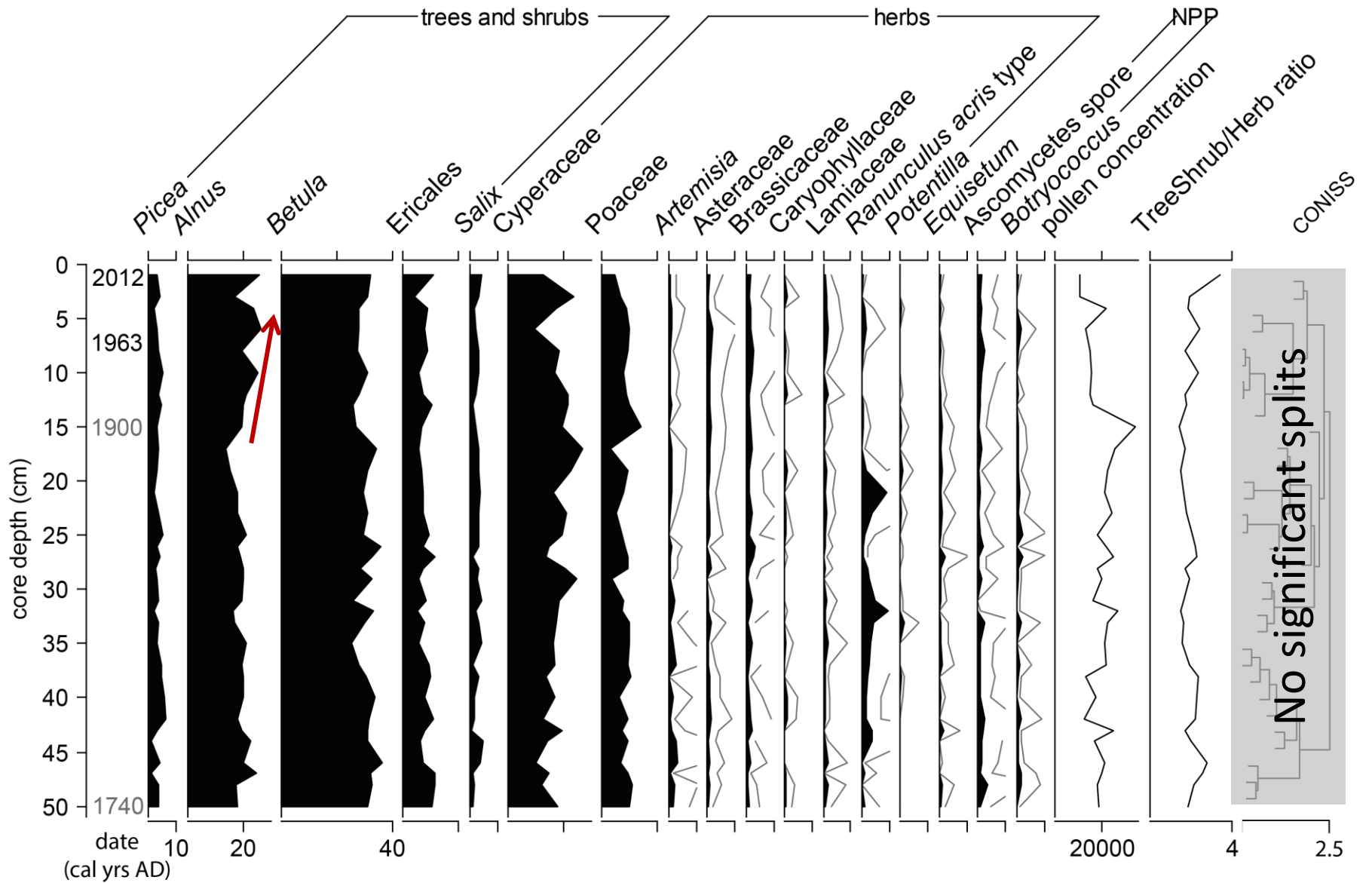
# Results



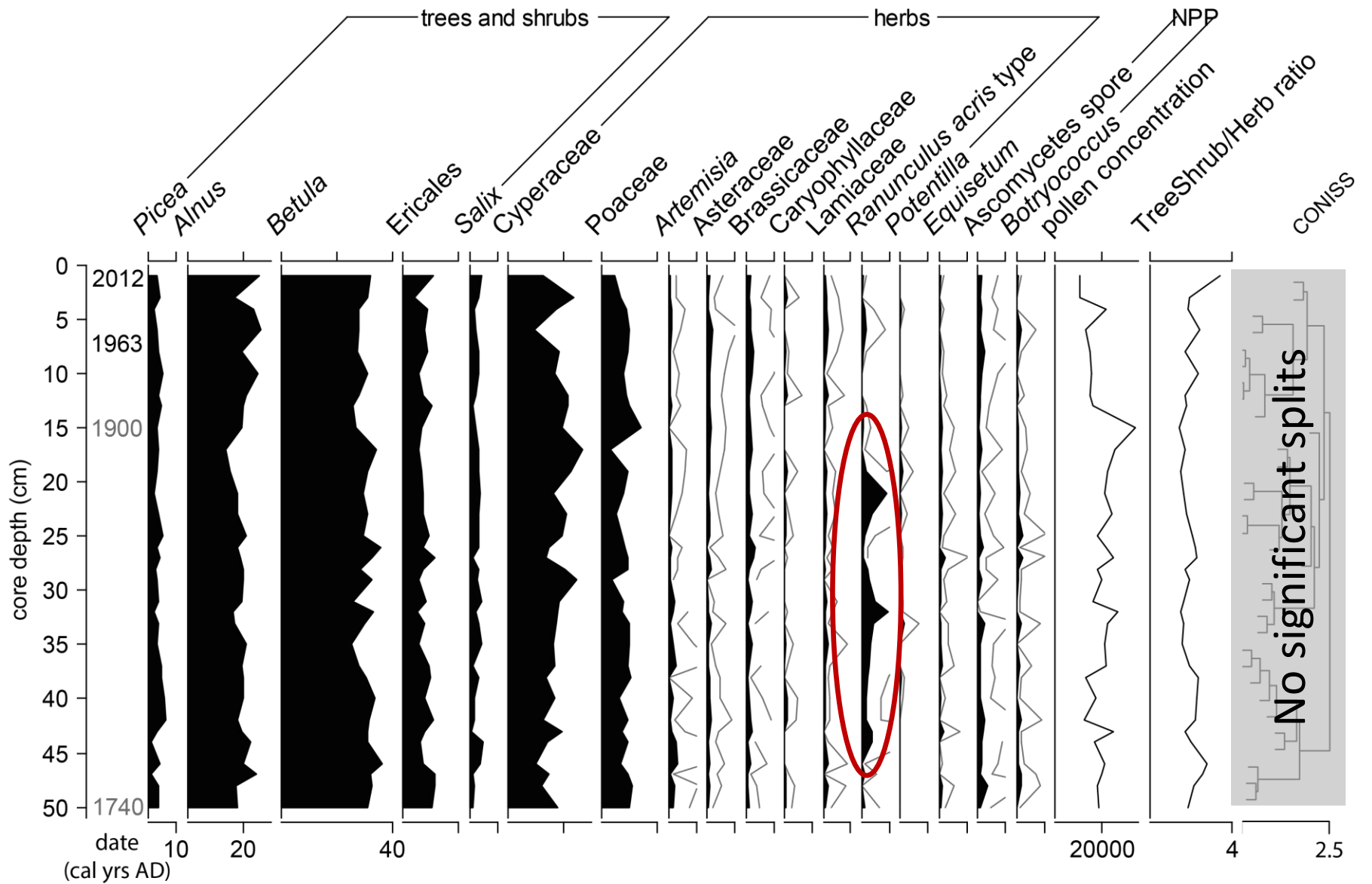
# Results



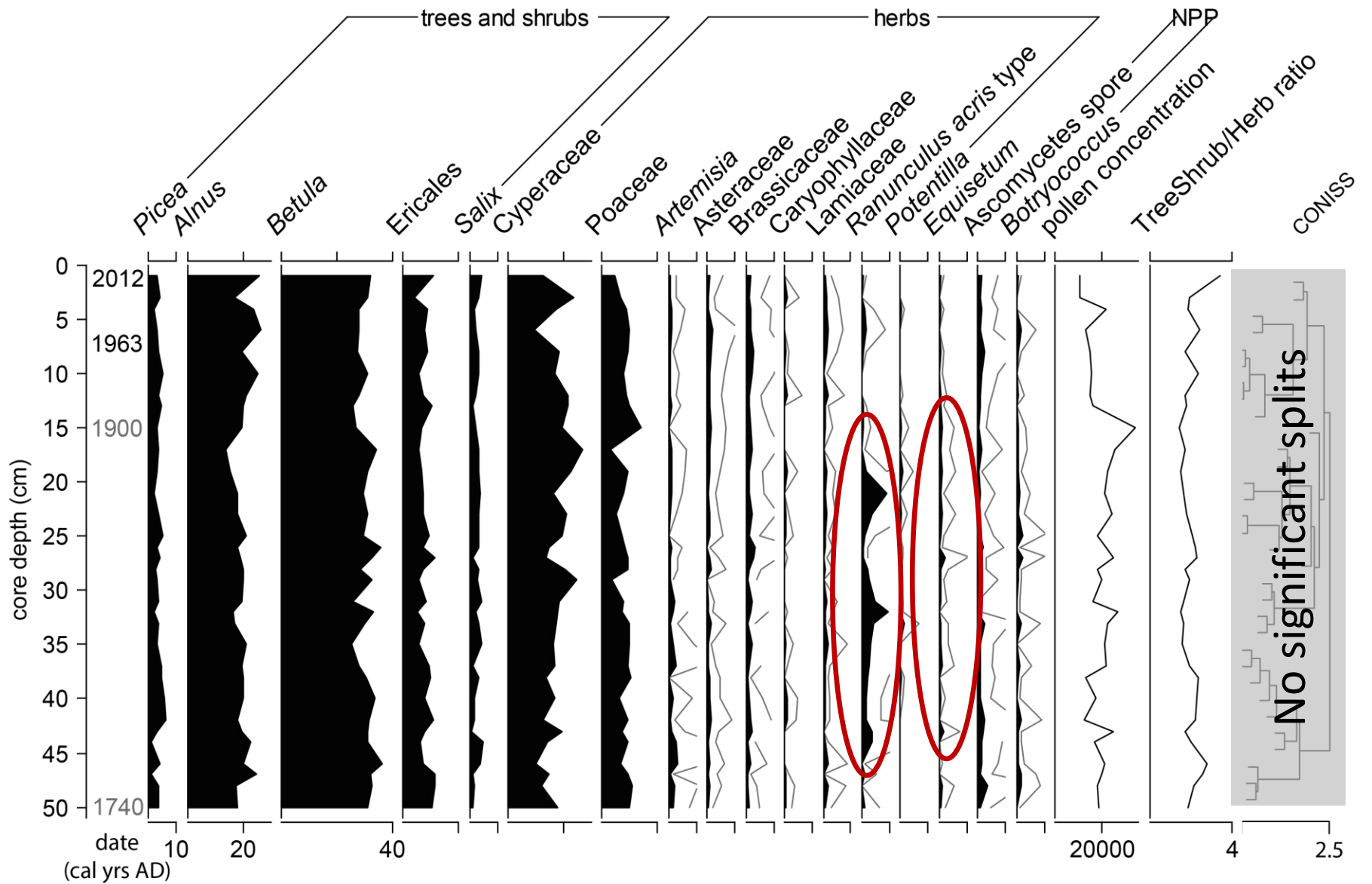
# Results



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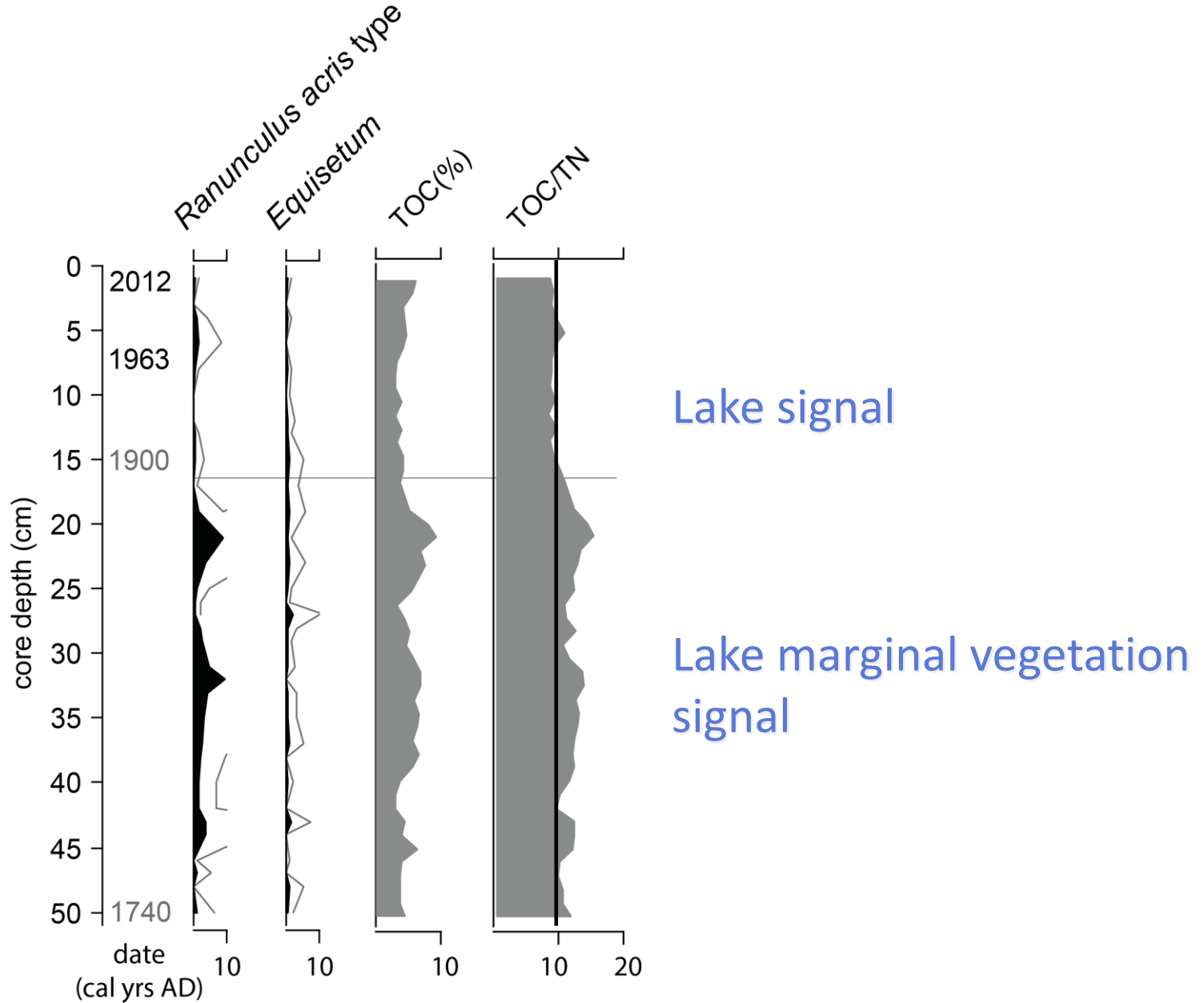


# Results



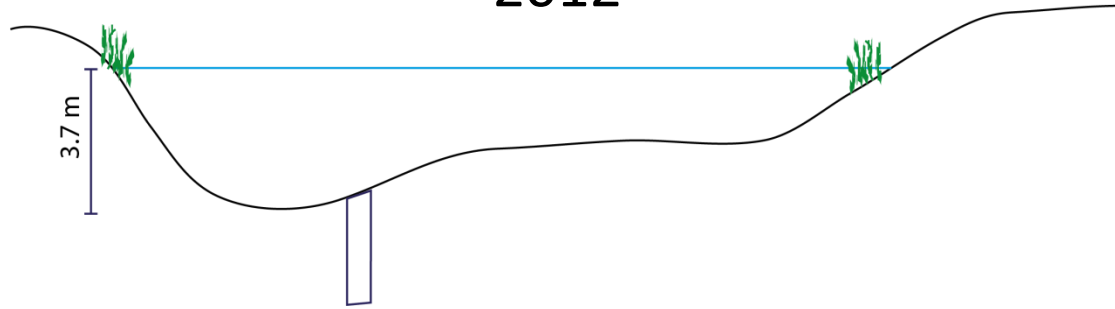


# Results



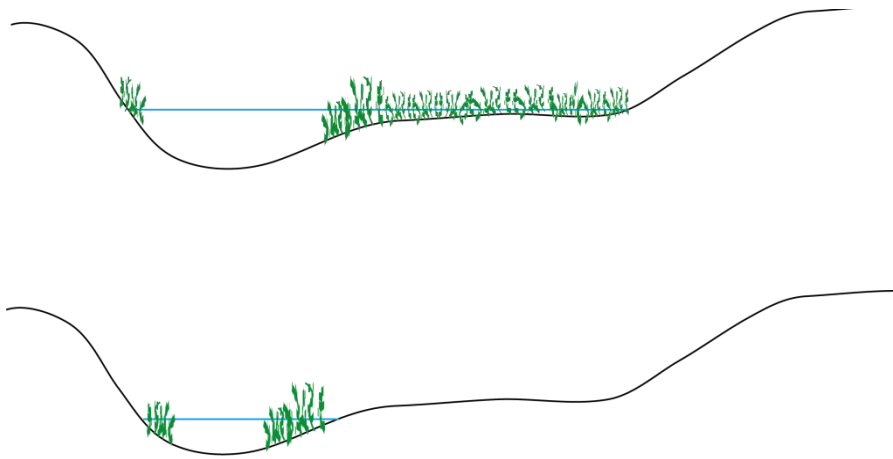
# Results – oscillating lake water level

2012

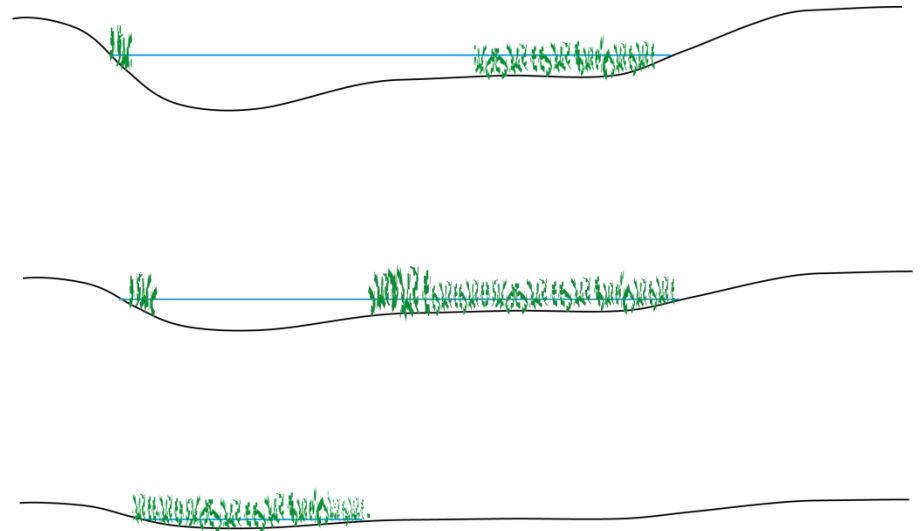


Pre 1900

Change in water level  
(draining and refilling)

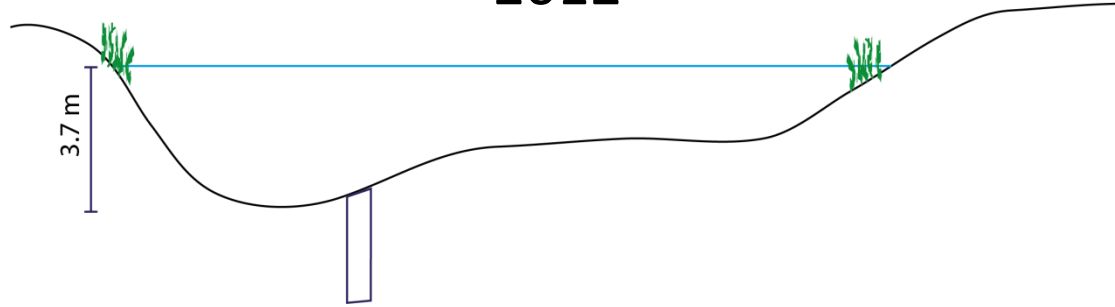


Change in basin depth  
(thermokarst)



# Results – oscillating lake water level

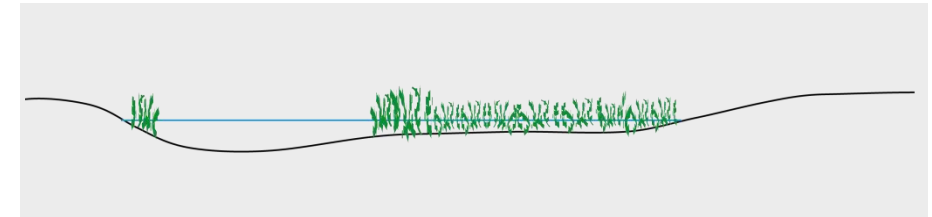
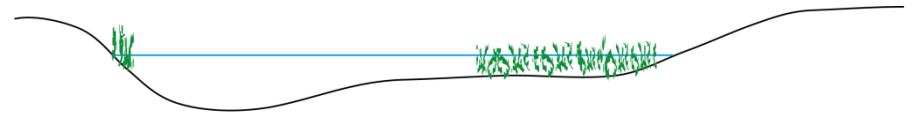
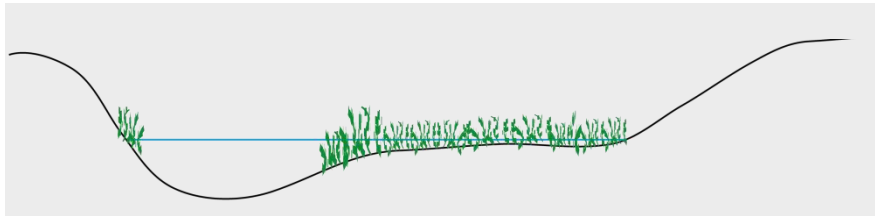
2012



Pre 1900

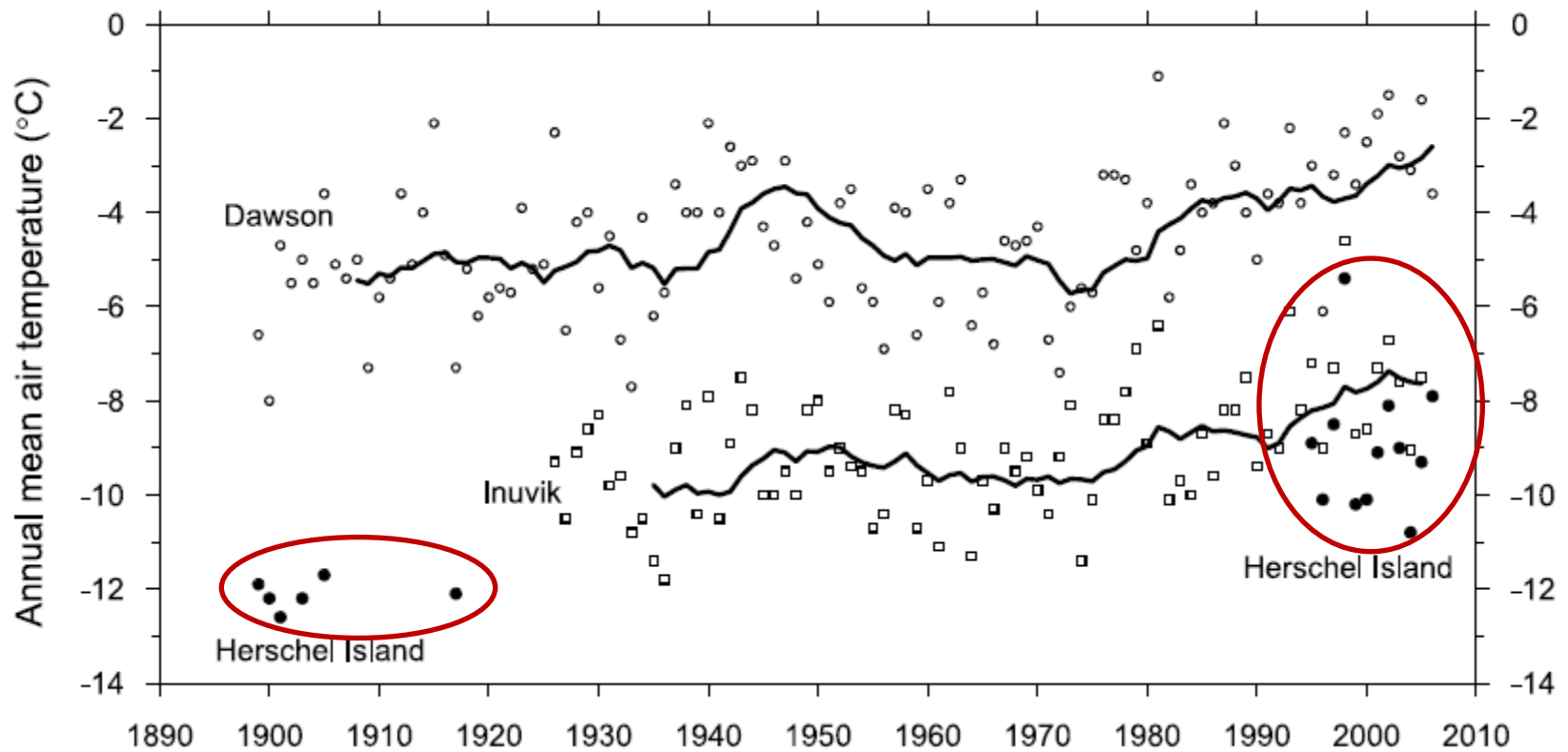
Change in water level  
(draining and refilling)

Change in basin depth  
(thermokarst)



 **Little Ice Age ?**

 **Recent warming?**



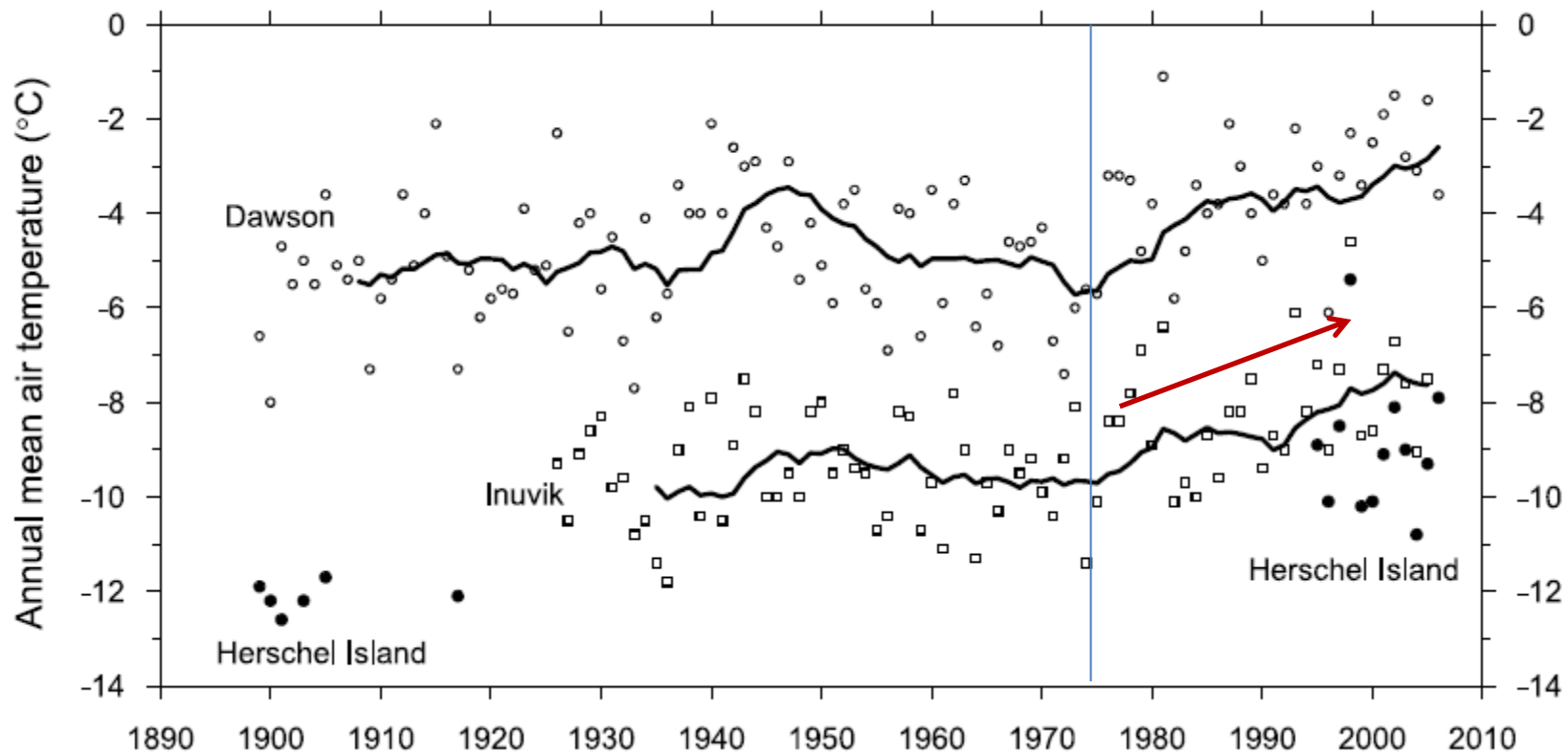
Burn and Zhang 2009

## Herschel Island (Yukon Coast)

1899-1905 compared to 1999-2005:

MAAT **+2.6°C**

MJanT **+5.8°C**



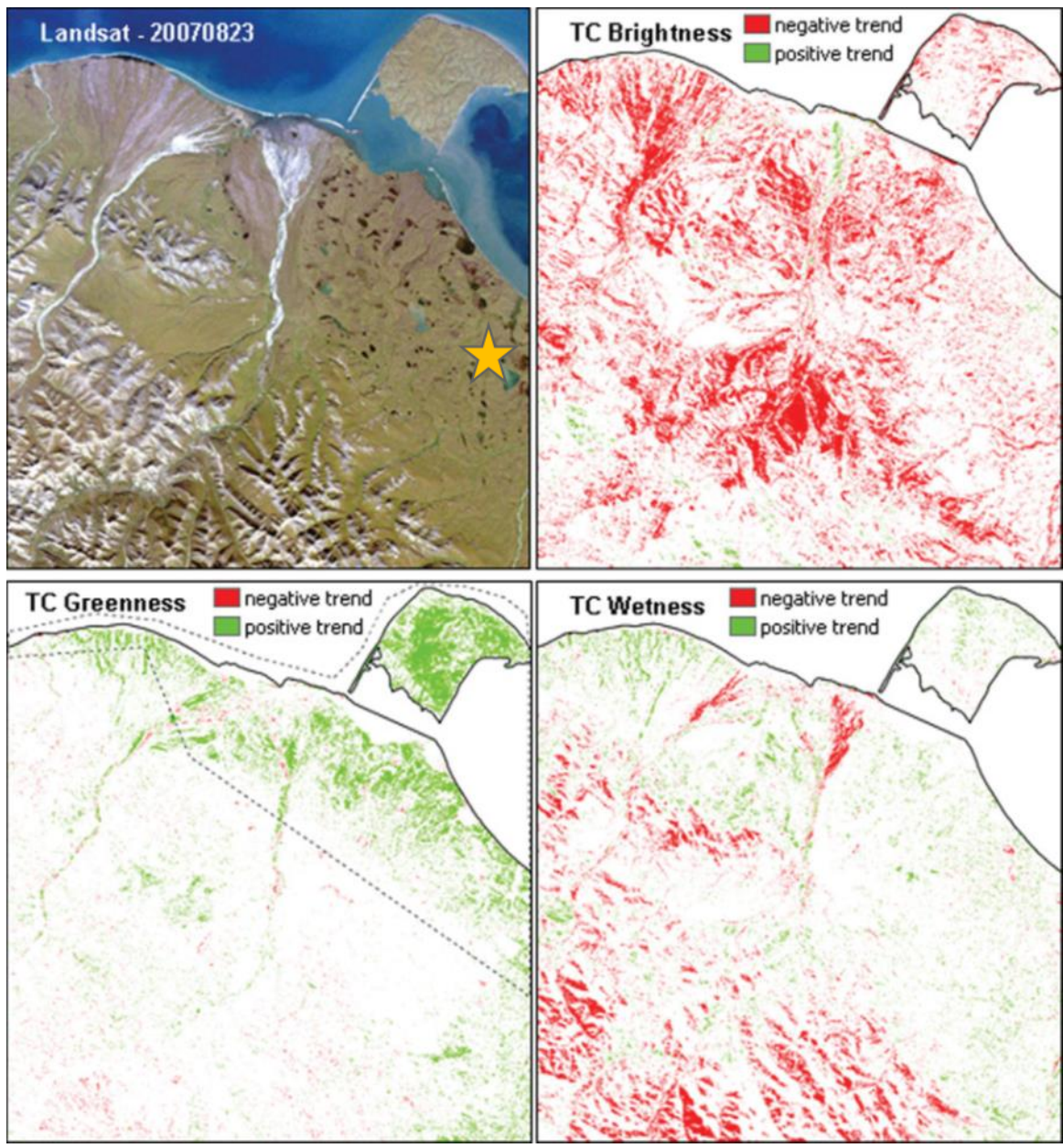
Burn and Zhang 2009

## Herschel Island (Yukon Coast)

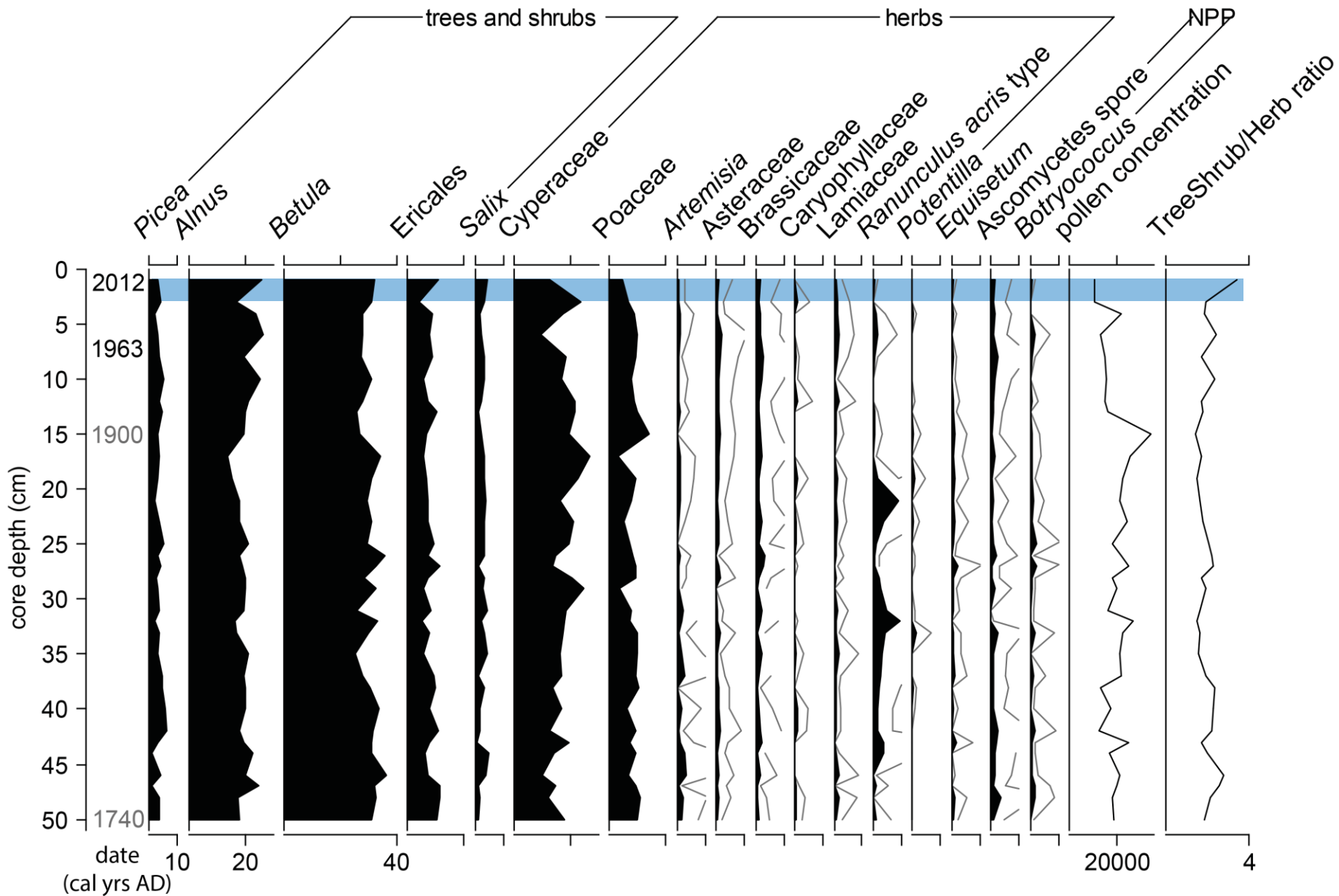
1899-1905 compared to 1999-2005:

MAAT **+2.6°C**

MJanT **+5.8°C**



Fraser et al. 2012





# Conclusions

- No regional vegetation change during the last 300 years
- Slight increase in *Alnus* pollen in the last century – approaching *Alnus* shrubline
- Local hydrological change: lower and variable lake water level pre 1900

Thank you for your attention!

