The Glaciolacustrine Sediment Record of Cariboo Lake, BC: Implications for Holocene Fluvial and Glacial Watershed Dynamics

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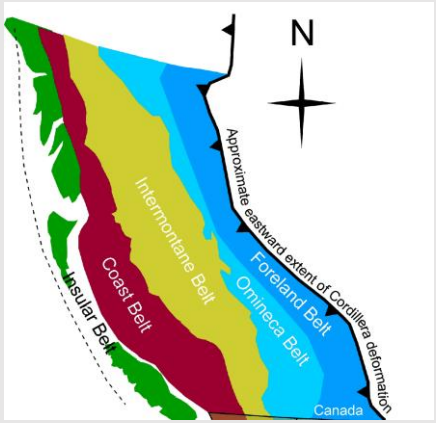
Background

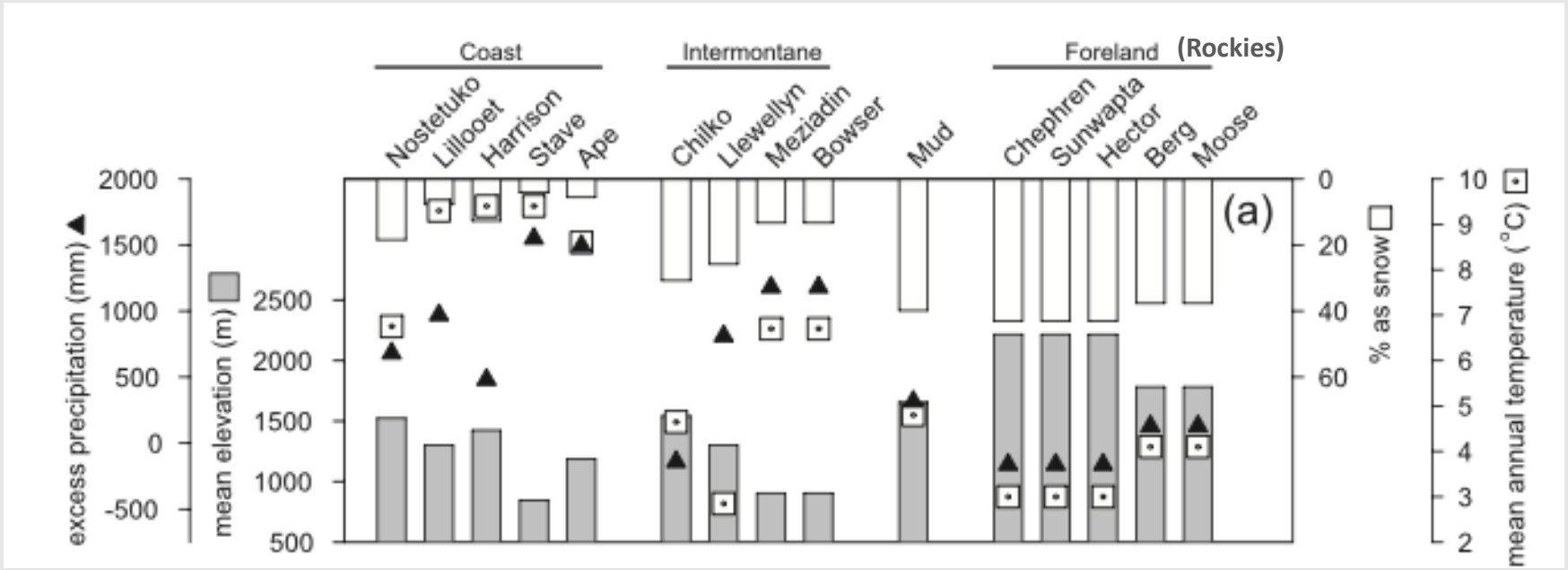
- Alpine environments & climate change
- Changes Include:
  - Volume & area of glacier extent
  - The production, connectivity, and delivery of sediment
- Environmental proxies in glaciated watersheds
  - Ice cores
  - Dating of material in glacier forefields
  - Glaciolacustrine sediment cores

Background

- Regional climate comparison of various glaciolacustrine sediment study sites



(Doughty et al., 1997)



(Hodder et al., 2006)

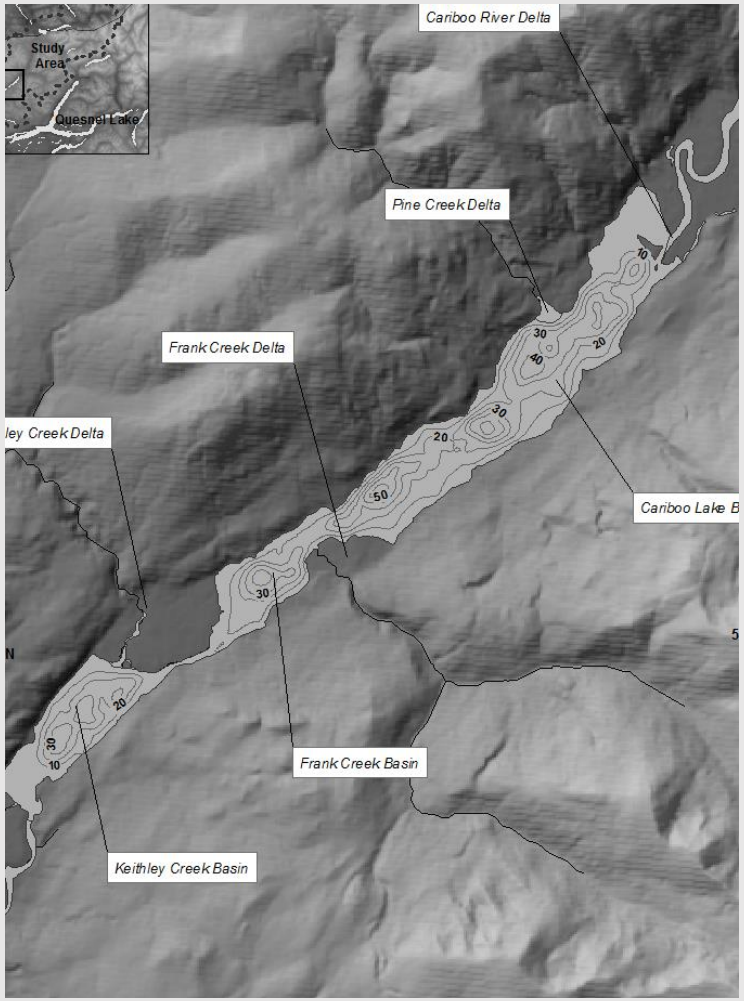
Purpose: To determine if the distal glacier-fed sediment record from Cariboo Lake provides a proxy of past geomorphic and hydroclimatic change

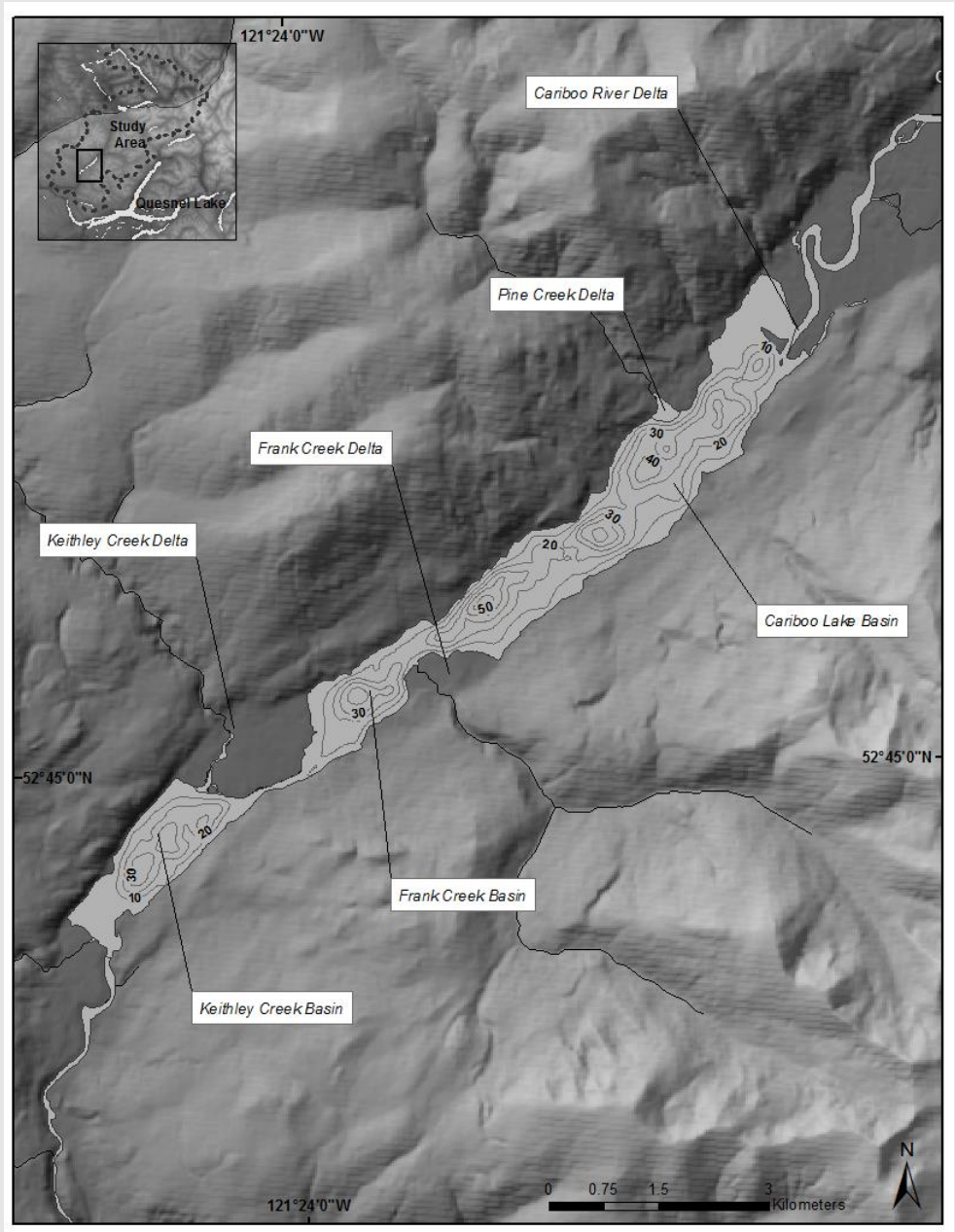
Objectives:

1. Determine the mechanisms that control the production, connection, and transport of sediment
2. Analyze the sediment record of Cariboo Lake and determine if it reflects changes in past watershed activity
3. Compare the Cariboo Lake sediment record to other regional climate proxies

Study Site

Cariboo Lake, British Columbia





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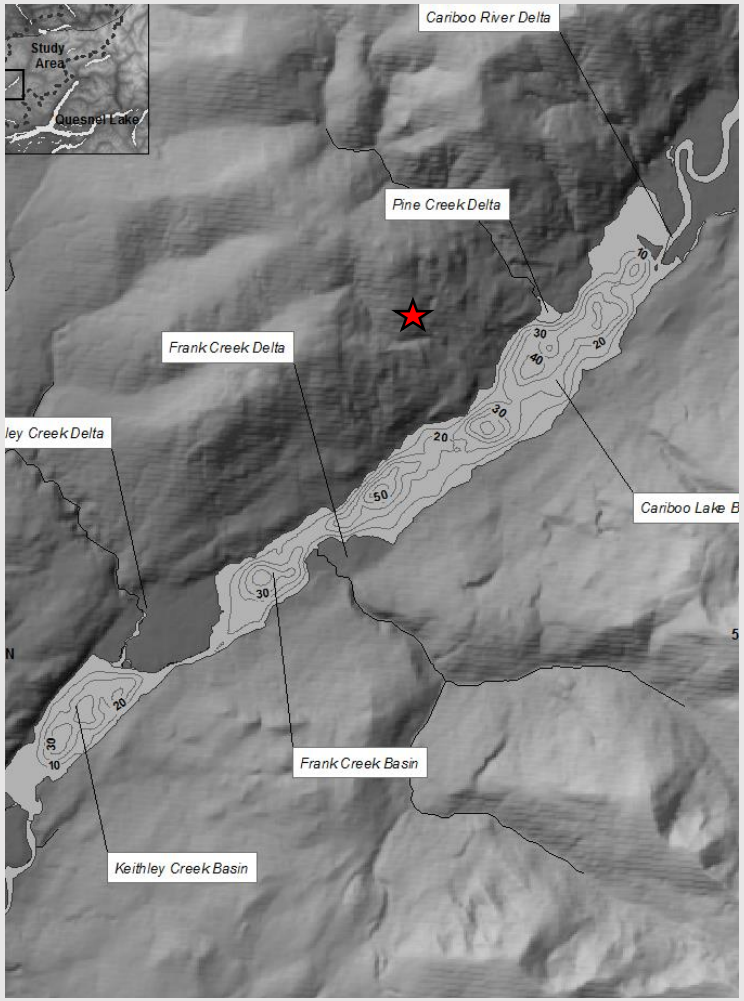

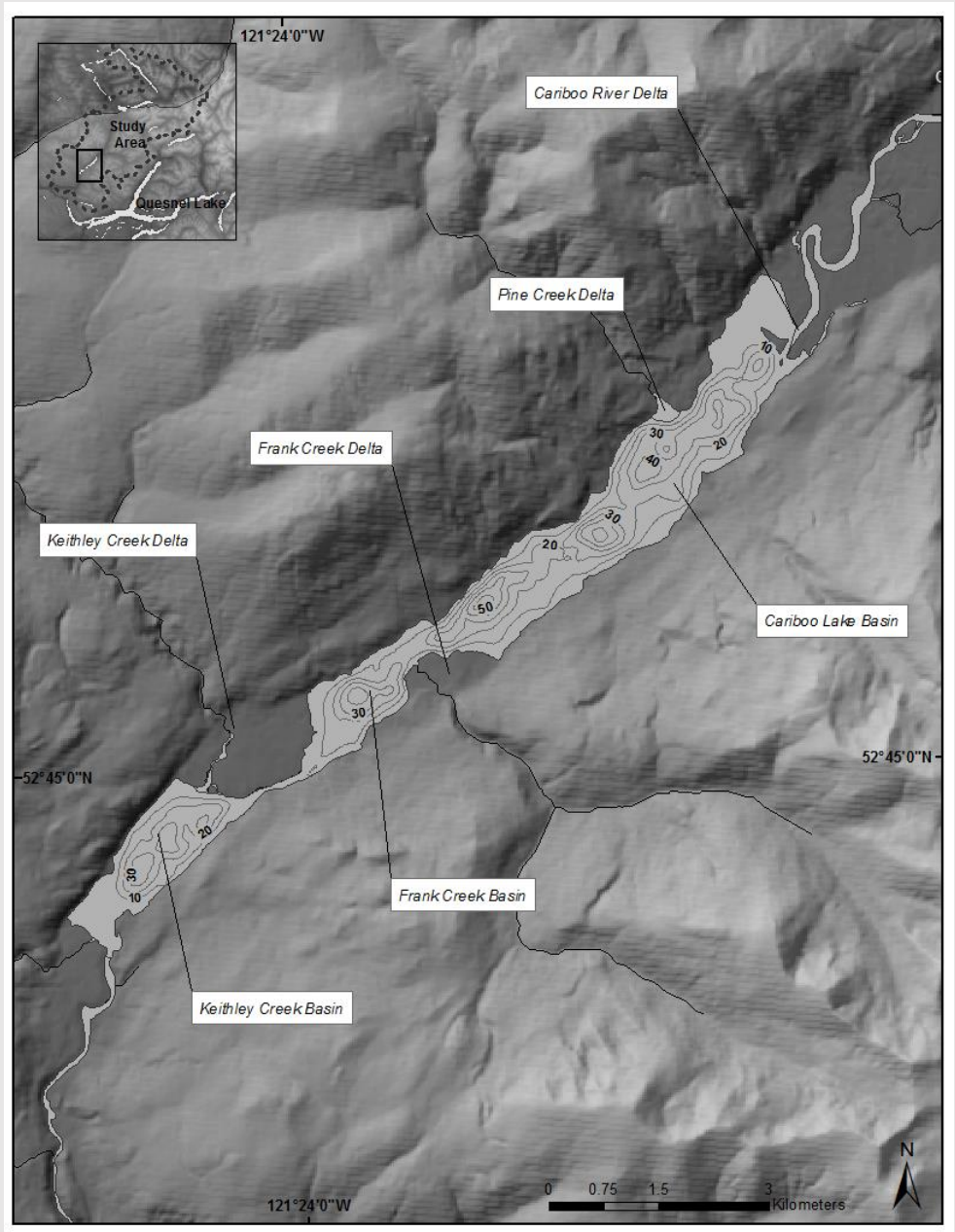

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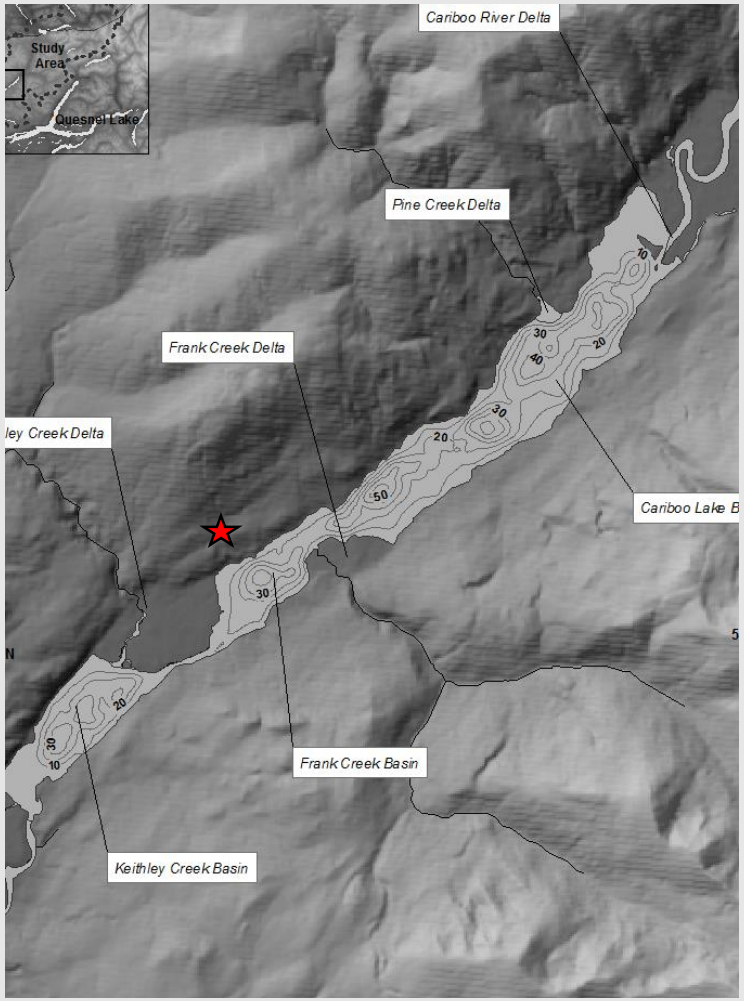

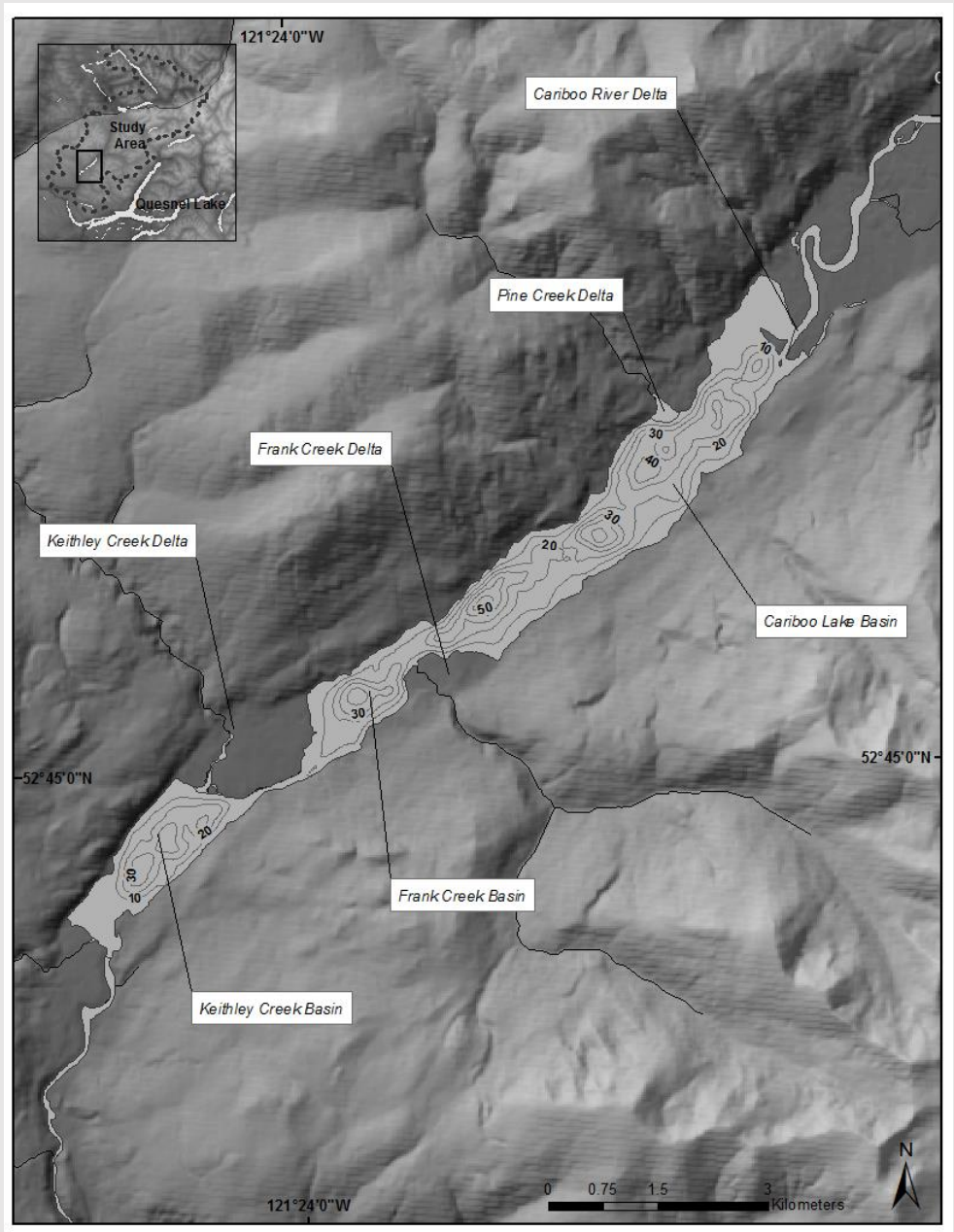

Methods

- Sub-Bottom Acoustic Survey

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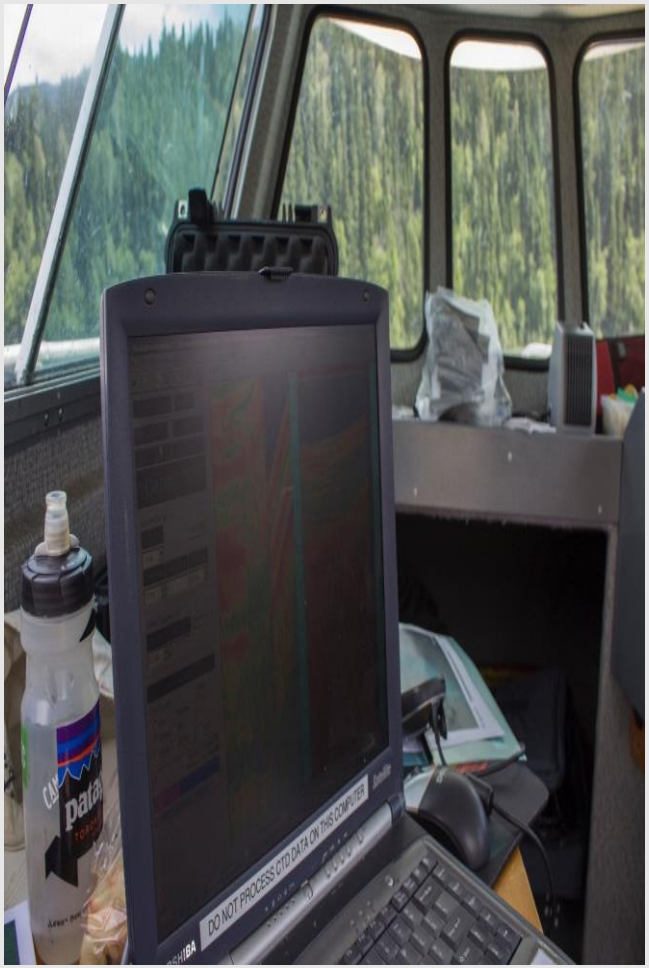
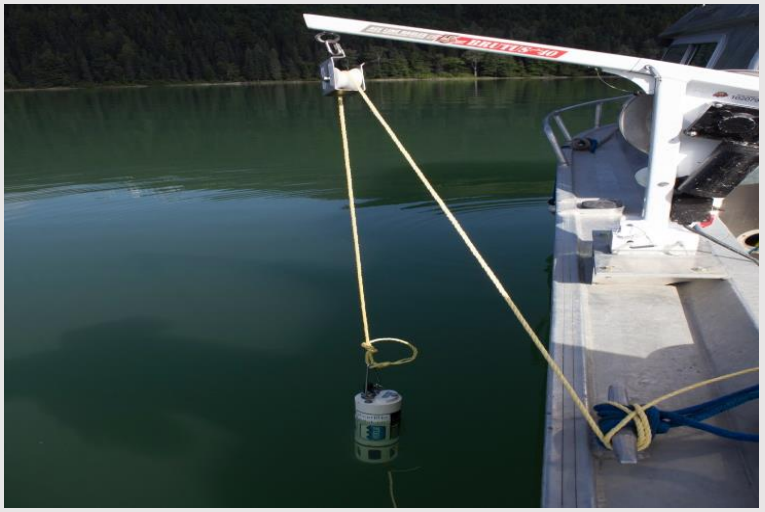
- CTD water column characteristics



Methods

- Sub-Bottom Acoustic Survey
- CTD water column characteristics
- 20 Ekman surficial cores (~10 cm length)
  - Laminae thickness measurements
  - Organic content
  - Sediment grain diameter
  - Provide a spatial record



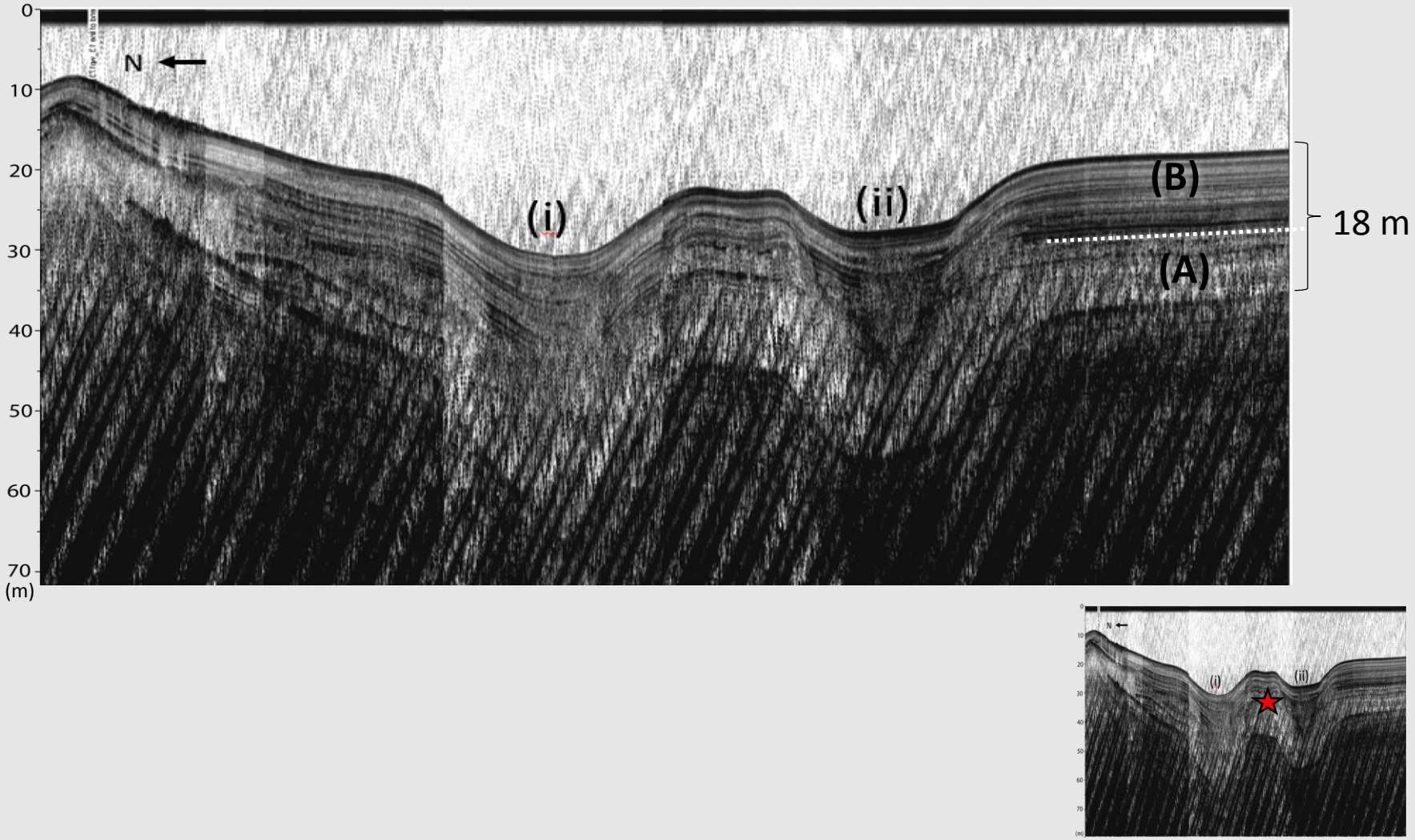
Methods

- Sub-Bottom Acoustic Survey
- CTD water column characteristics
- 20 Ekman dredge cores (~ 10 cm length)
  - Laminae thickness measurements
  - Organic content
  - Sediment grain diameter
  - Provide a spatial record
- 4 Vibrocores (~ 4 m length)
  - Laminae thickness measurements
  - Organic content
  - Sediment grain diameter
  - AMS radiocarbon analysis
  - Provide a temporal record

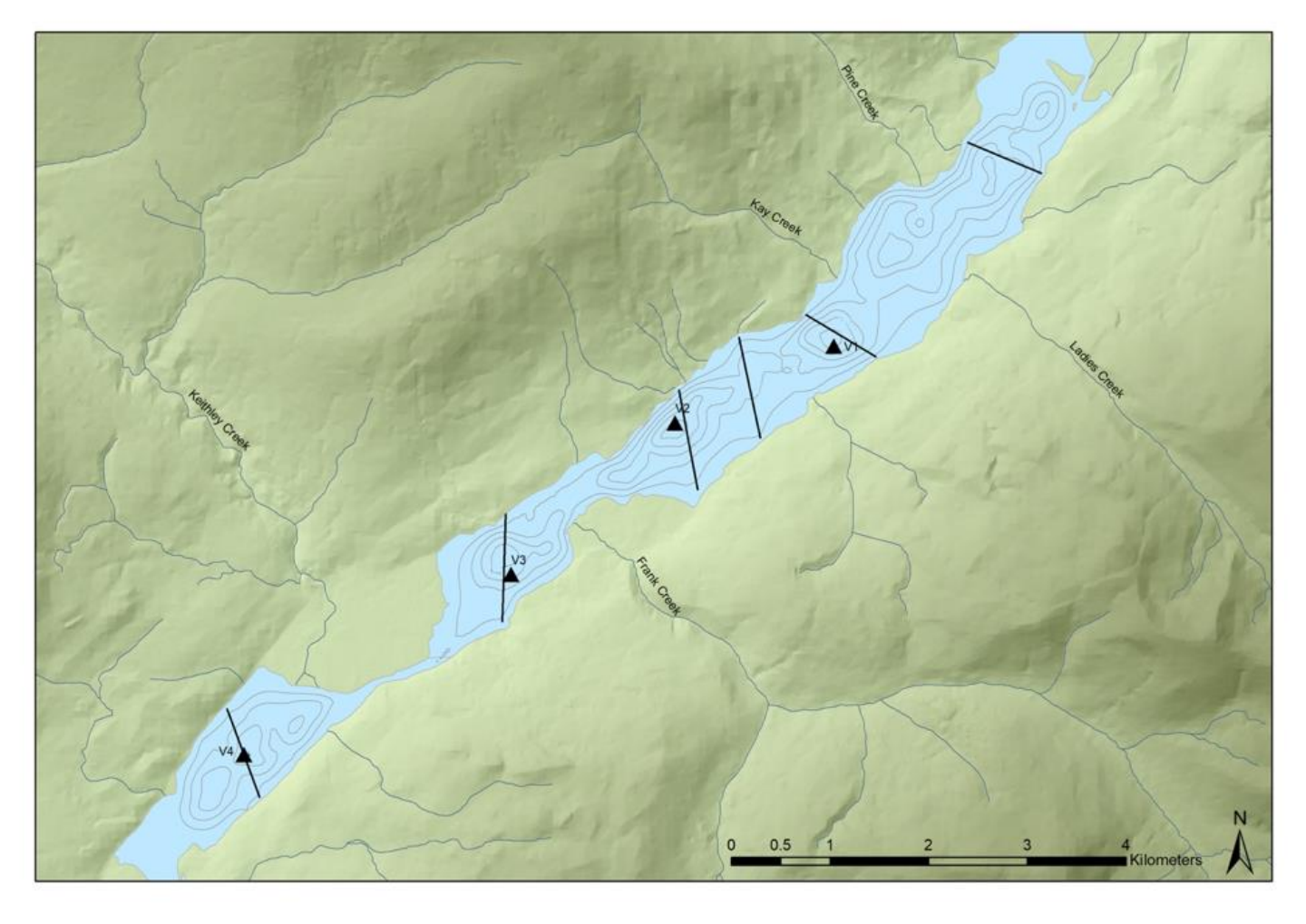
V2 – (96 – 166 cm)

Results: Sub-Bottom Acoustics Transects

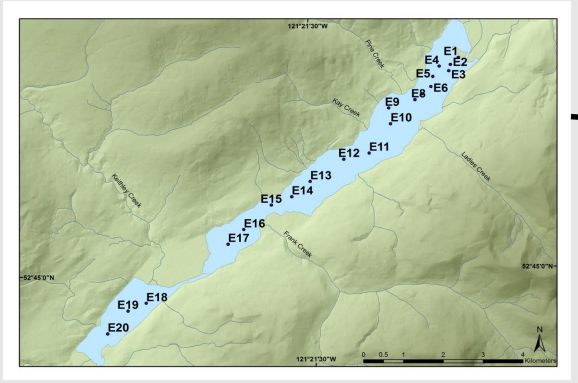
Sub-Bottom Acoustics: Transect C

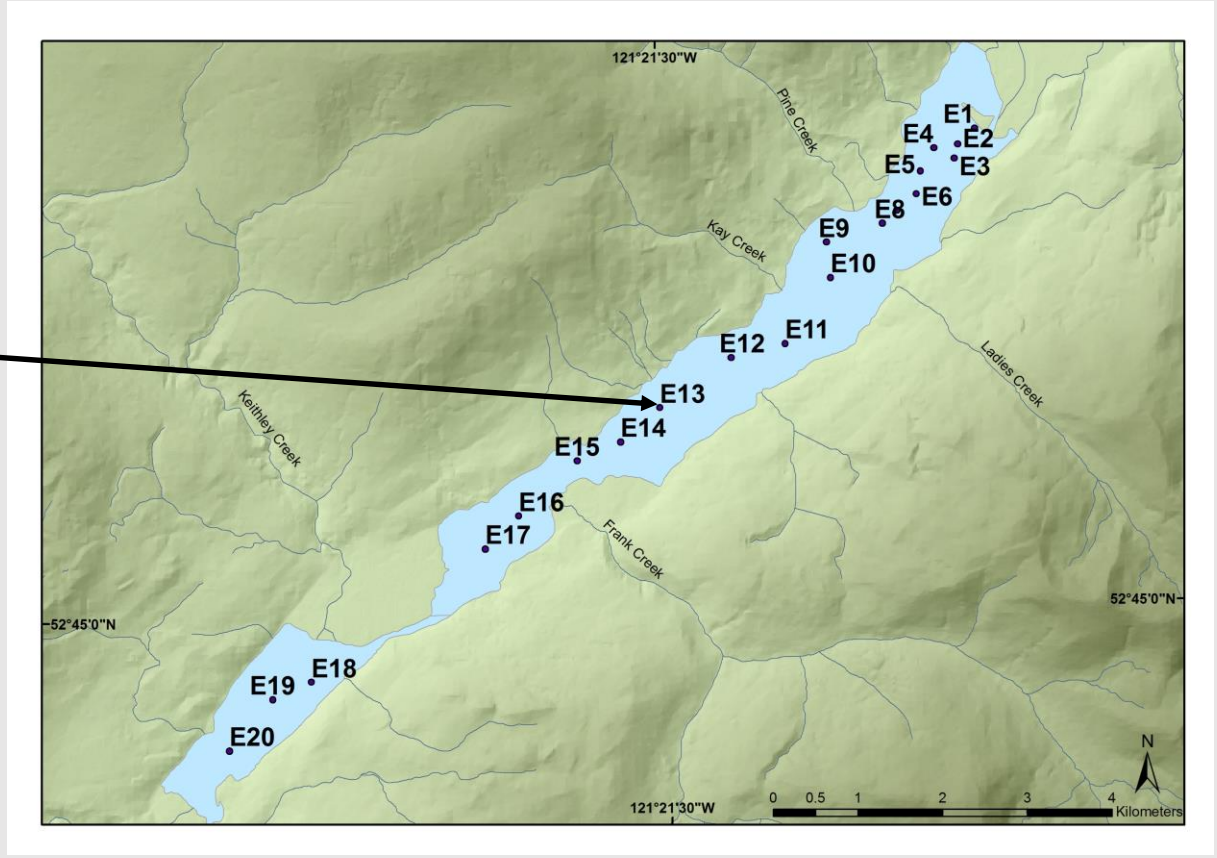


Sediment Thickness Map

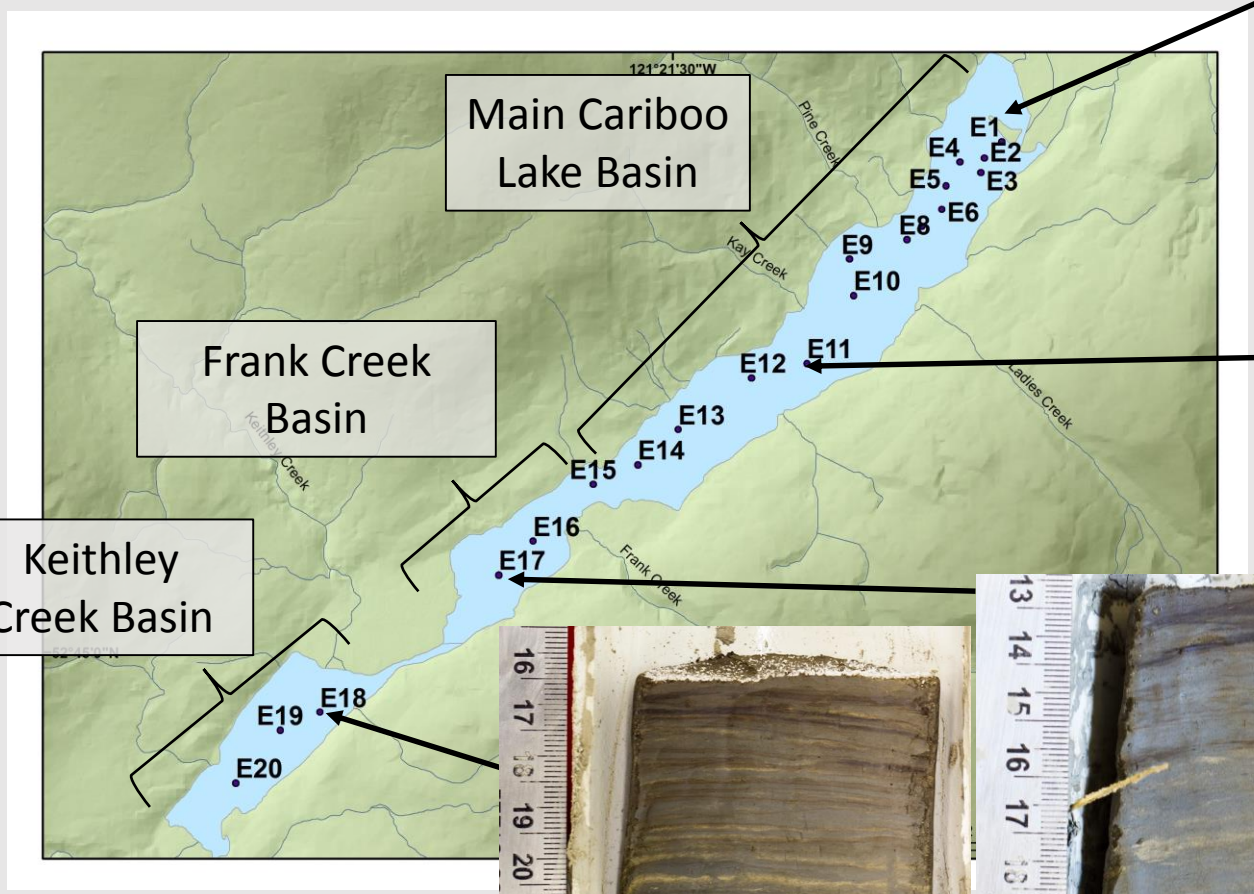


Ekman Surficial Sediment Record

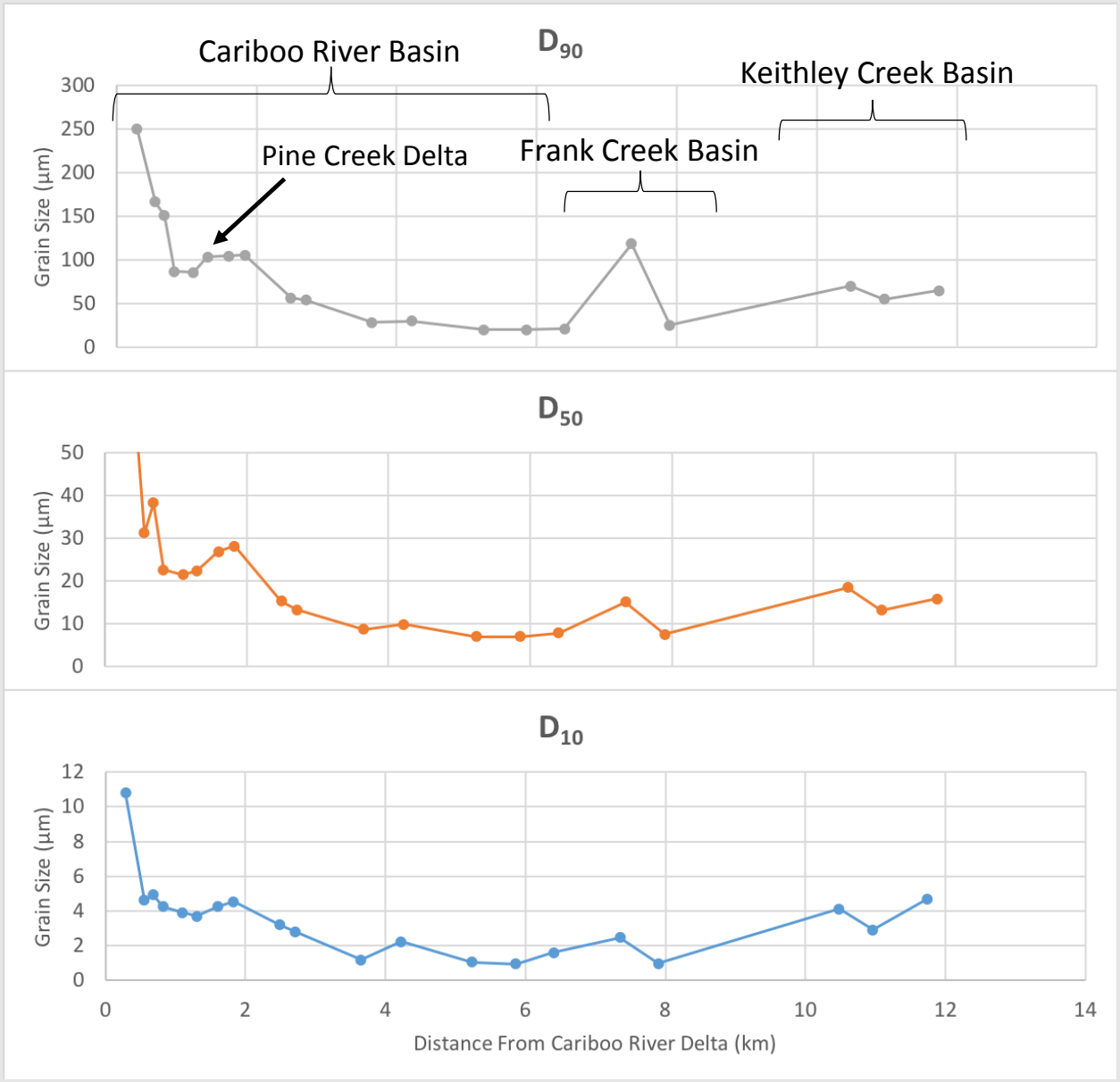




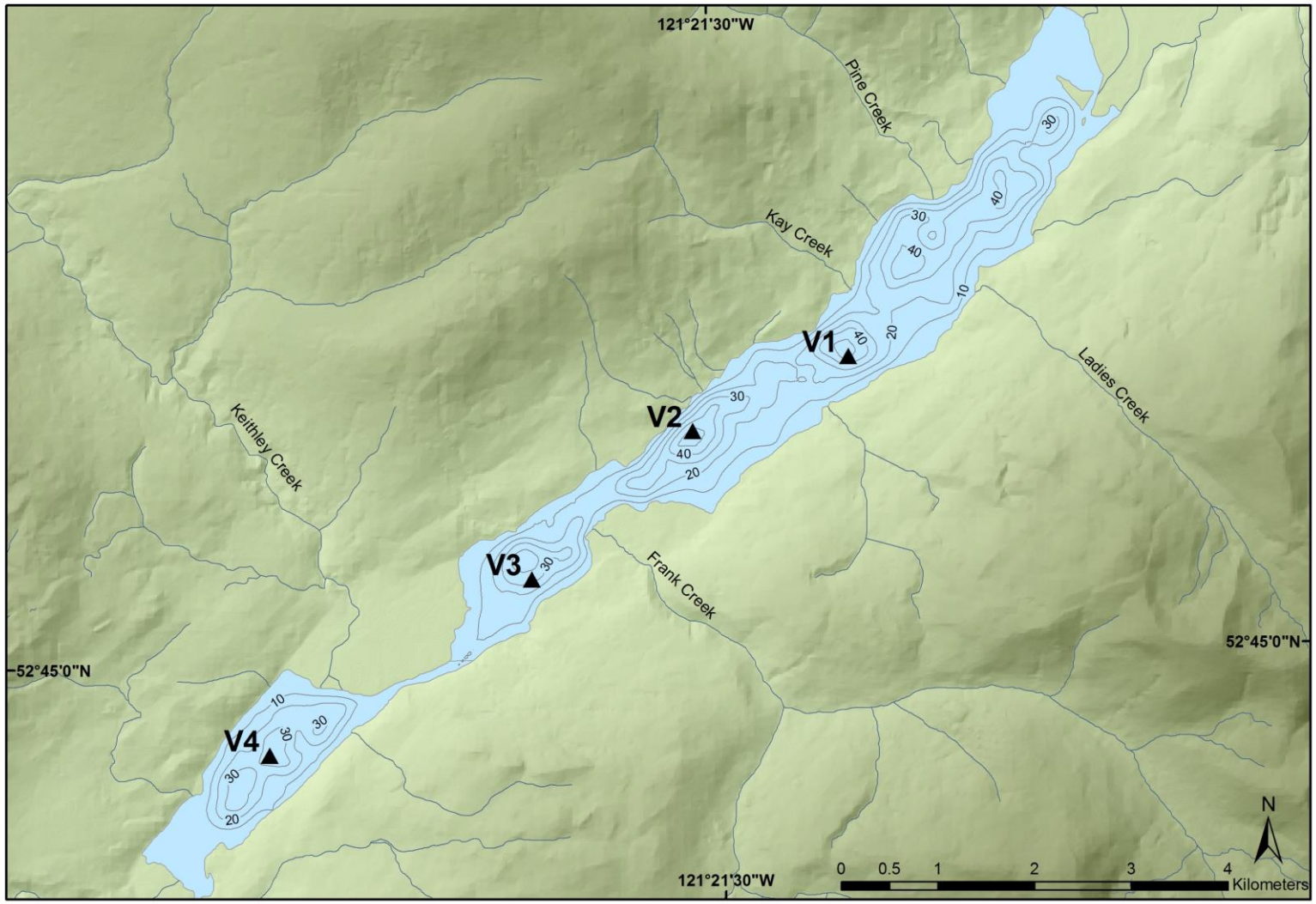
Ekman Cores


121°21'30"W
Main Cariboo Lake Basin
Frank Creek Basin
Keithley Creek Basin
Pine Creek
Kay Creek
Ladies Creek
Frank Creek
Keithley Creek
E1
E2
E3
E4
E5
E6
E8
E9
E10
E11
E12
E13
E14
E15
E16
E17
E18
E19
E20

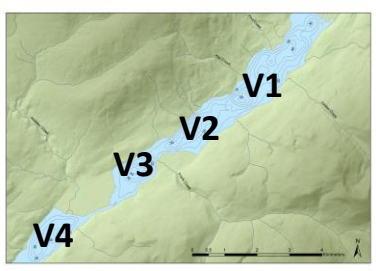
Ekman Grain Size Diameter



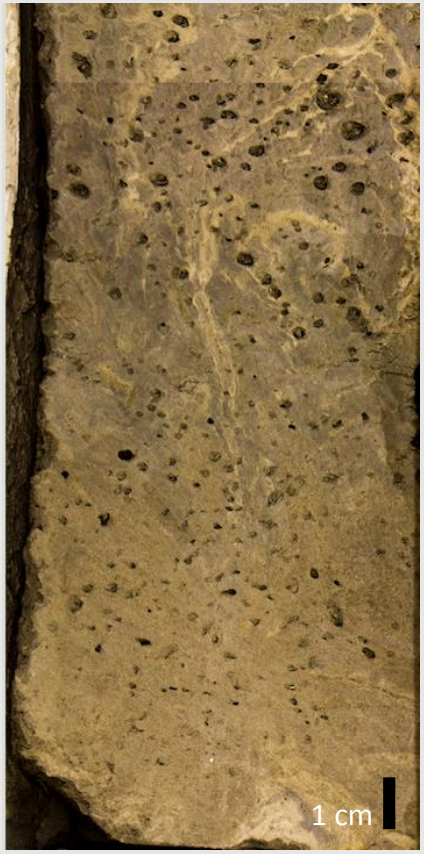
Vibro Core Location Map



Long Core Bottoms



V1

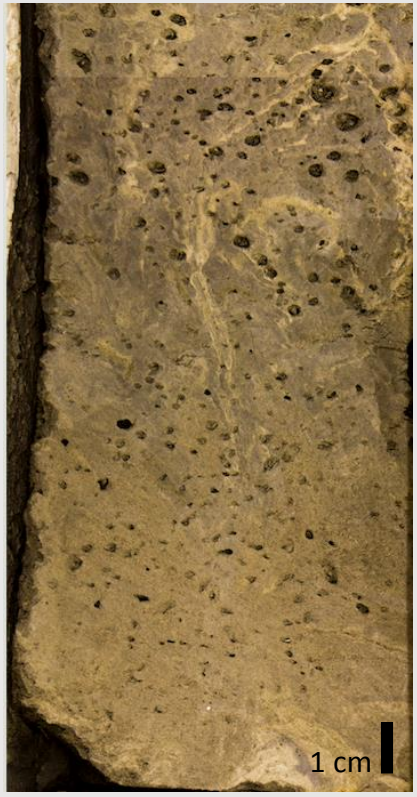


AD 450 - 525

V2

AD 150 - 200

V3



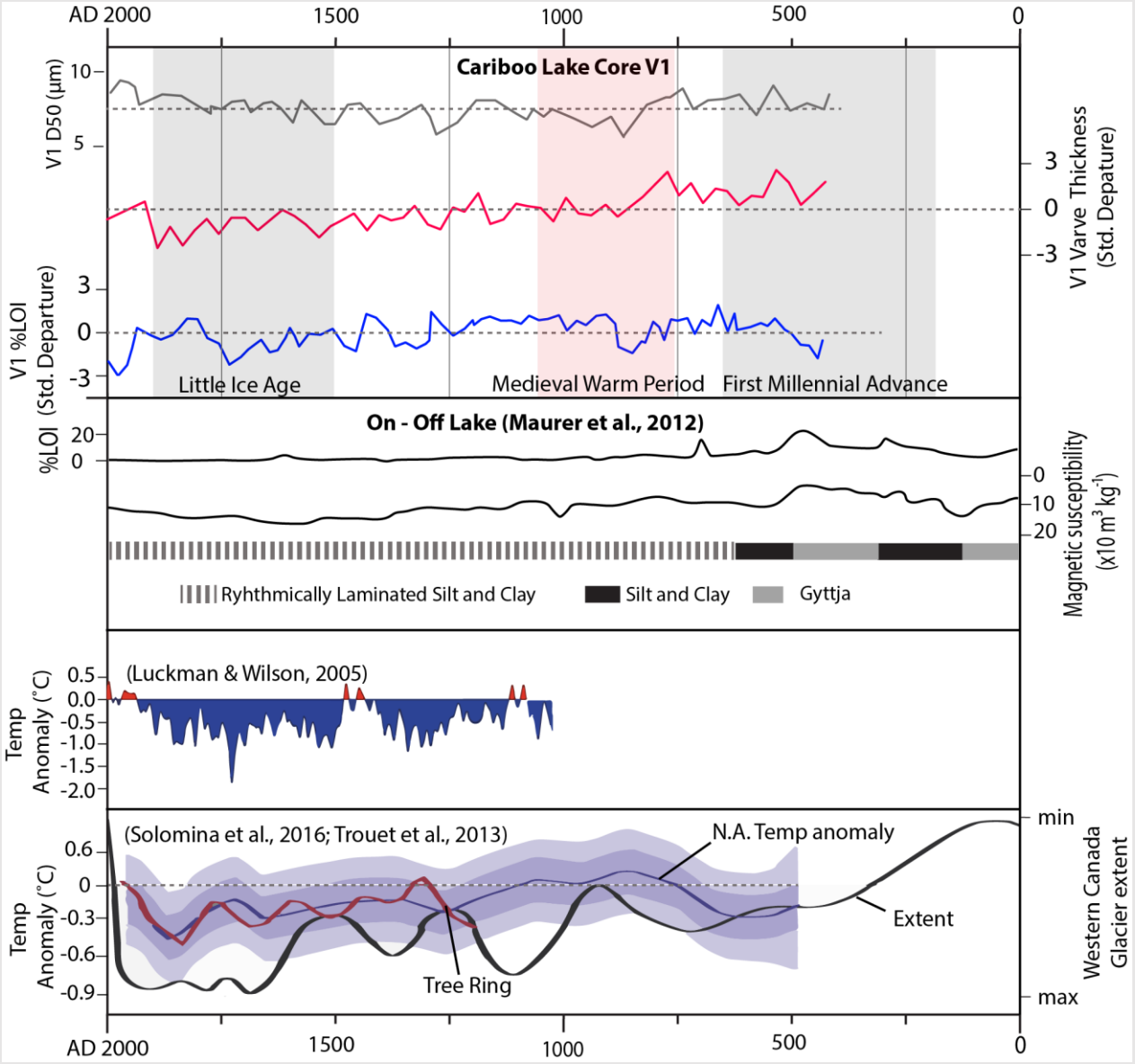
N. D.

V4

N. D.

Distance From Cariboo River Delta (km)			
3.75	5.50	7.55	10.75

Regional Comparison



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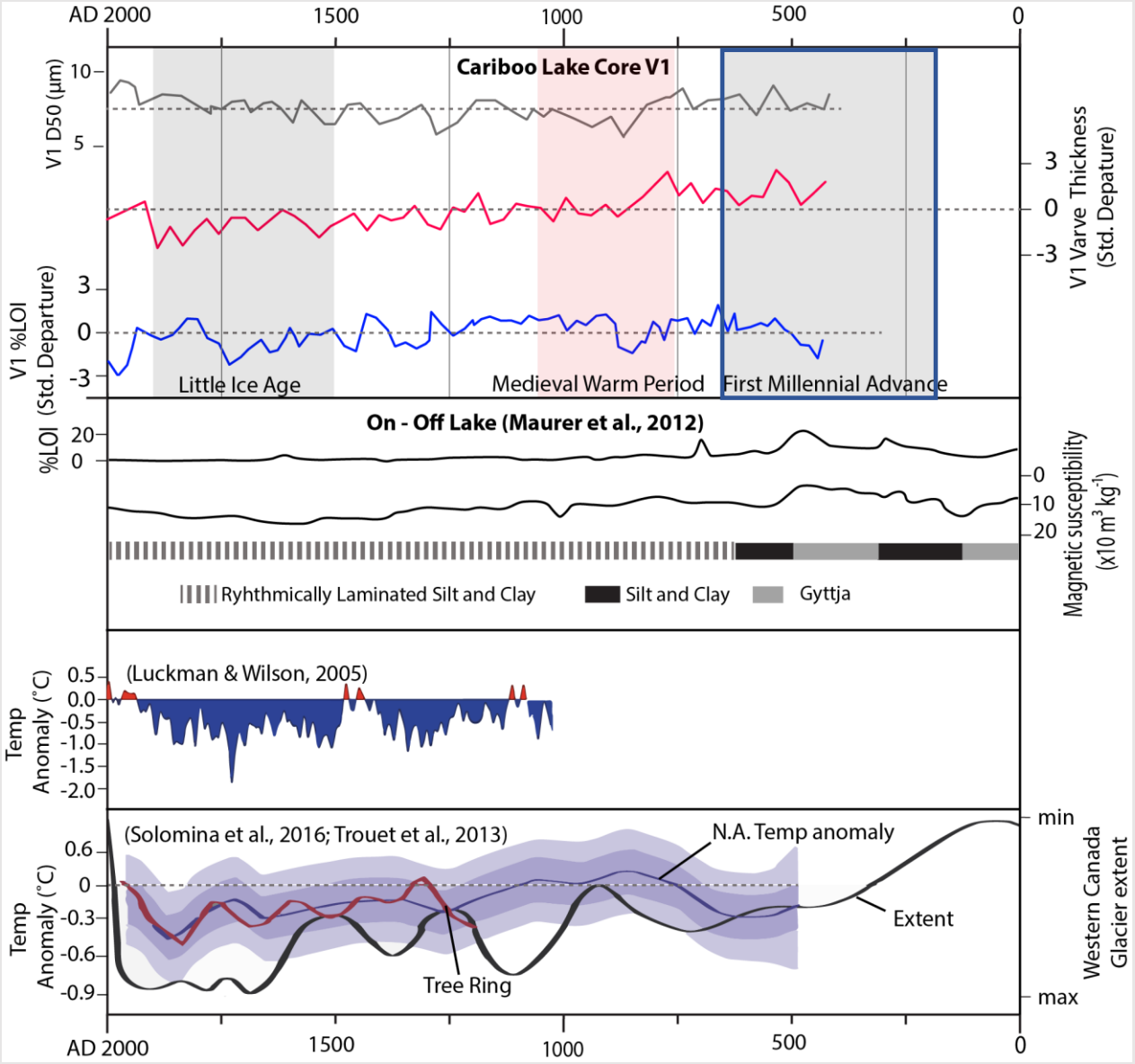

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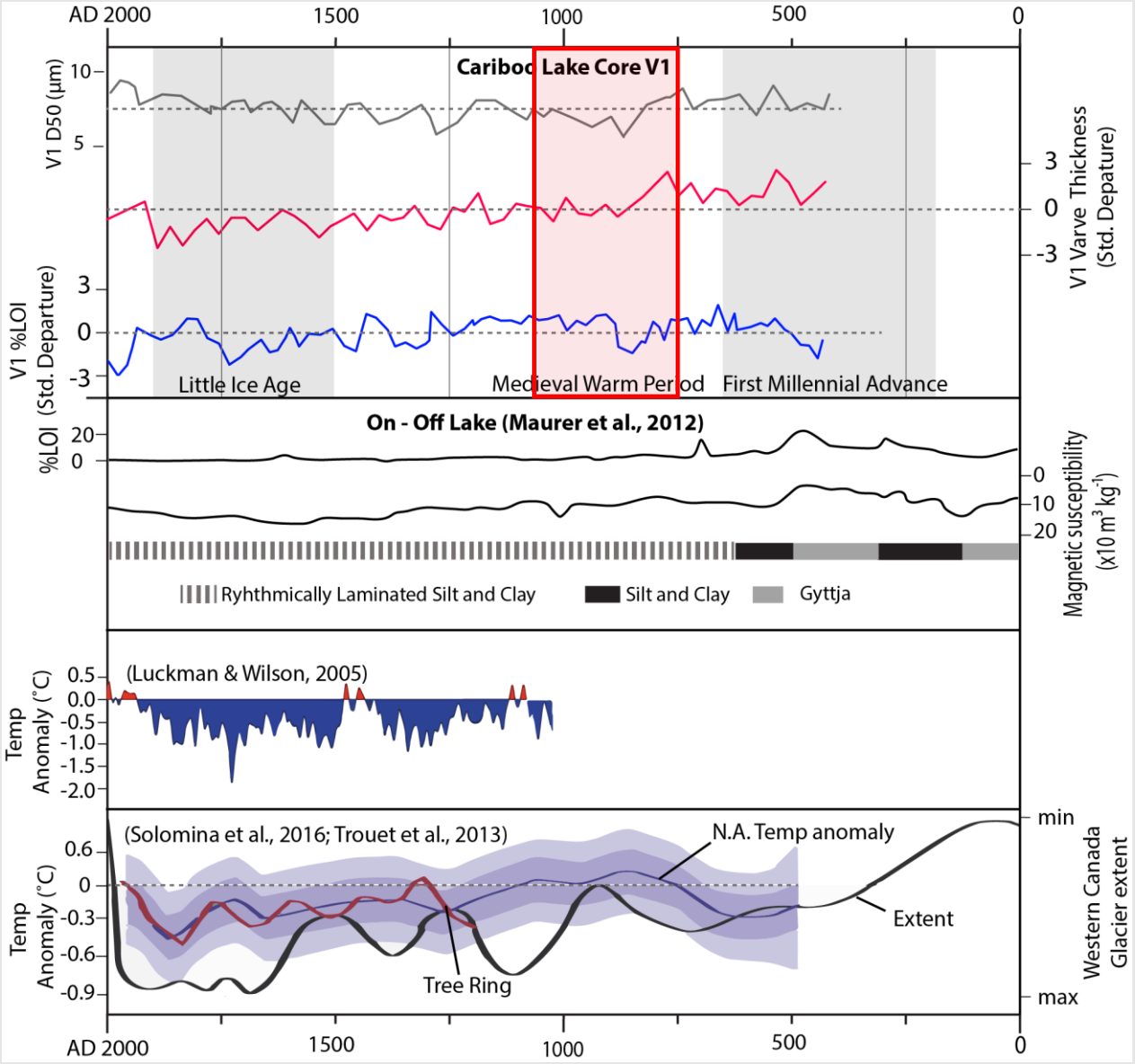

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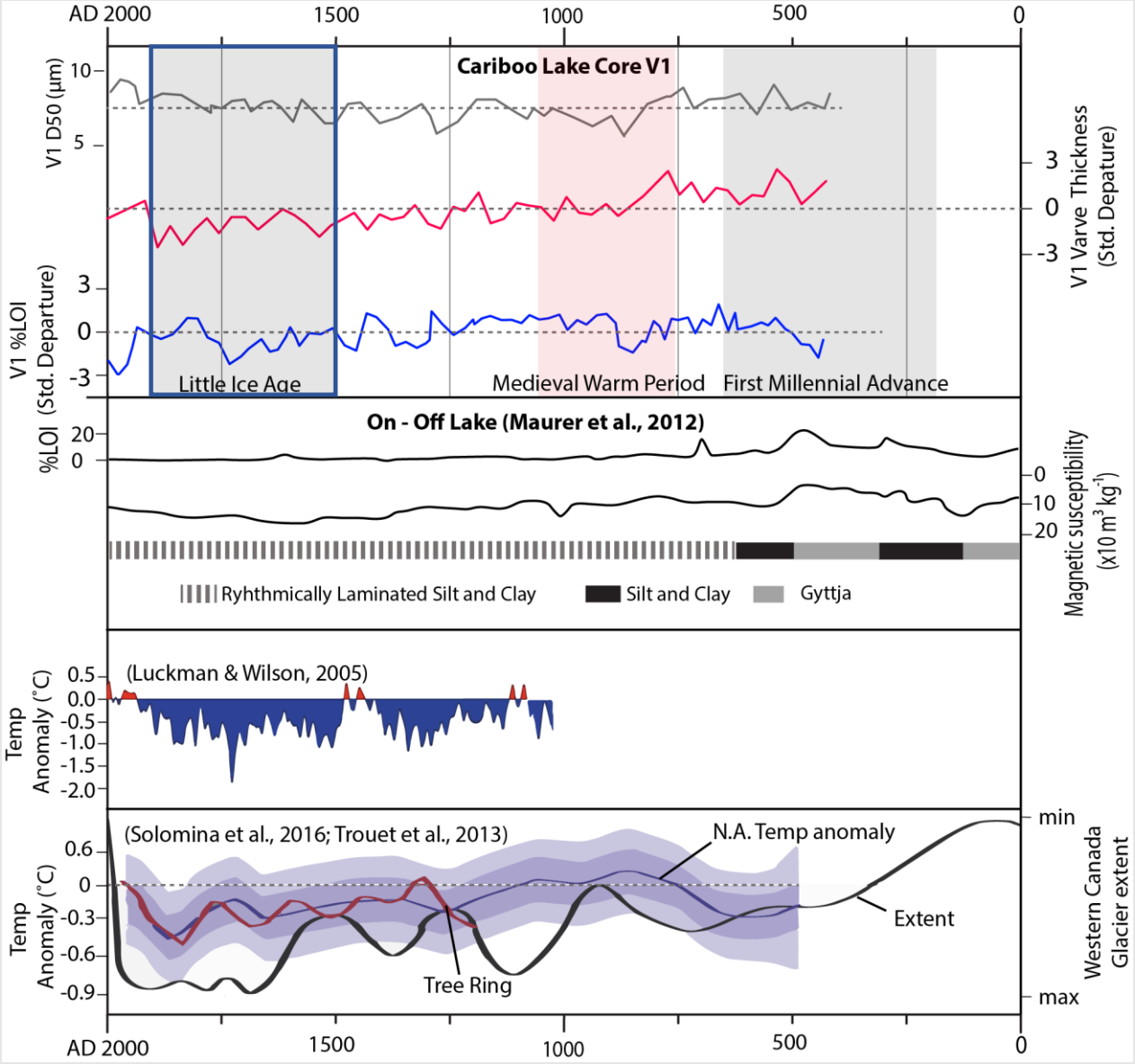
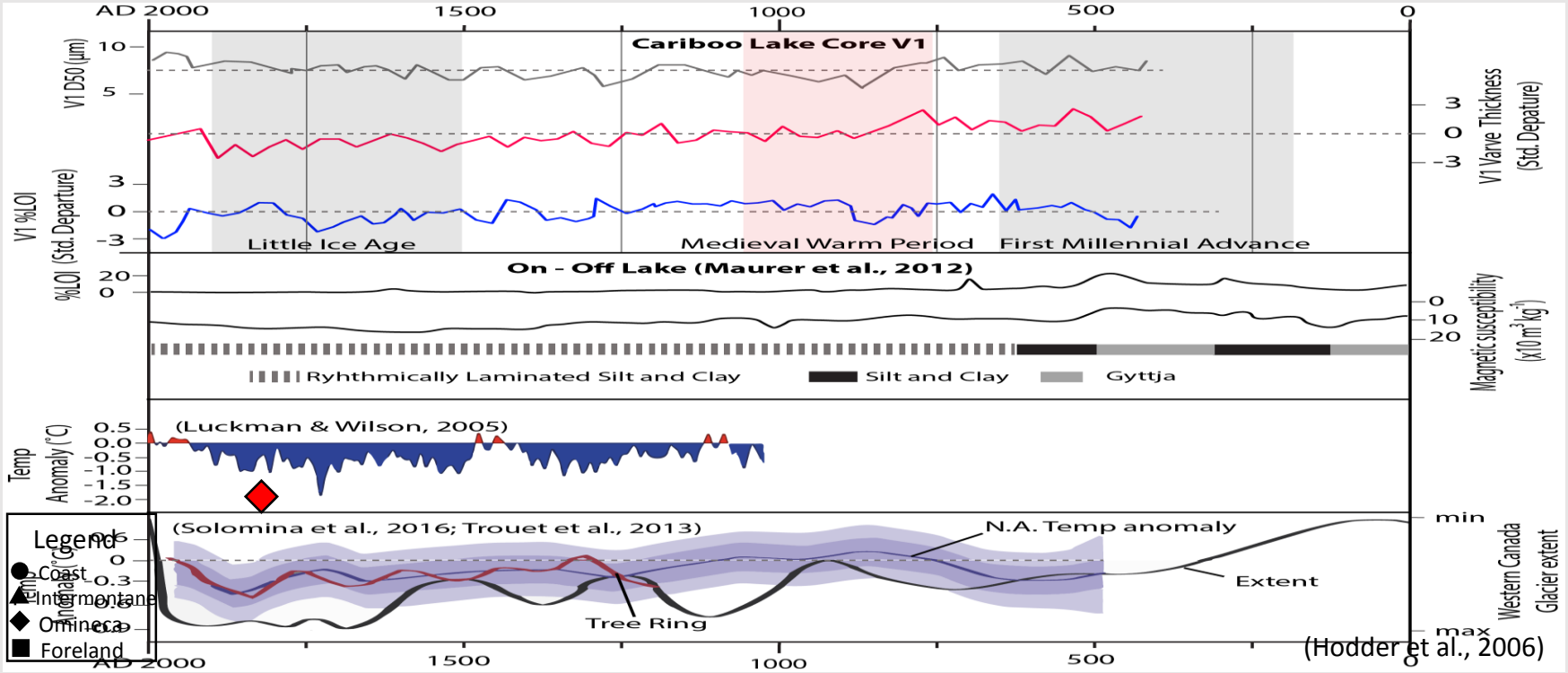


Sediment Yield Comparison



Cariboo Lake: ◆

6.35-7.59 $Mg \cdot km^{-2} \cdot a^{-1}$

2.4% Perm. Snow Cover

Thank you for your time!

Acknowledgements

- Funding provided by the University of Toronto.
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