Proglacial lake sediment records of Holocene mountain glacier change on the Nuussuaq peninsula, West Greenland: Initial results

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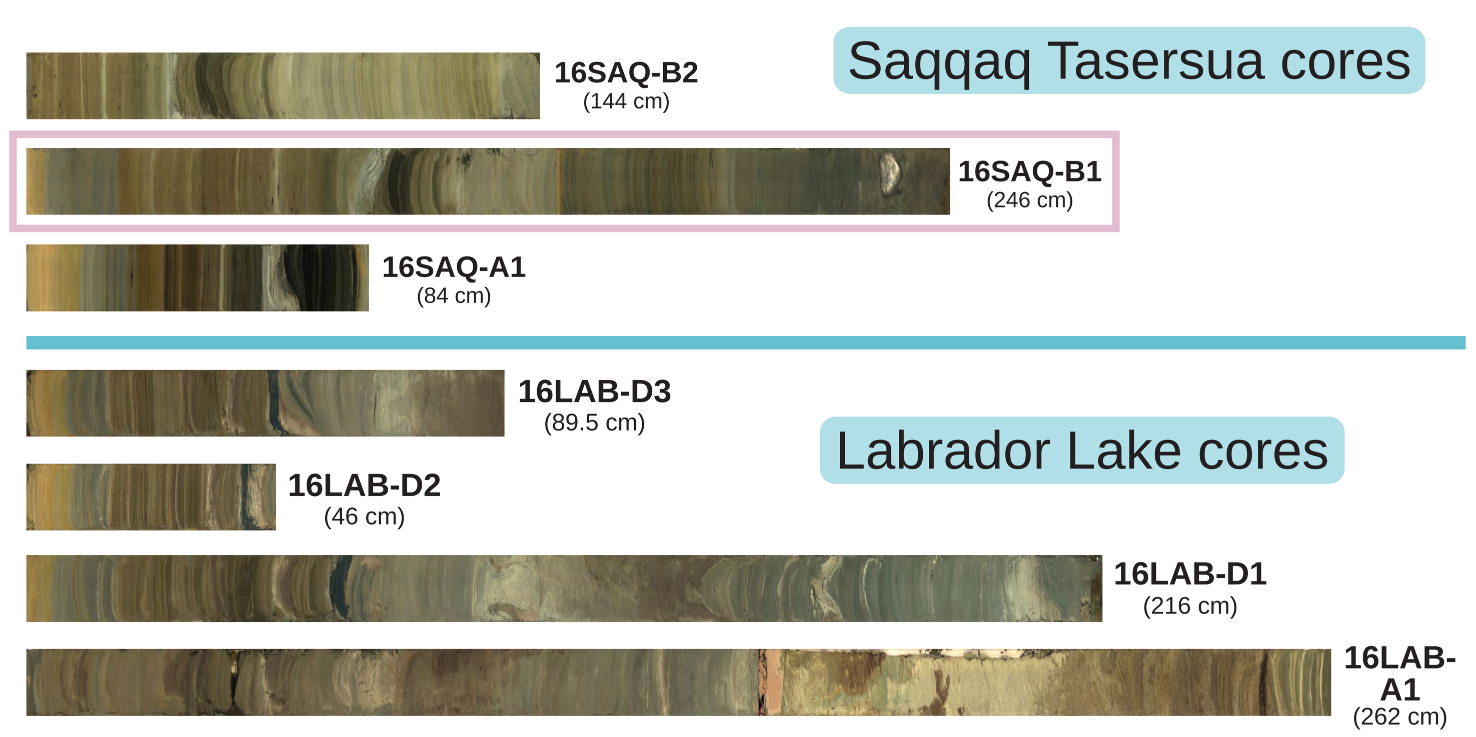
1. INTRODUCTION & PROJECT OBJECTIVES:

- Recent research suggests local glacier fluctuations in West Greenland may record regional patterns of North Atlantic climate variability (Schweinsberg et al., 2017)
- However, additional records are needed to determine the significance of these glacier fluctuations, particularly during the late Holocene
- Here, we reconstruct high-resolution chronologies of Holocene mountain glacier variability in West Greenland using:
  (1) lake sediment proxies
  (2) ^{10}Be dating of erratics and boulders on late Holocene moraines

2. SUMMARY OF FIELDWORK:

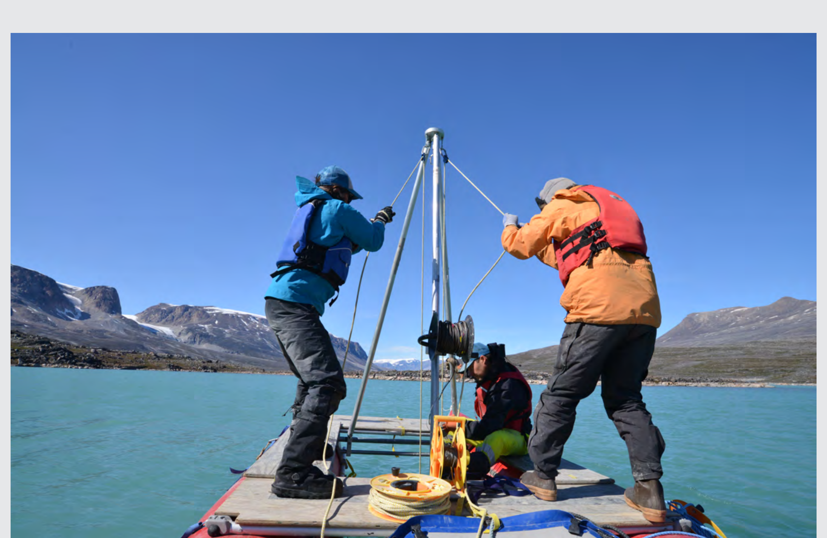
- We collected seven sediment cores from two proglacial lakes (Labrador Lake and Saqqap Tasersua) and samples for ^{10}Be dating from boulders on a late Holocene moraine sequence (n=27) and from erratics perched on bedrock (n=4)

We focus on the lake sediment core from Saqqaq Tasersua (16SAQ-B1) for this presentation!



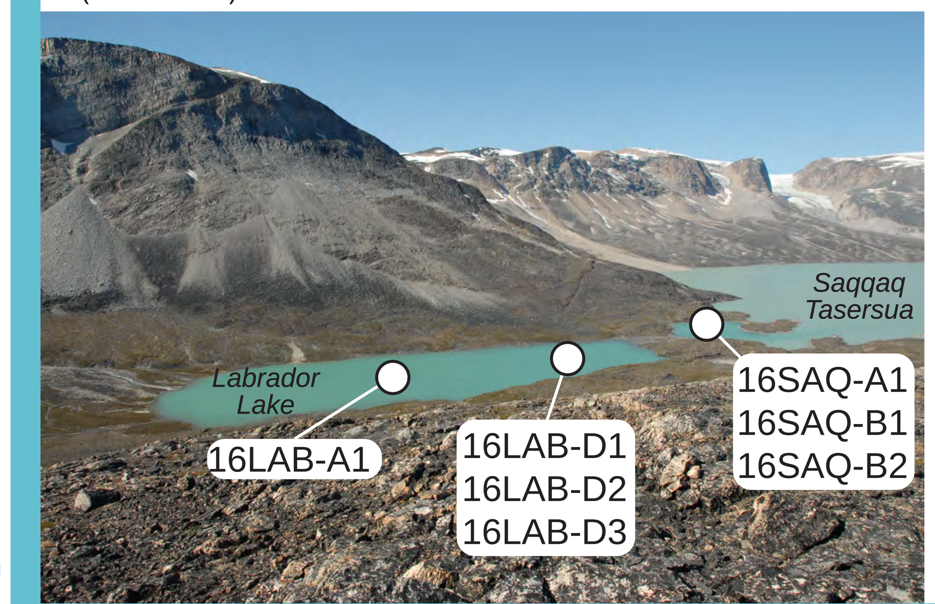
3. METHODS:

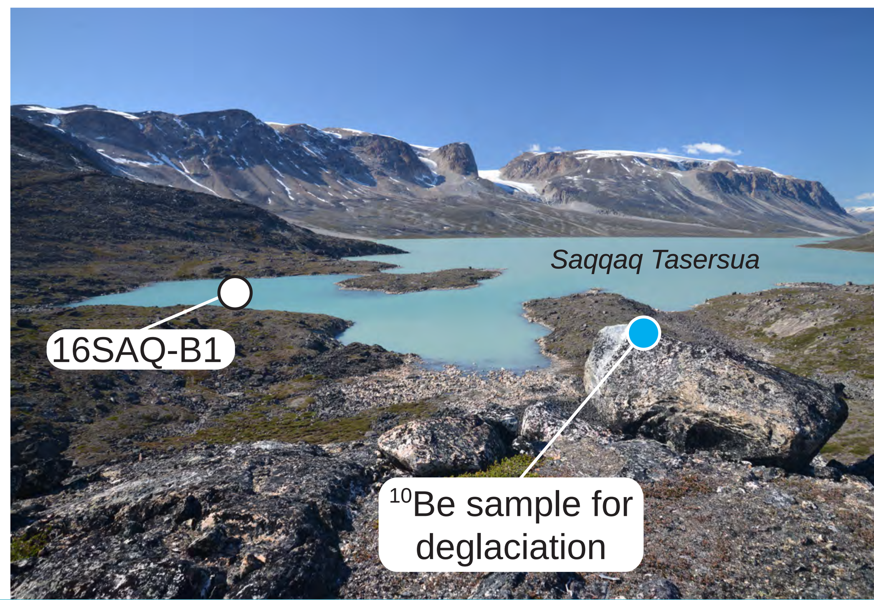
- We interpret changes in the lake sediments as indices of glacier size (Balascio et al., 2015)
- ^{14}C-dating of macrofossils
- Glacier records are developed from magnetic susceptibility, gamma density, and elemental analyses



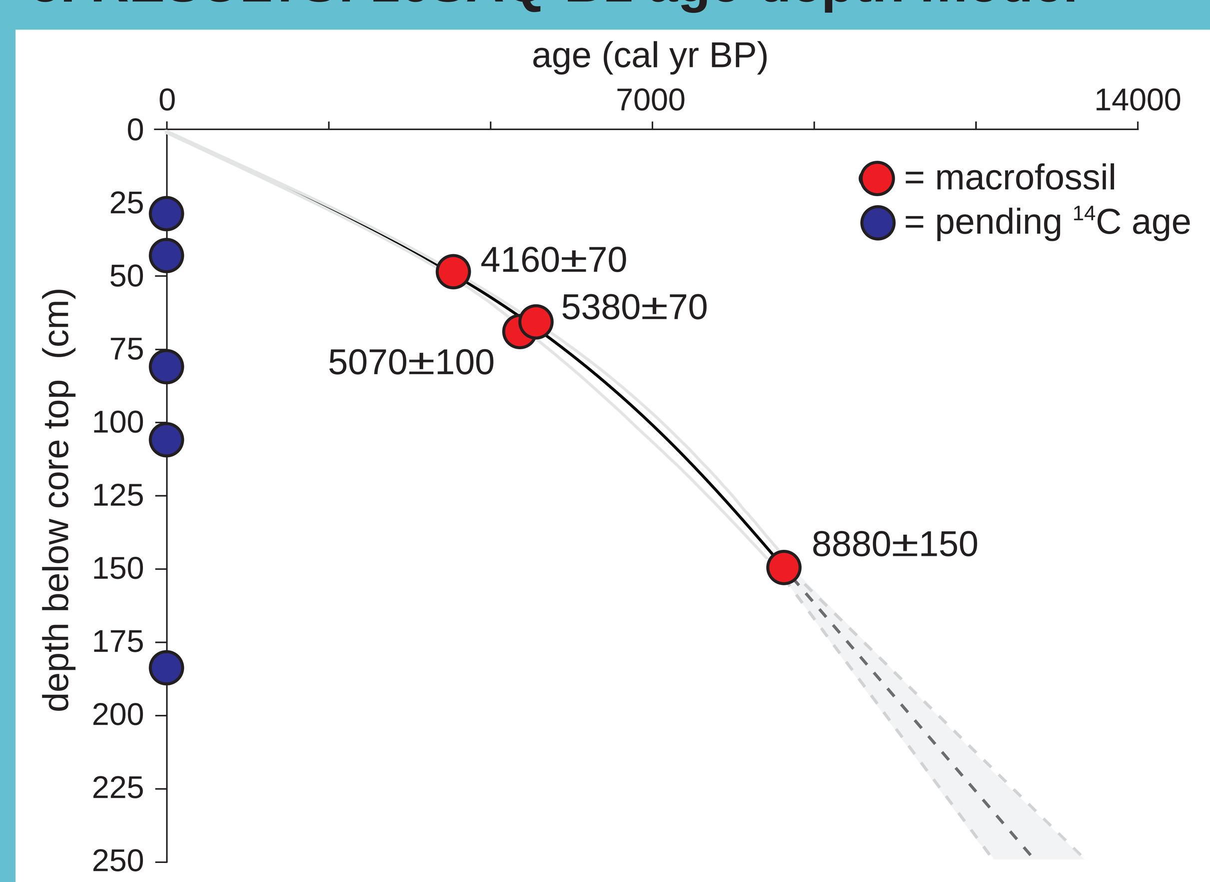
4. STUDY REGION: Nuussuaq peninsula

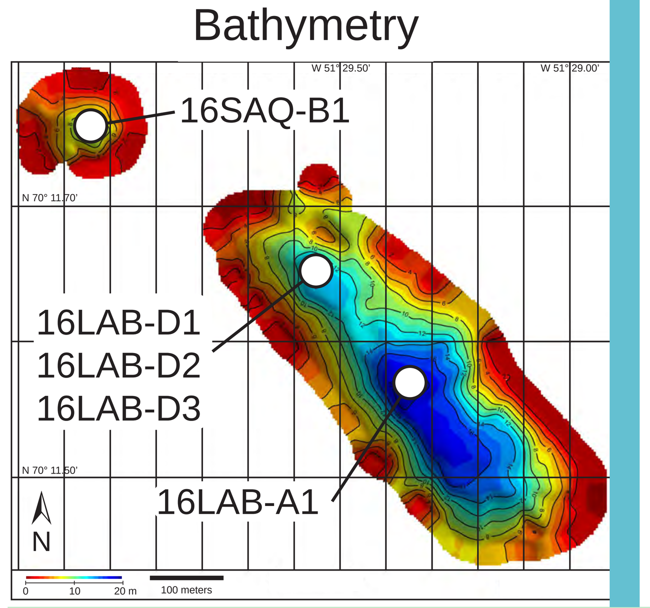
Study region in eastern Nuussuaq, West Greenland. Orange circles indicate lakes cored in this study and previous investigations (Schweinsberg et al., 2017). Blue circles show the locations of the late Holocene moraines sampled in summer 2016 and the previously dated Uigorlip moraines (Young et al., 2015). Base image is a Landsat8 natural color composite (RGB: 432).





5. RESULTS: 16SAQ-B1 age-depth model





References

Balascio, N.L., D'Andrea, W.J., and Bradley, R.S., 2015, Glacier response to North Atlantic climate variability during the Holocene: Climate of the Past 11, 2009–2036.

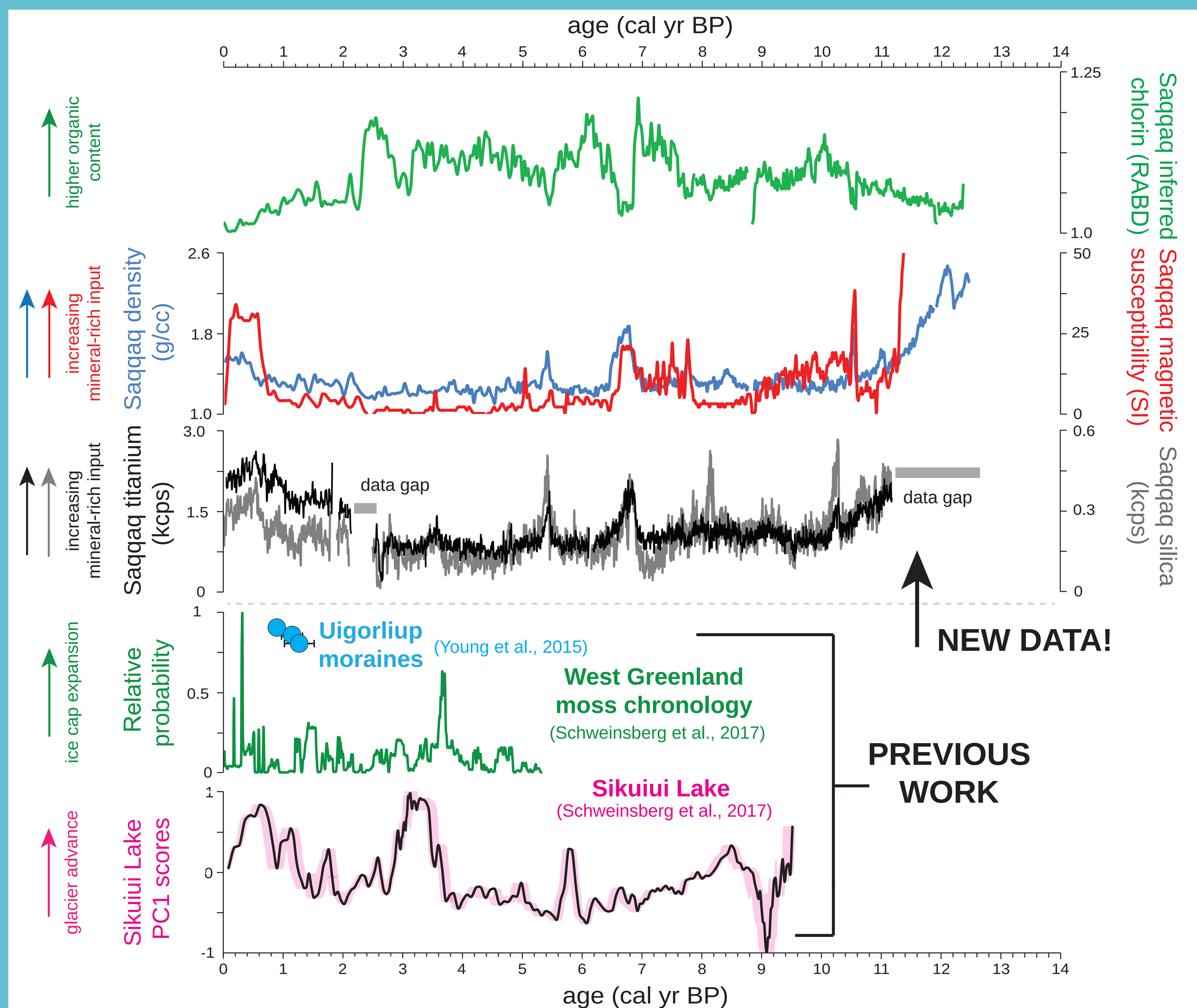
Briner, J.P., et al., 2016, Holocene climate change in Arctic Canada and Greenland: Quaternary Science Reviews 147, 340–364.

Kelly, M.A., and Lowell, T.V., 2009, Fluctuations of local glaciers in Greenland during latest Pleistocene and Holocene time: Quaternary Science Reviews 28, 2088 2106.

Schweinsberg, A.D., Briner, J.P., Miller, G.H., Bennike, O., and Thomas, E.K., 2017, Local glaciation in West Greenland linked to North Atlantic Ocean circulation during the Holocene: Geology 45, 195-198.

Young, N.E., Schweinsberg, A.D., Briner, J.P., Schaefer, J.M., 2015, Glacier maxima coeval with Norse settlement in Greenland during the Medieval Warm Period: Science Advances 1, 1-8.

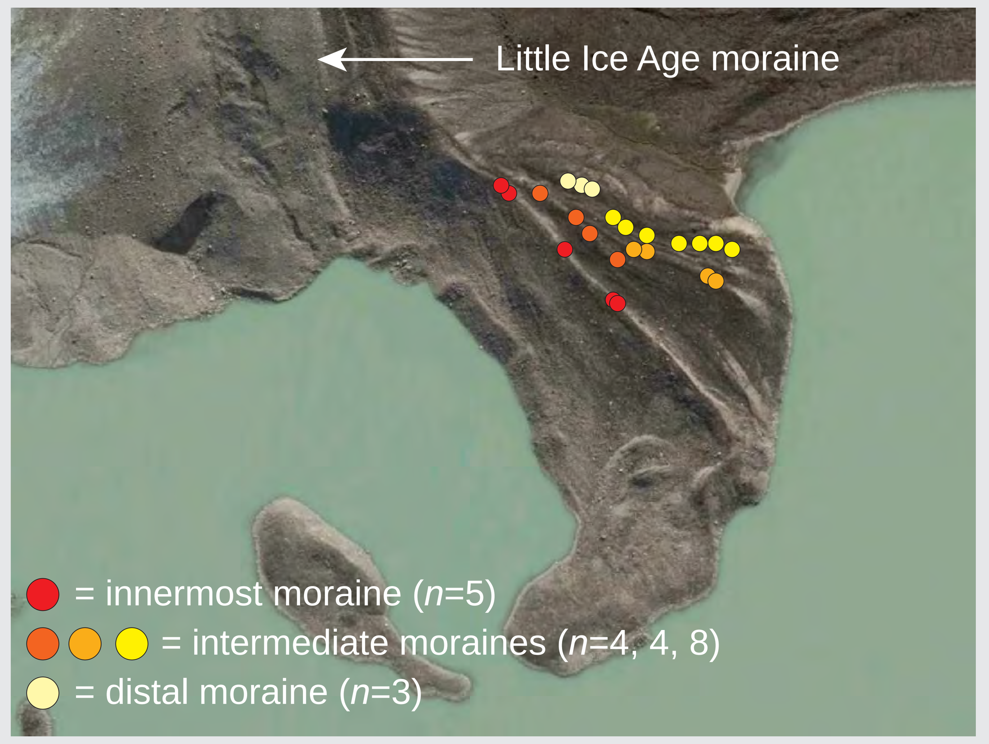
6. RESULTS: Downcore data



7. PRELIMINARY CONCLUSIONS:

- Two intervals of increased mineral-rich input from ~7.0-6.3 cal kyr BP and ~5.4-5.2 cal kyr BP may reflect brief periods of glacier advance, and may correlate to glacier advances recorded in Sikuiui Lake at ~5.8 cal kyr BP (Schweinsberg et al., 2017)
- Onset of Neoglaciation occurs at ~2.2 cal kyr BP, following generally low mineral-rich input during the early and middle Holocene
- Periods of enhanced glacier activity in Saqqaq Tasersua and Sikuiui Lake appear synchronous during the past 2000 years; however, the glacier advance at ~3.5 cal kyr BP in Sikuiui Lake is not documented in Saqqaq Tasersua
- The estimated timing and magnitude of these intervals will likely change with refinements to the age model

How old are these moraines?



8. WHAT'S NEXT?

- Additional ^{14}C ages to constrain the age model for 16SAQ-B1
- Principal Component Analysis for 16SAQ-B1
- ^{10}Be dating of erratics and late Holocene moraines to constrain the timing of regional deglaciation and directly date late Holocene glacier fluctuations in this region, respectively.