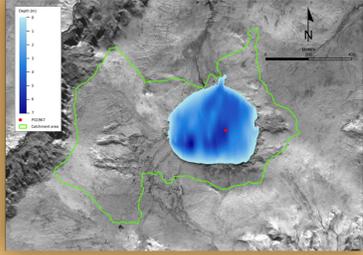


# Palaeoecological implications from an 11,500 year old thermokarst lake in Northwest Canada (Herschel Island, Yukon)

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## STUDY AREA AND SCIENTIFIC BACKGROUND



Bathymetry, catchment & core location of Lake Herschel (IKONOS satellite image, 2000)

Lake sediments are valuable archives to reconstruct past environmental and climate conditions. A 727 cm sediment record from a lake in the centre of Herschel Island was recovered in order to gain insights into a dynamic periglacial system.

Herschel Island itself is of outstanding scientific interest since it is part of a push moraine at the westernmost edge of the Wisconsin Glaciation in Canada. A Holocene environmental record is now supplemented by palynological and micropaleontological results.



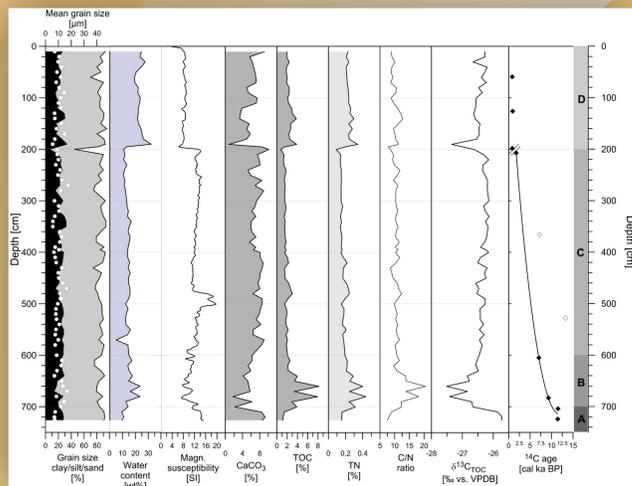
Aerial photo of Lake Herschel (2010)



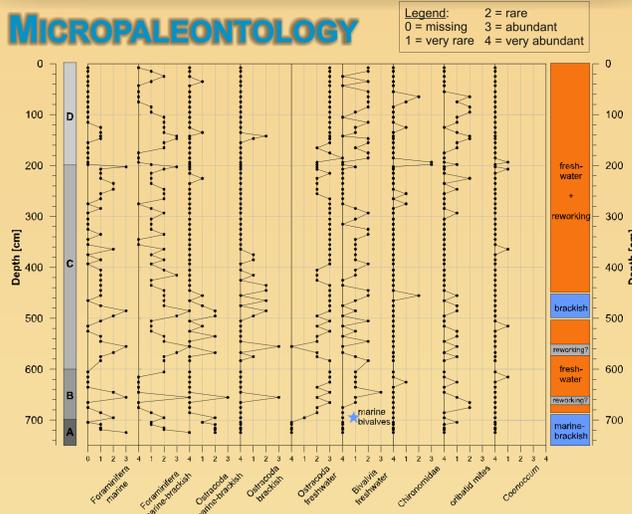
Study area

## Thermokarst dynamics, Paleolimnology, Holocene Thermal Maximum, Ostracods, Pollen

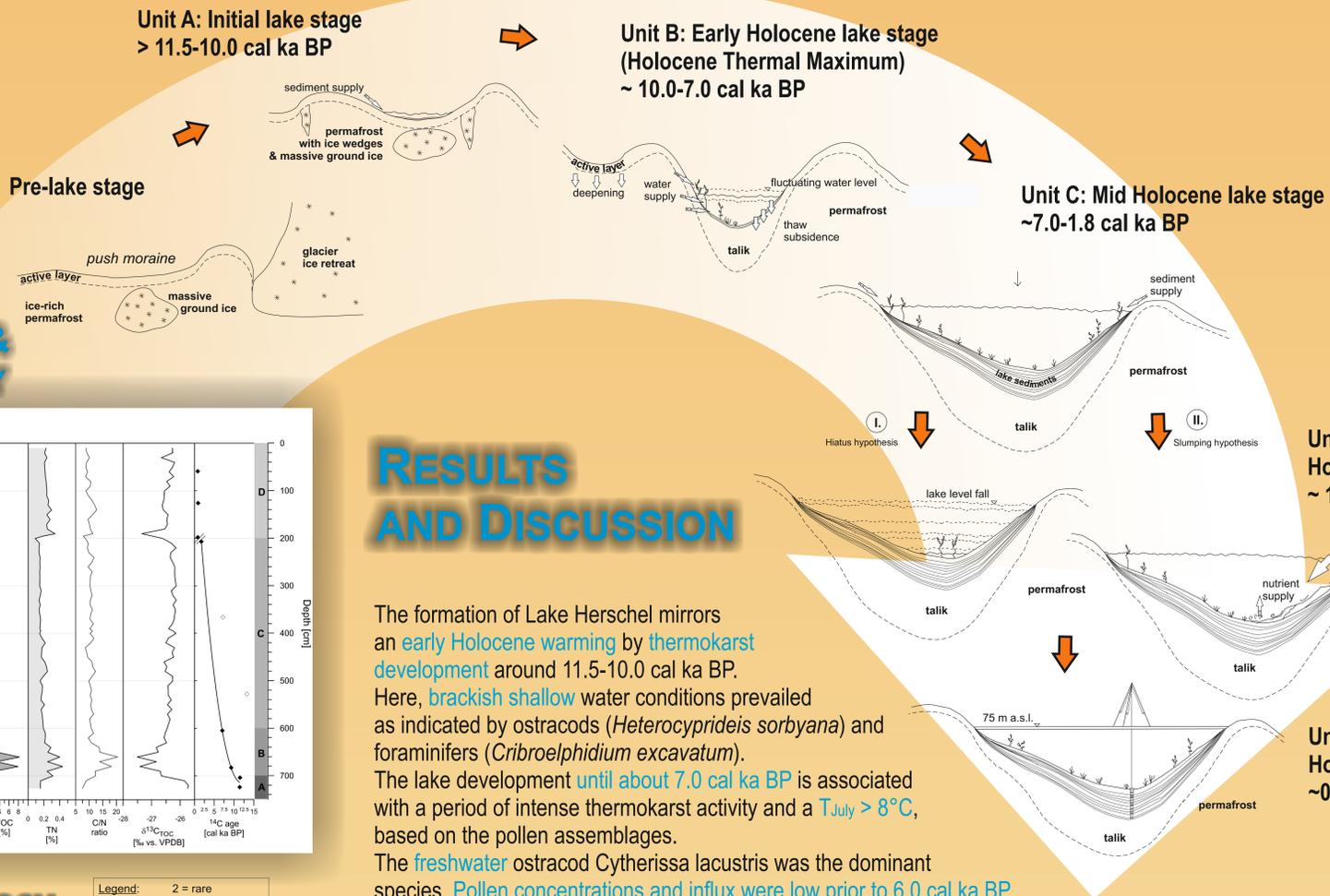
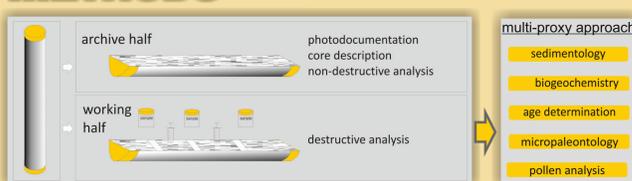
### SEDIMENTOLOGY & BIOGEOCHEMISTRY



### MICROPALEONTOLOGY



### METHODS

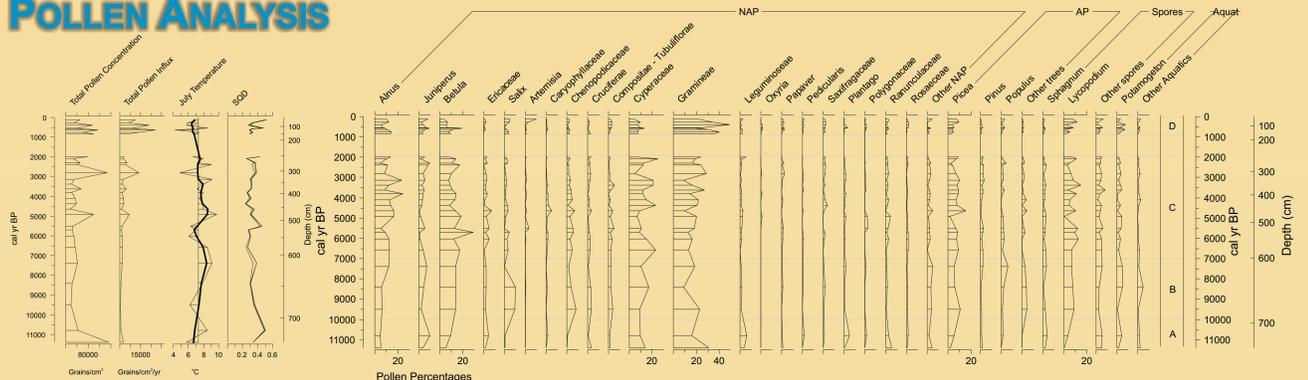


## RESULTS AND DISCUSSION

The formation of Lake Herschel mirrors an **early Holocene warming** by **thermokarst development** around 11.5-10.0 cal ka BP. Here, **brackish shallow** water conditions prevailed as indicated by ostracods (*Heterocyprideis sorbyana*) and foraminifers (*Cribolephidium excavatum*). The lake development **until about 7.0 cal ka BP** is associated with a period of intense thermokarst activity and a **T<sub>July</sub> > 8°C**, based on the pollen assemblages. The **freshwater** ostracod *Cytherissa lacustris* was the dominant species. **Pollen concentrations and influx were low** prior to 6.0 cal ka BP and subsequently increased.

The ostracod association became more **diverse in the mid-Holocene**; *Fabaeformiscandona levanderi* is the dominant species besides *C. lacustris*. **Poaceae pollen increased** in sediments younger than 3.0 cal ka BP and **Cyperaceae pollen decreased after 1.8 cal ka BP**. Pollen from several shrubs were found in relatively high quantities, including *Alnus*, *Juniperus* and *Betula*; only the latter is found on Herschel Island in the recent tundra environment and the pollen of the others are presumably transported from the adjacent continent. The ostracod associations show a **persistent lake with high input of allochthonous material** and possibly elevated salinity. A change in the sedimentation rate between 1.8 to 0.9 cal ka BP is explained either by a hiatus due to modified drainage conditions or slumping. **Bioproductivity increased**, as shown by a richer fauna (Chironomidae). Foraminifers are abundant and occur together with fresh and brackish water ostracods reflecting elevated salinity. The final **late-Holocene phase**, beginning by 0.9 cal ka BP, was characterized a **poorer ostracod fauna and disappearance of foraminifers**, as well as pollen-based **T<sub>July</sub> below 7°C**.

### POLLEN ANALYSIS



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