Multidecadal delay between deglaciation and formation of a proglacial sediment record

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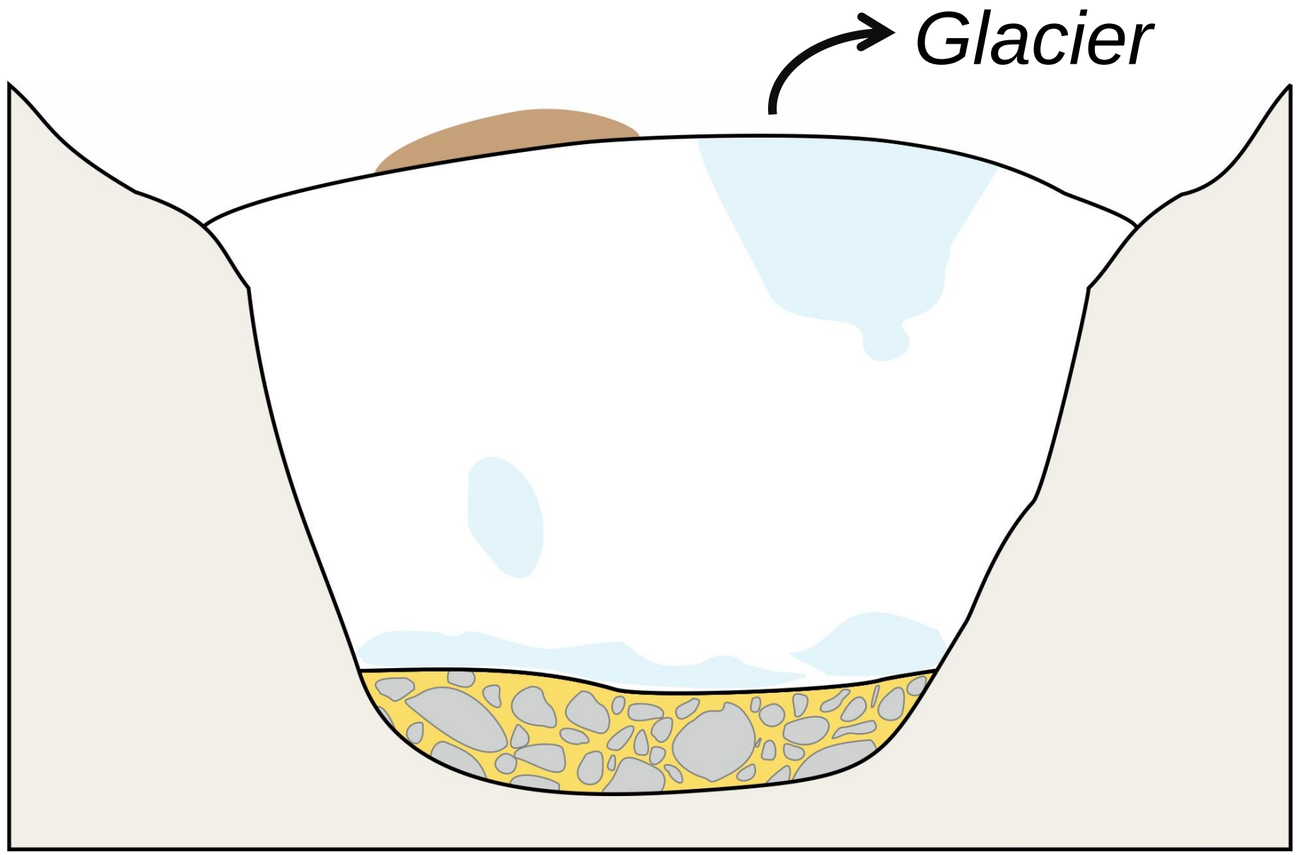
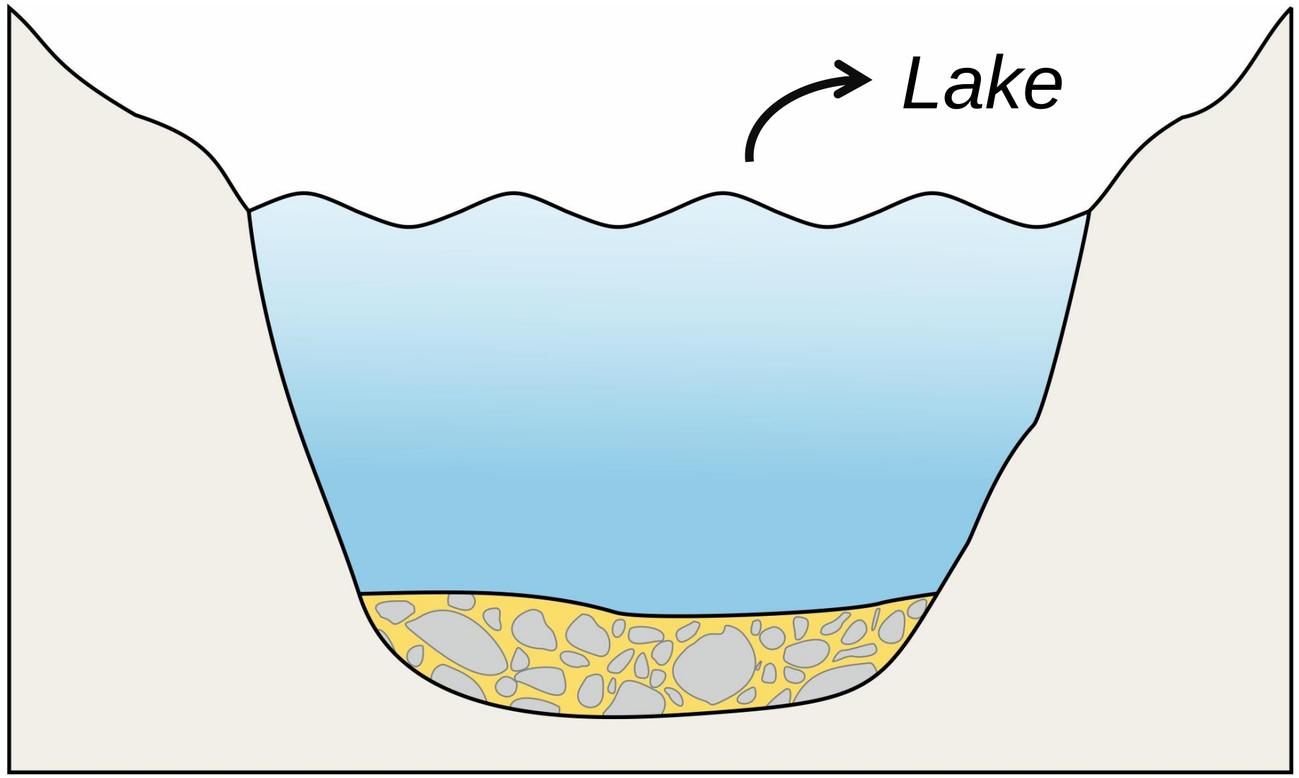
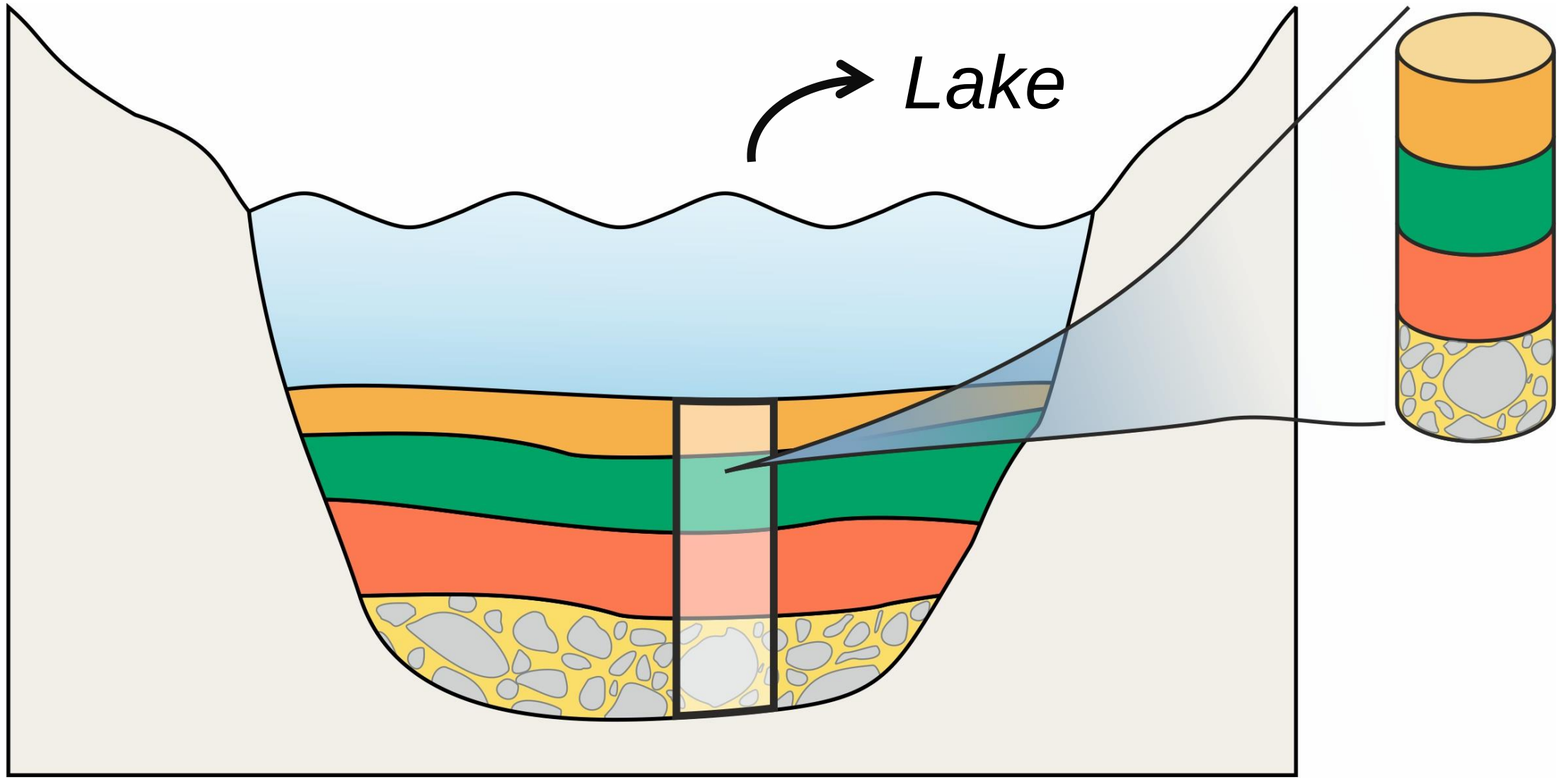
Intro Lake deglaciation timing



Intro Lake deglaciation timing



Intro Lake deglaciation timing



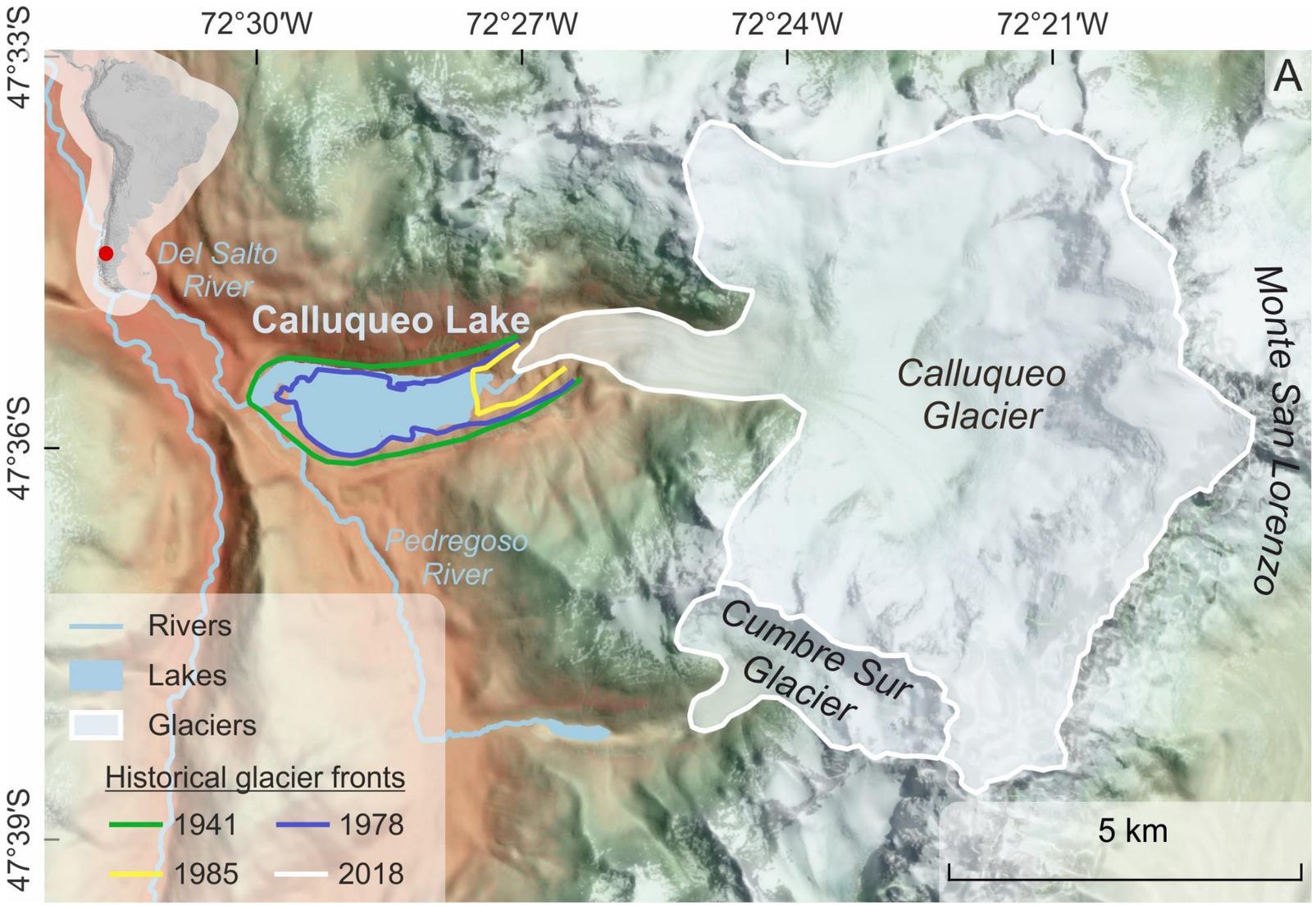
➔ Date basal sediment

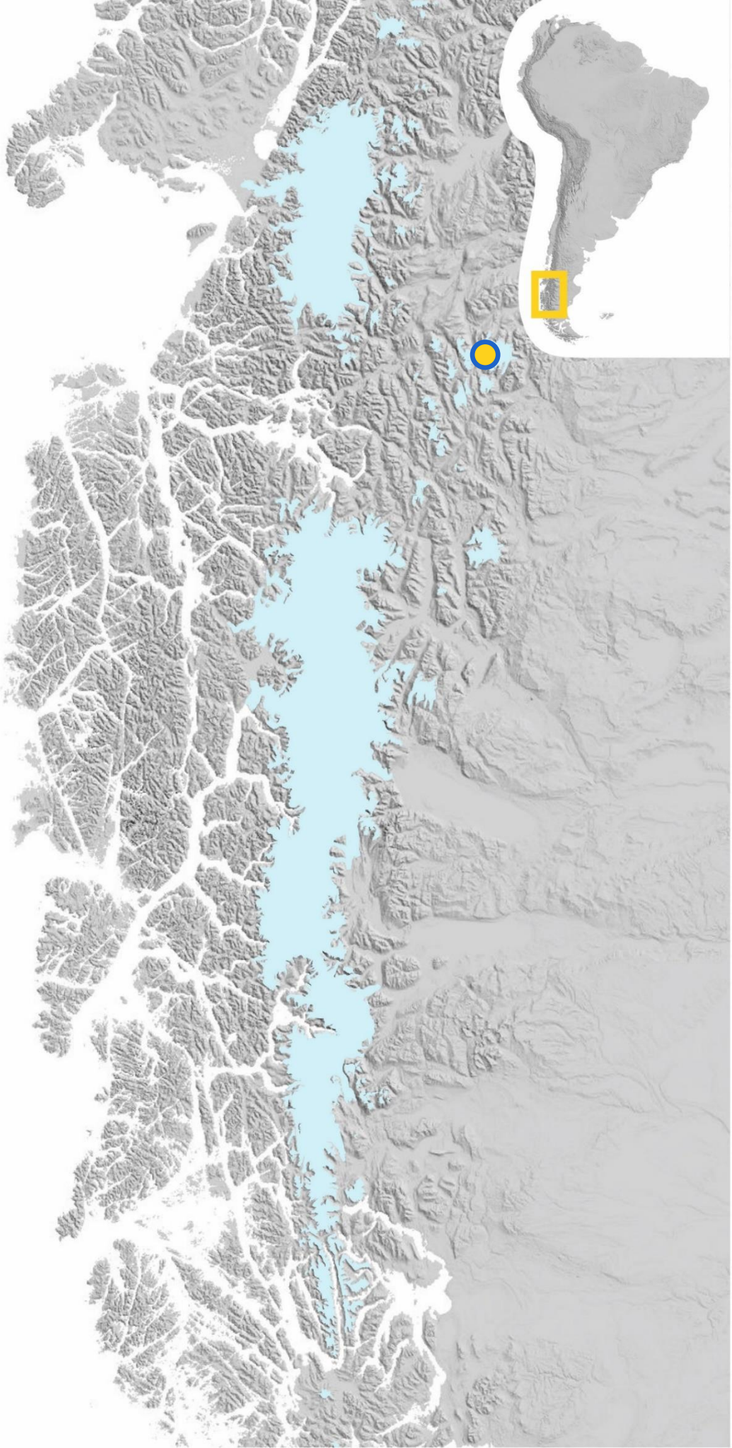
🡻

Timing of deglaciation

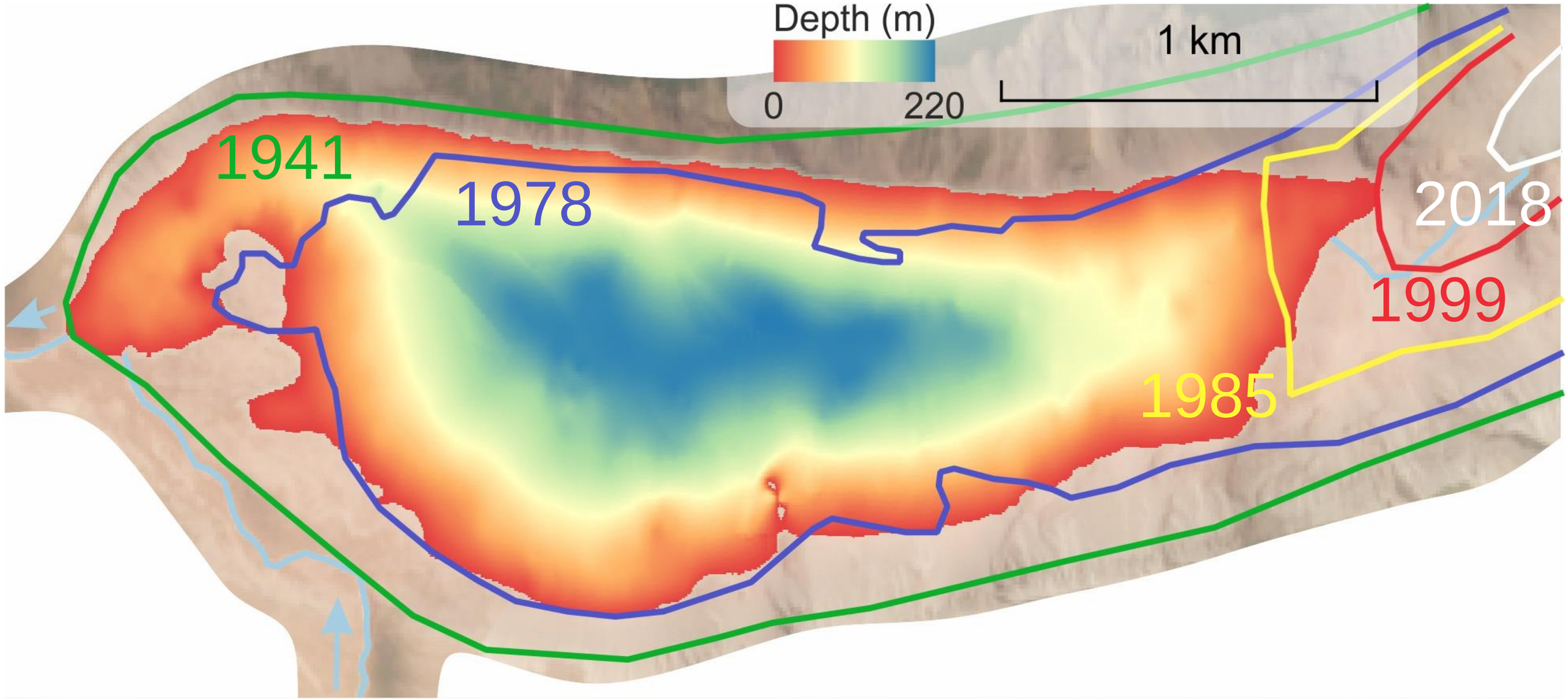
Is there a delay between deglaciation and formation of a fine-grained stratigraphic record?

Setting Calluqueo Glacier





Setting Calluqueo Lake



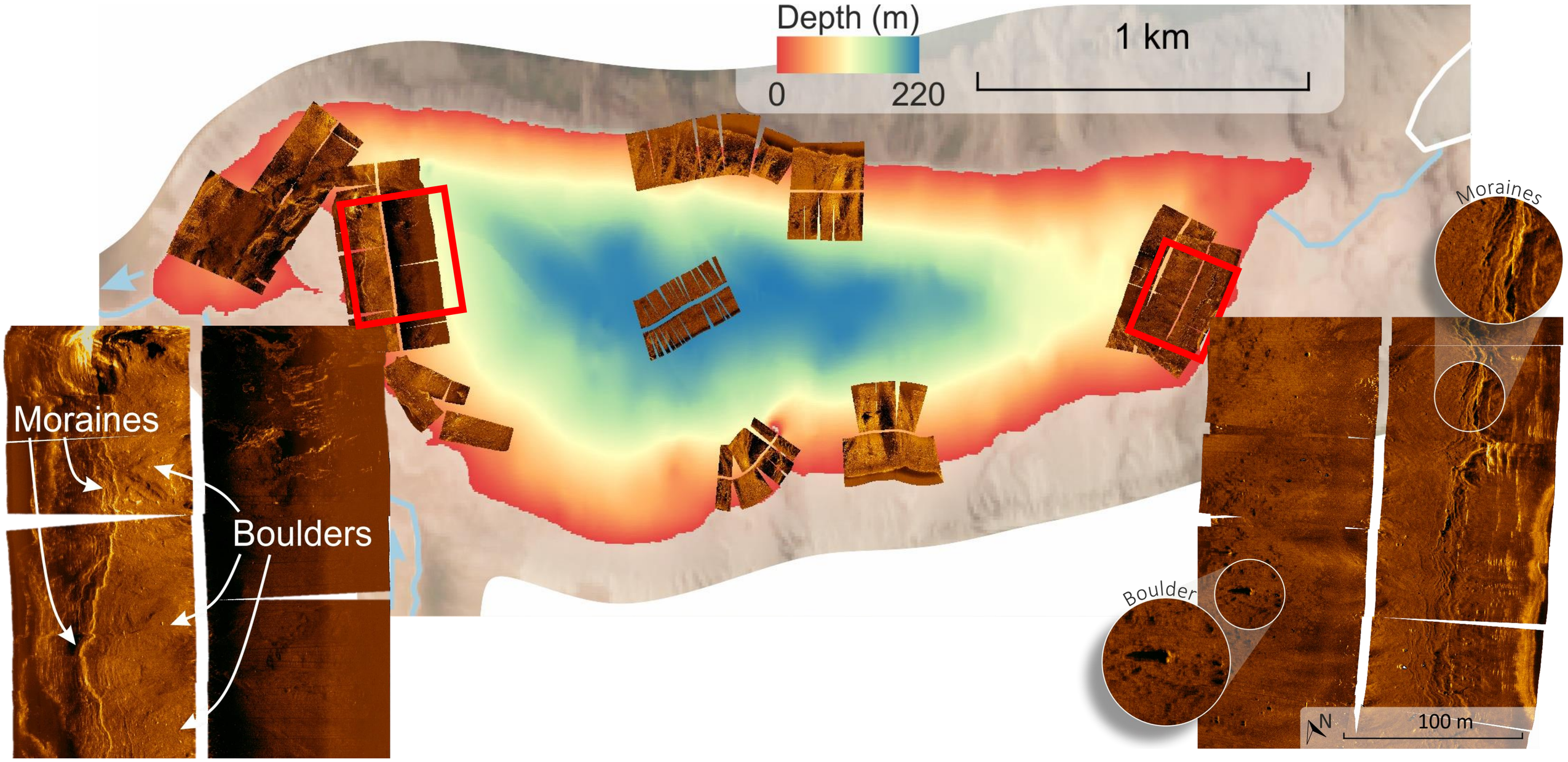
Distal basin:

ice-free for > 40 years

Proximal basin:

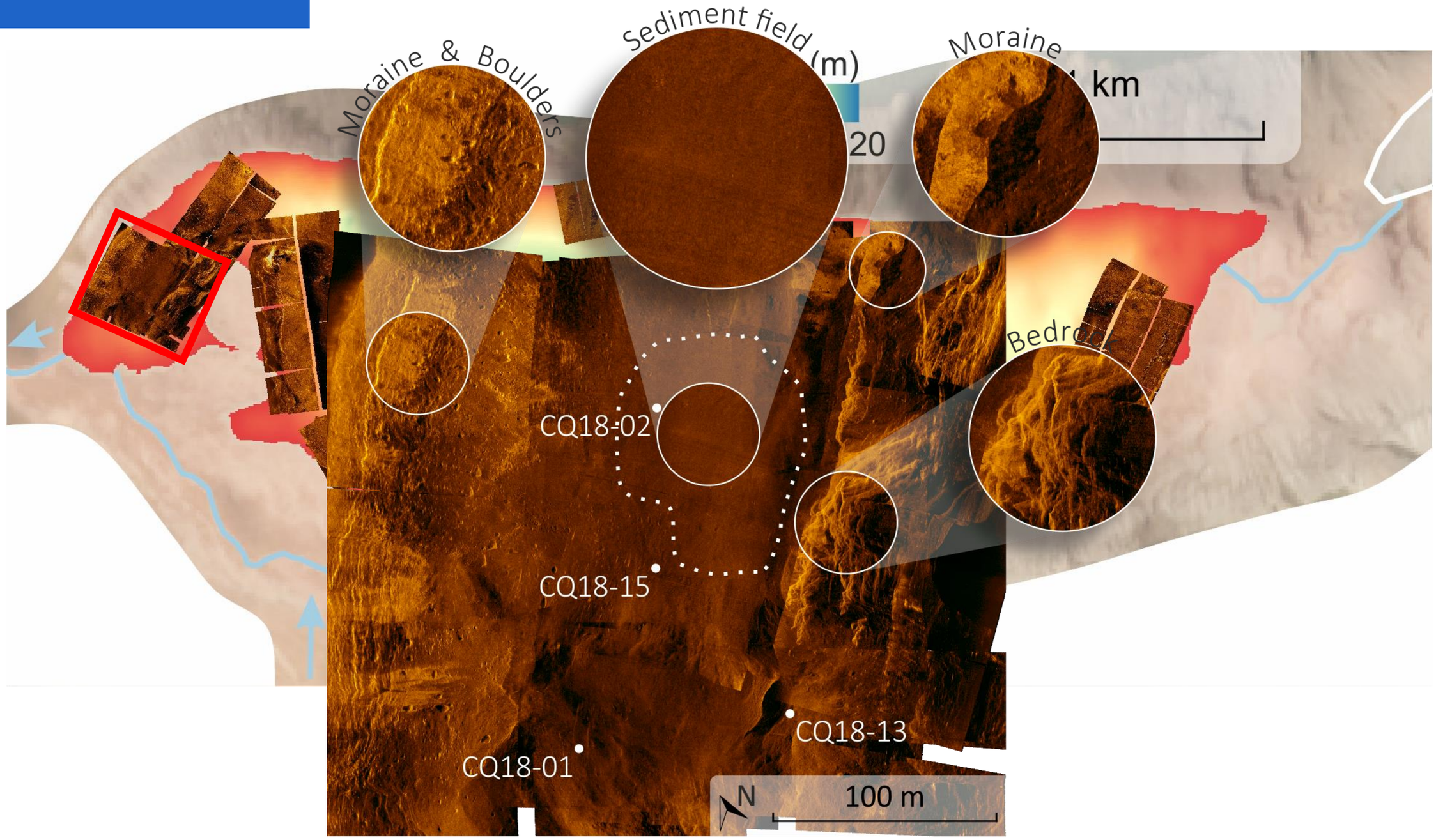
ice-free for > 20 years

Results Lake floor features

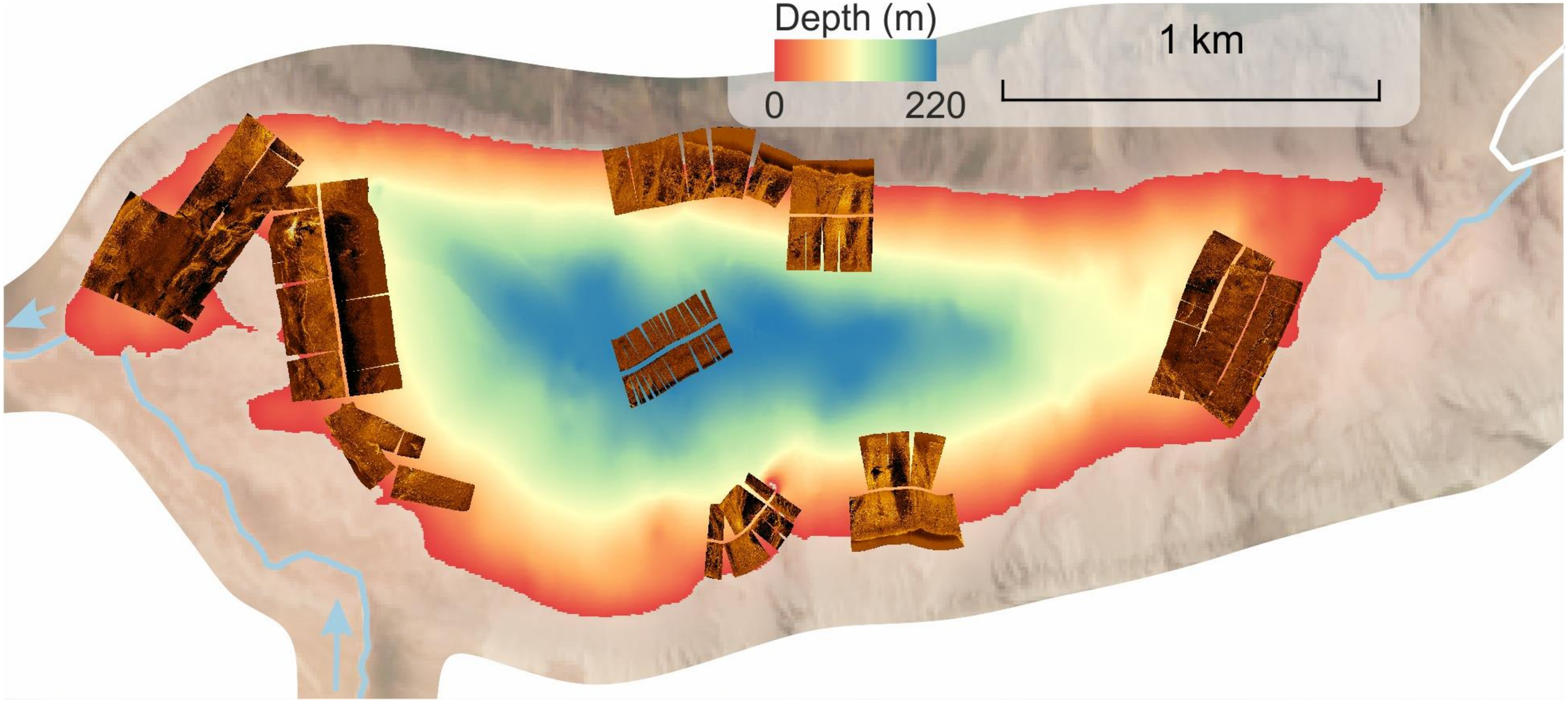


Results

Lake floor features



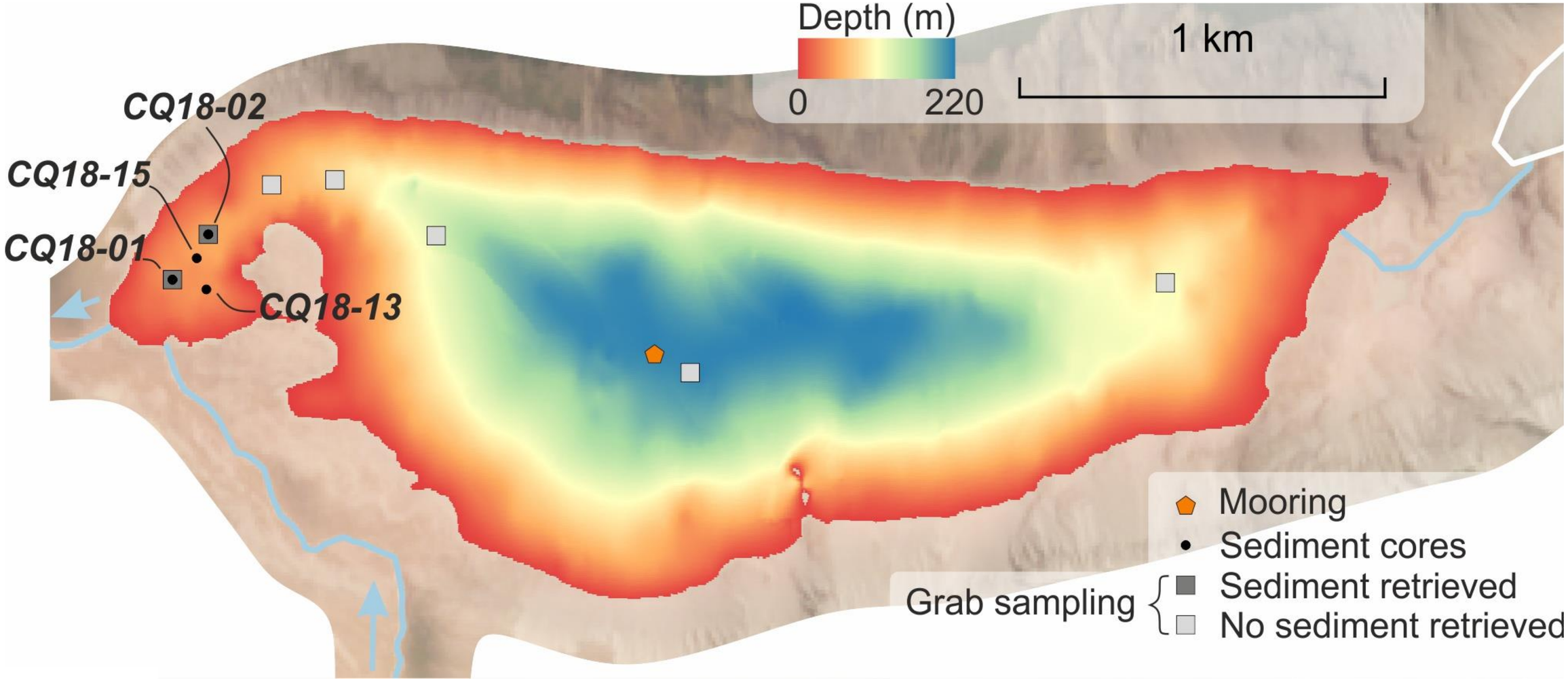
Results Lake floor features



Distal basin: Moraines, boulders, exposed bedrock, fine-grained sediment field

Proximal basin: Moraines, boulders, exposed bedrock

Results Fine-grained sediments in Calluqueo Lake



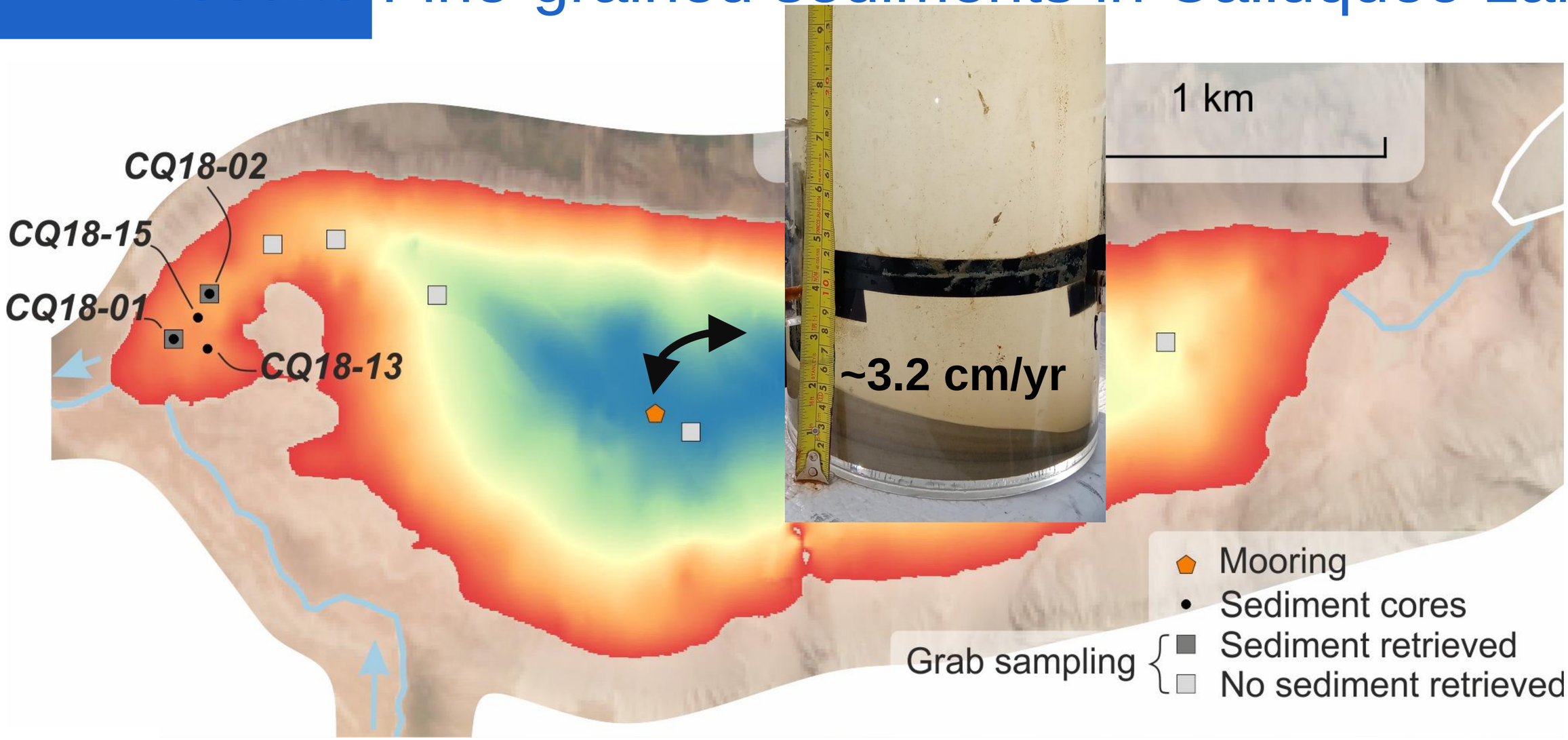
Distal basin:

<u>Fine-grained sediment field</u>

Proximal basin:

<u>No</u> fine-grained sediments

Results Fine-grained sediments in Calluqueo Lake



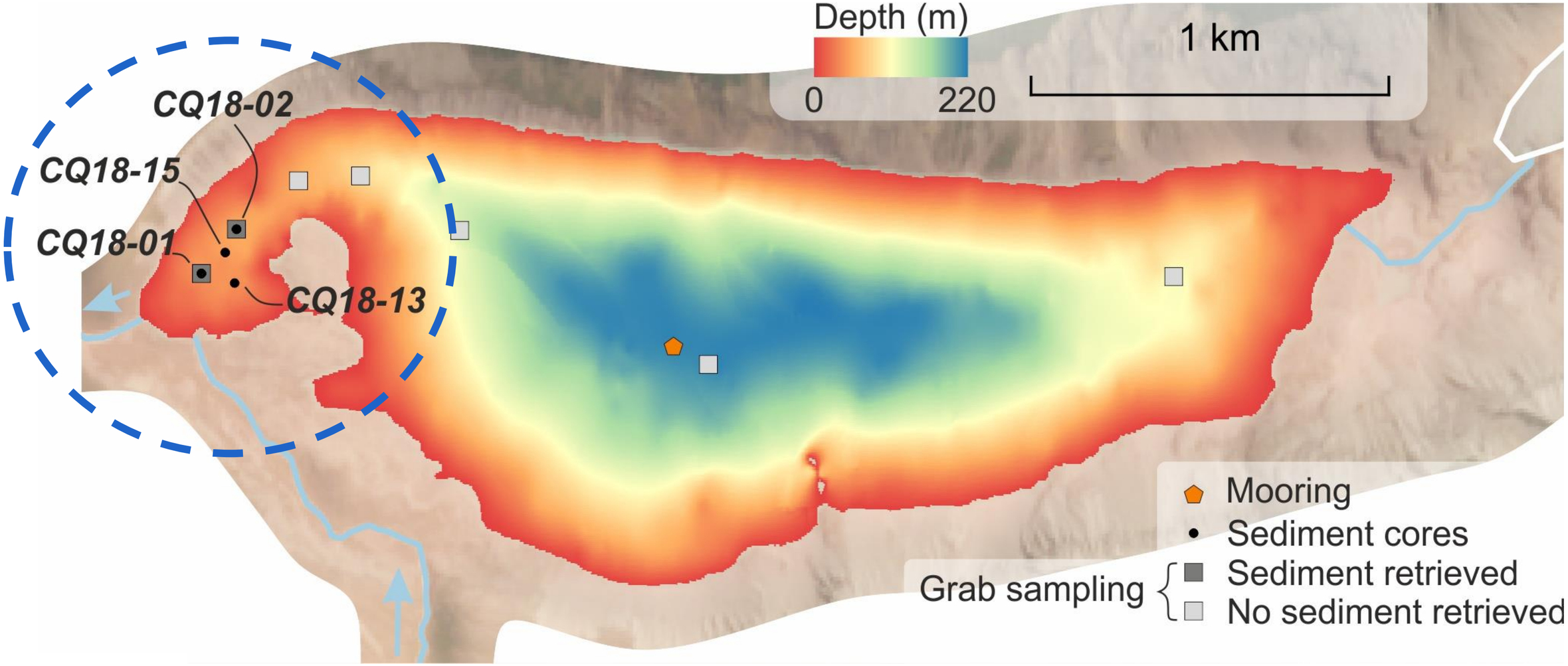
Distal basin:

<u>Fine-grained sediment field</u>

Proximal basin:

<u>No</u> fine-grained sediments

Results Fine-grained sediments in Calluqueo Lake



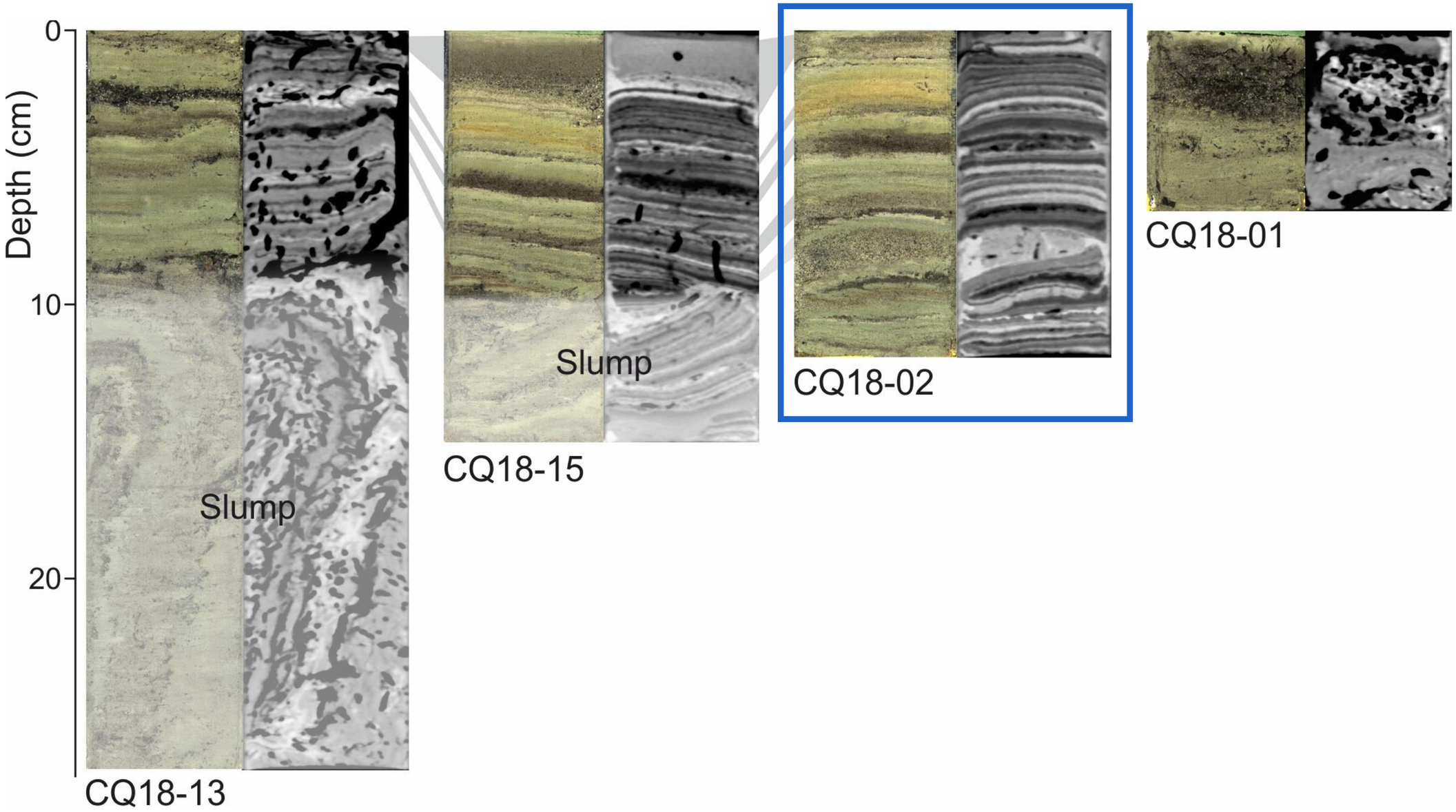
Distal basin:

<u>Fine-grained sediment field</u>

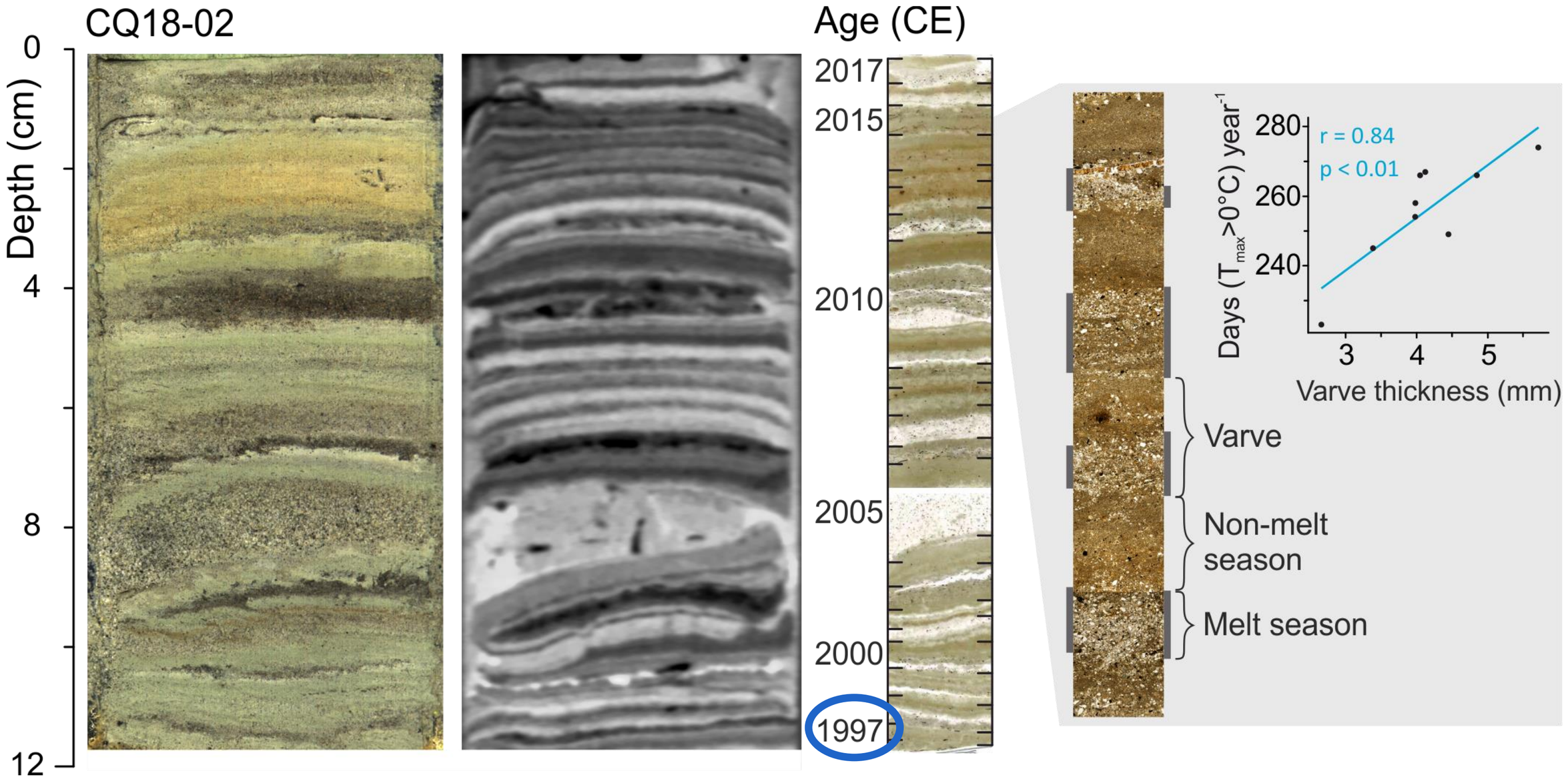
Proximal basin:

<u>No</u> fine-grained sediments

Results Fine-grained sediments in Calluqueo Lake

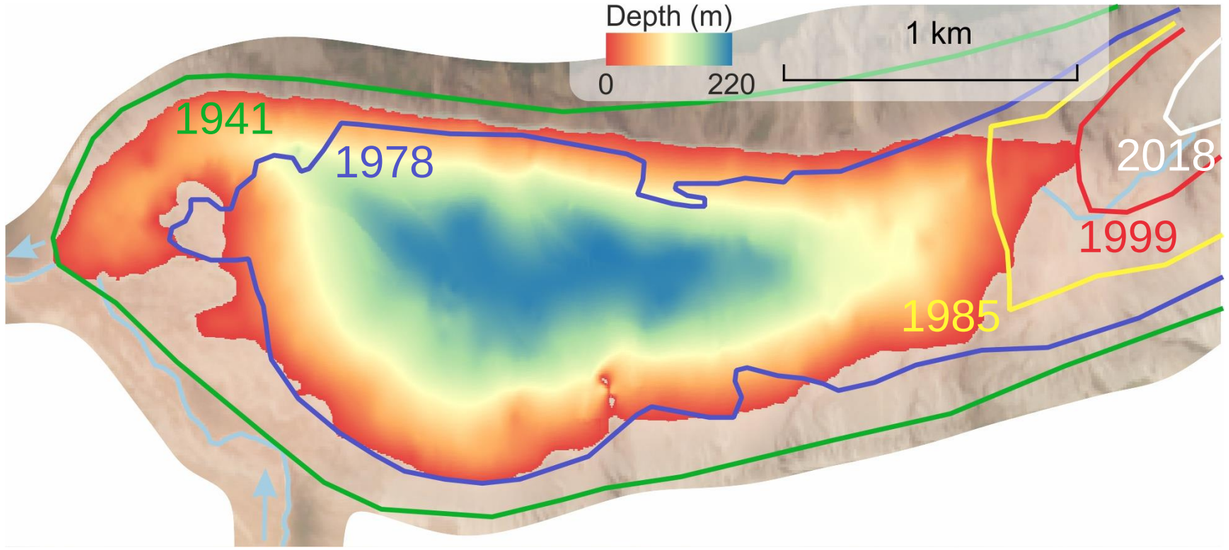


Results Fine-grained sediments in Calluqueo Lake



Results Deglaciation – Sediment record

1) Distal basin deglaciated between 1941 – 1978

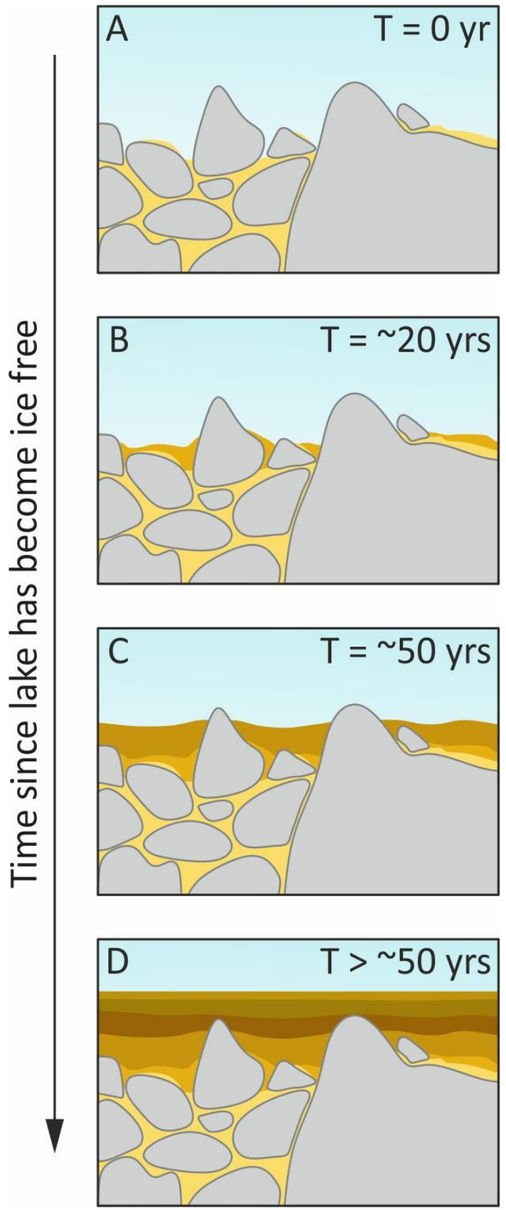


2) Formation of a fine-grained sediment record in 1997 ± 2

2 – 5 decades delay between **deglaciation** and formation of **a fine-grained sediment record**

~1 m sedimentation

Summary Sedimentation in a proglacial lake



Diamicton and exposed bedrock create an uneven lake floor.

Fine-grained sediments accumulate in between pebbles and boulders to smoothen the lake floor.

Formation of a fine-grained stratigraphic record.

Delay in Calluqueo:

- A few decades

Timing depends on:

- Initial lake floor roughness
- Sedimentation rate

Implications Deglaciation timing based on basal ages

1) Absolute chronology

Timing of LGM deglaciation

a few decades **<** 10's – 100's yrs ^{14}C error

OK

Timing of Holocene deglaciation

a few decades **≈** 10's yrs ^{14}C error

OK

2) Relative chronology

Careful!

Comparing basal ages within the same regional varve chronologies

Possible variations in the delay between lakes