

Rationale and Research Goals

Problem:

The Hudson Bay Lowland (HBL) region of central Canada contains a fragmented Quaternary stratigraphic record from multiple glacial cycles that hinders ice sheet and paleoenvironmental reconstructions.

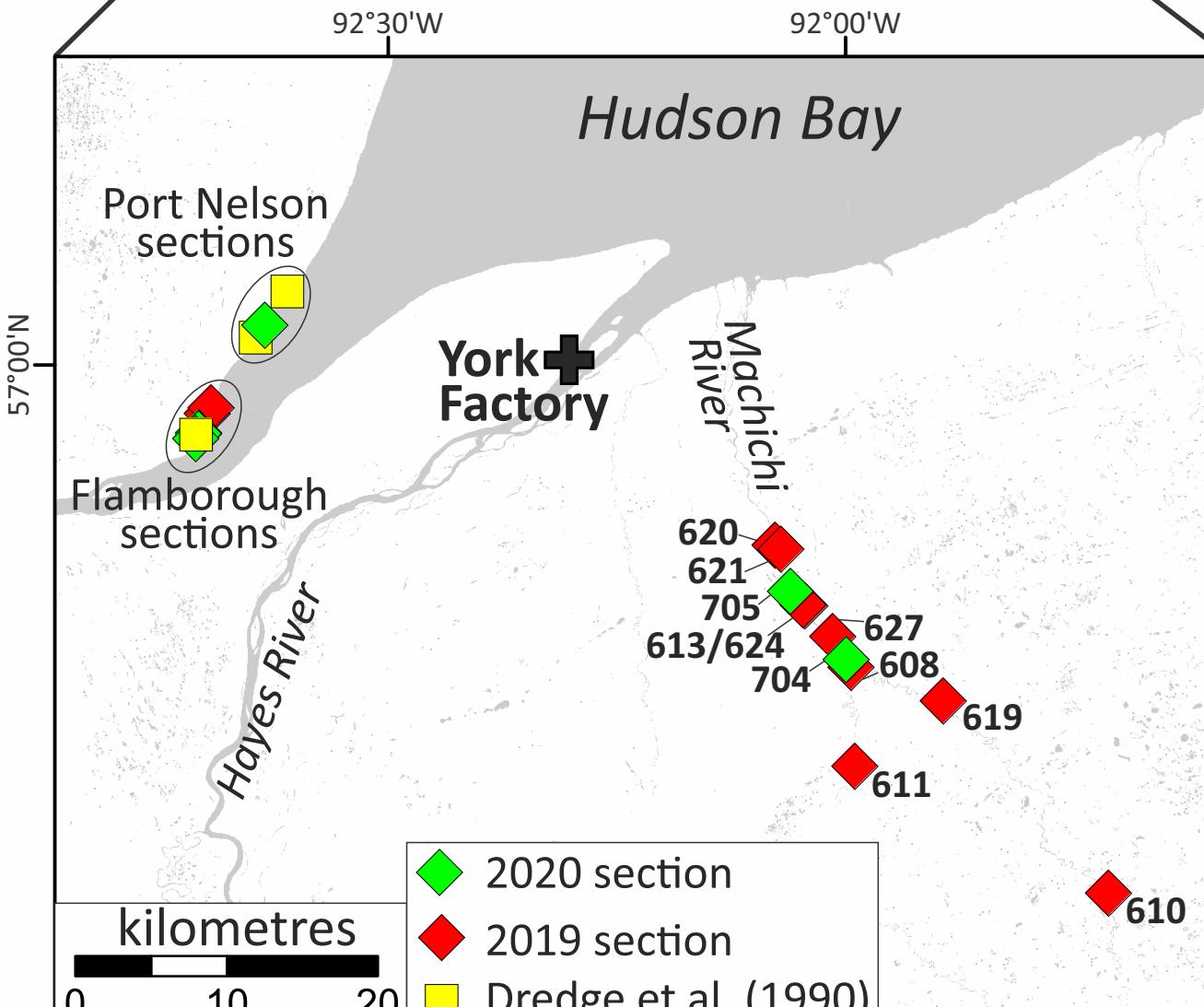
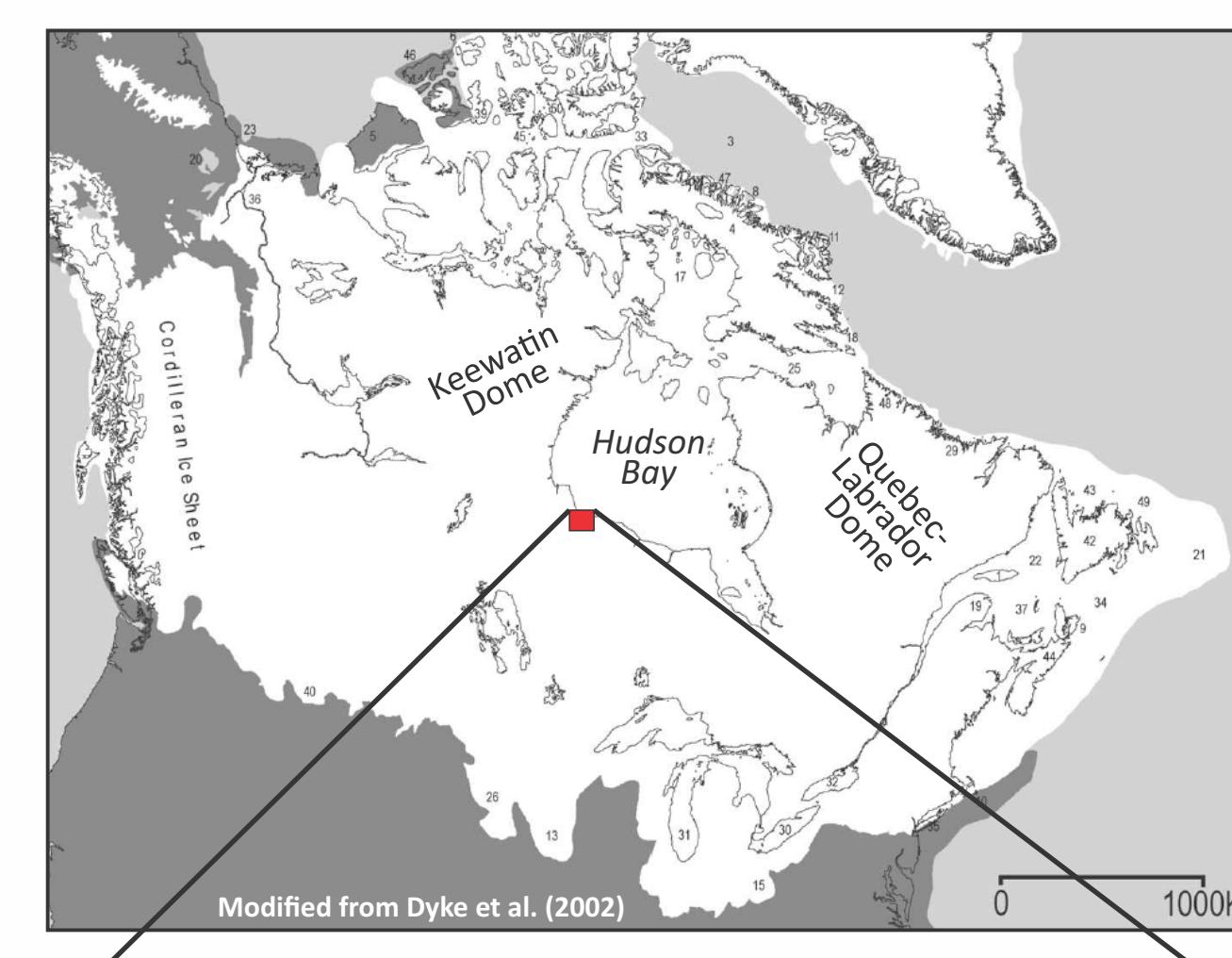
Current research:

To further improve the stratigraphic framework by applying novel strategies to establish the relationship between glacial (till) and nonglacial units.

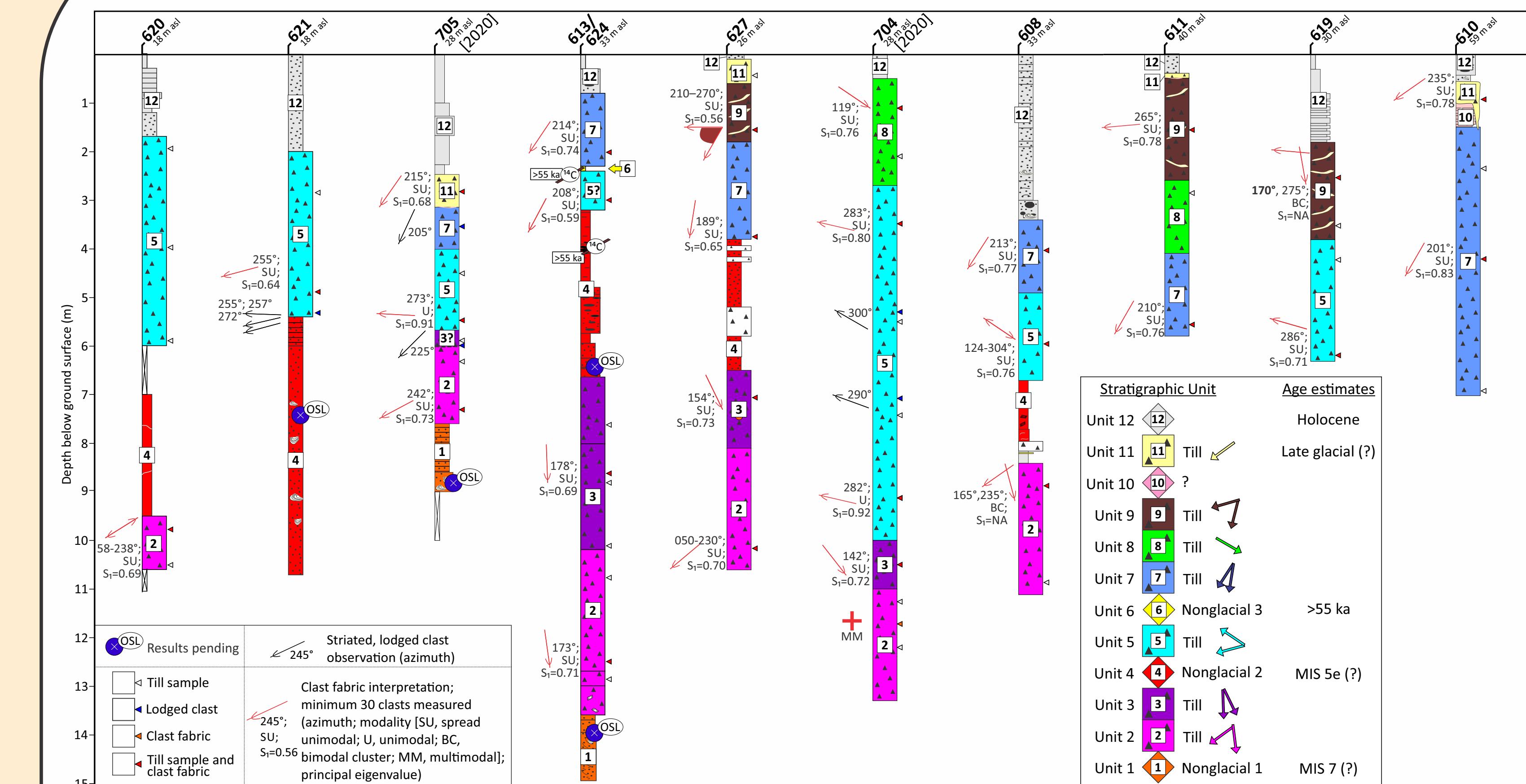
>>till composition analysis, stratigraphic ice-flow indicators and chronology (OSL and ¹⁴C) methods

Study area context

- Inner core region near the geographic centre of the Laurentide Ice Sheet
- Experienced ice-flow from both the Quebec/Labrador and Keewatin domes

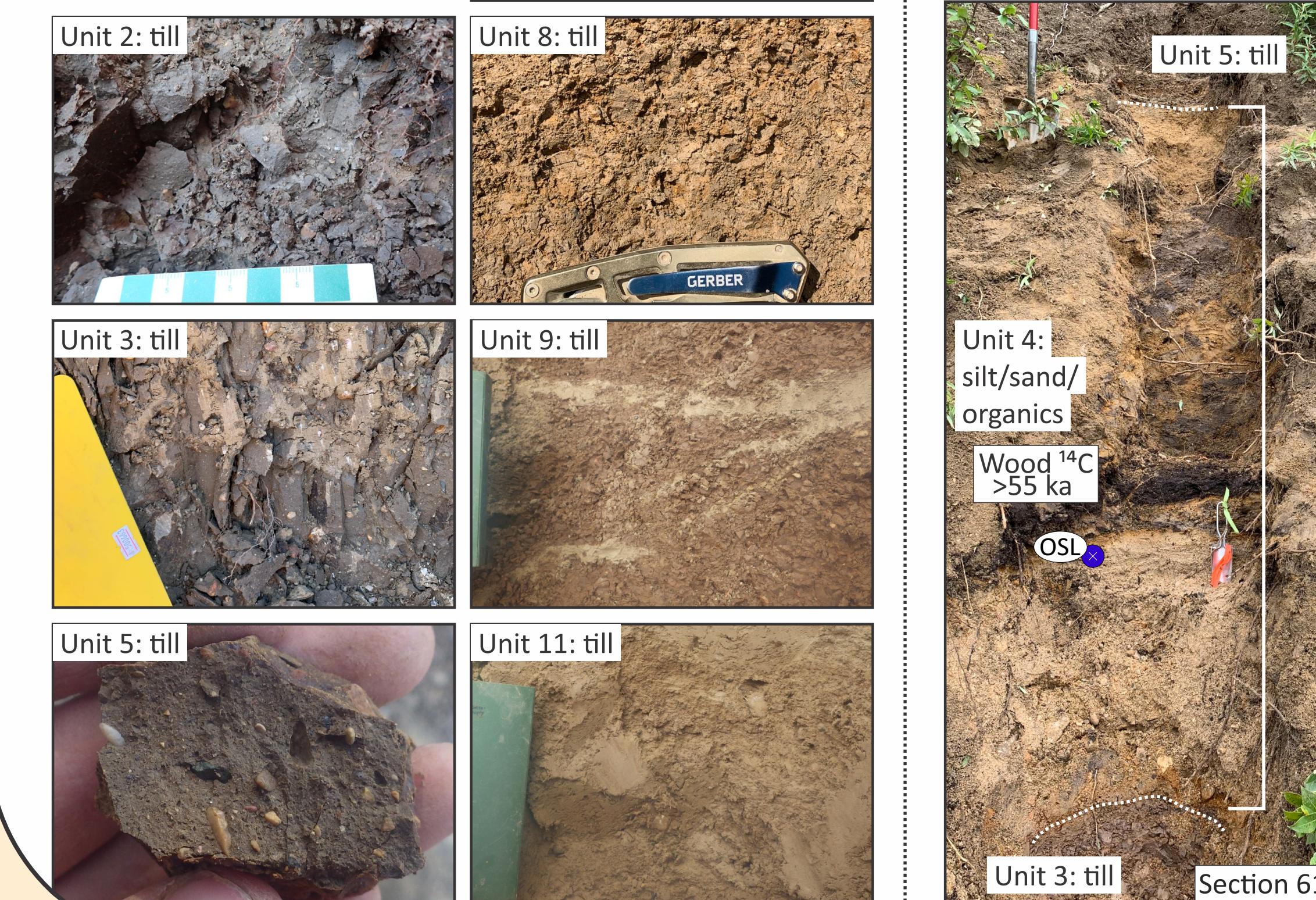


Data and current interpretation of the Machichi River Quaternary stratigraphy

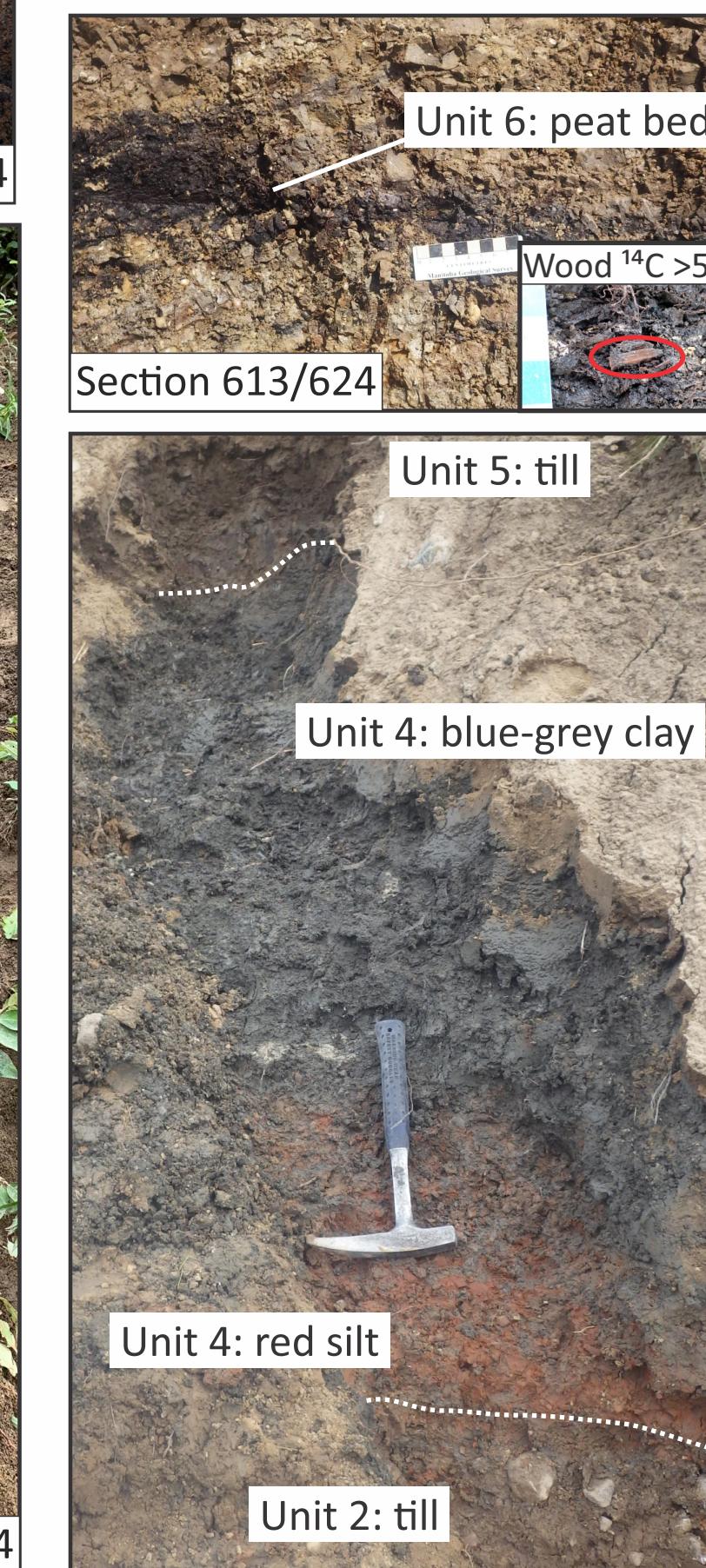


- Ice-flow indicators, sedimentology and stratigraphic relationships delineate 7 till and 3 organic-bearing intertill units
- Units are not laterally extensive or at the same relative stratigraphic position

Machichi River Till units



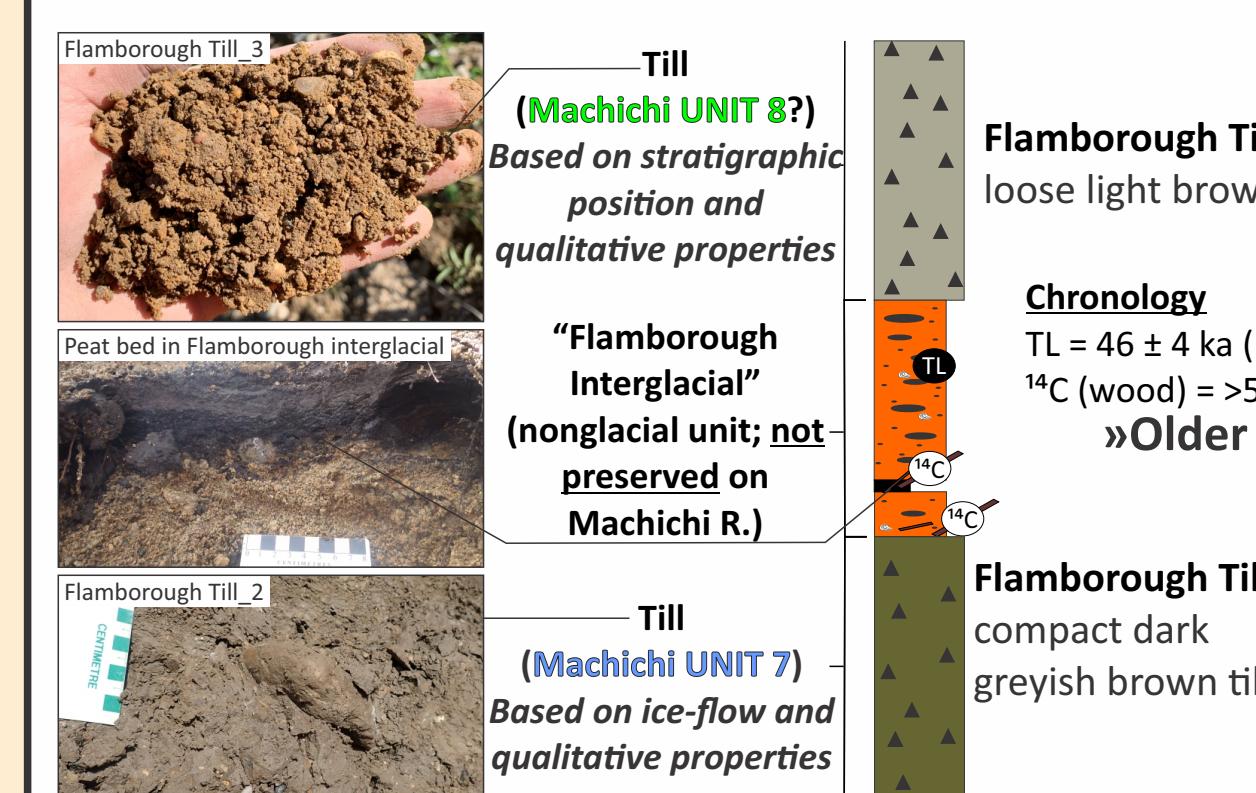
Machichi River Nonglacial units



Application of the Machichi River stratigraphic framework to the Flamborough and Port Nelson intertill nonglacial units

Flamborough nonglacial unit

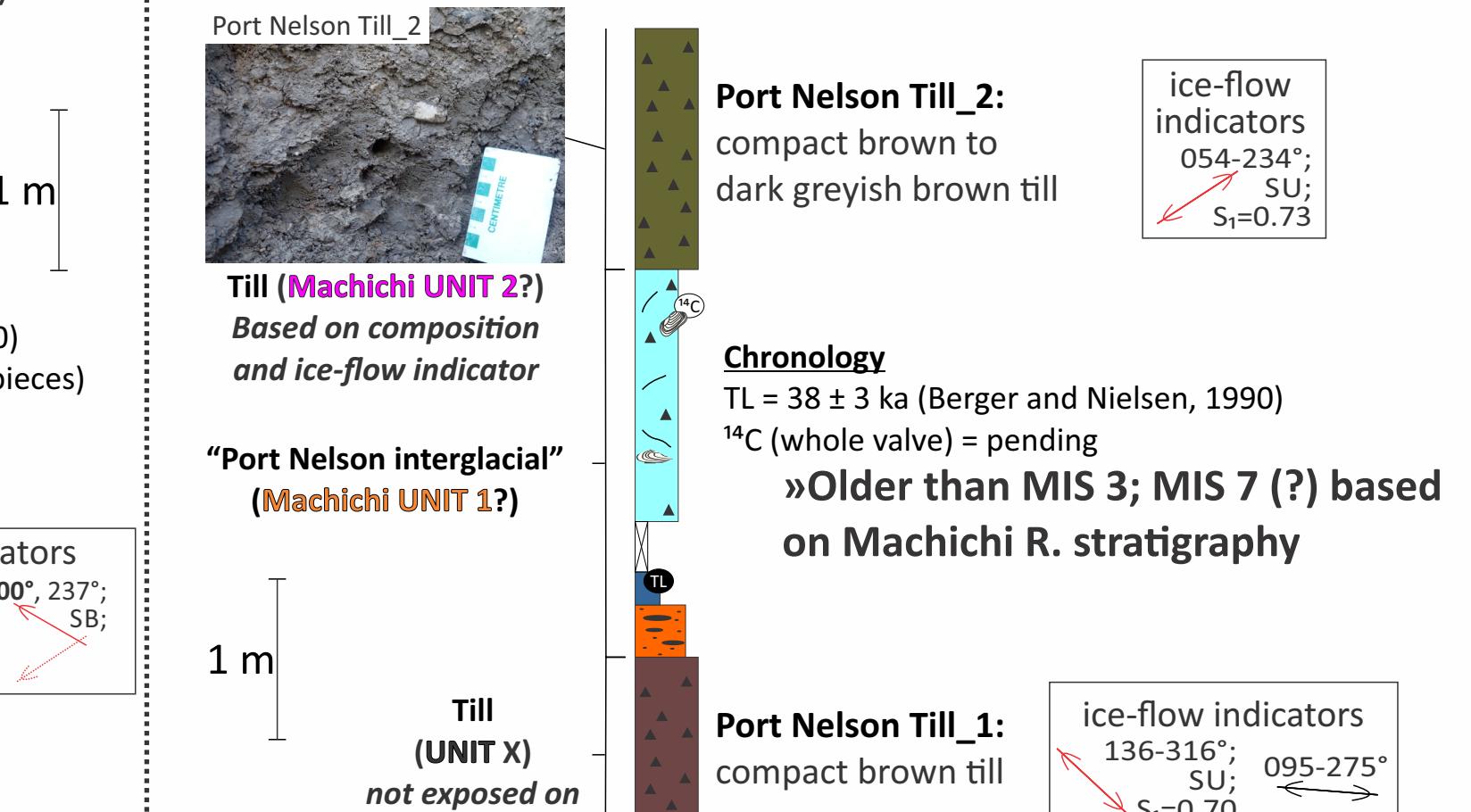
2019/2020 observations (originally described by Dredge et al., 1990)



>>till composition results pending

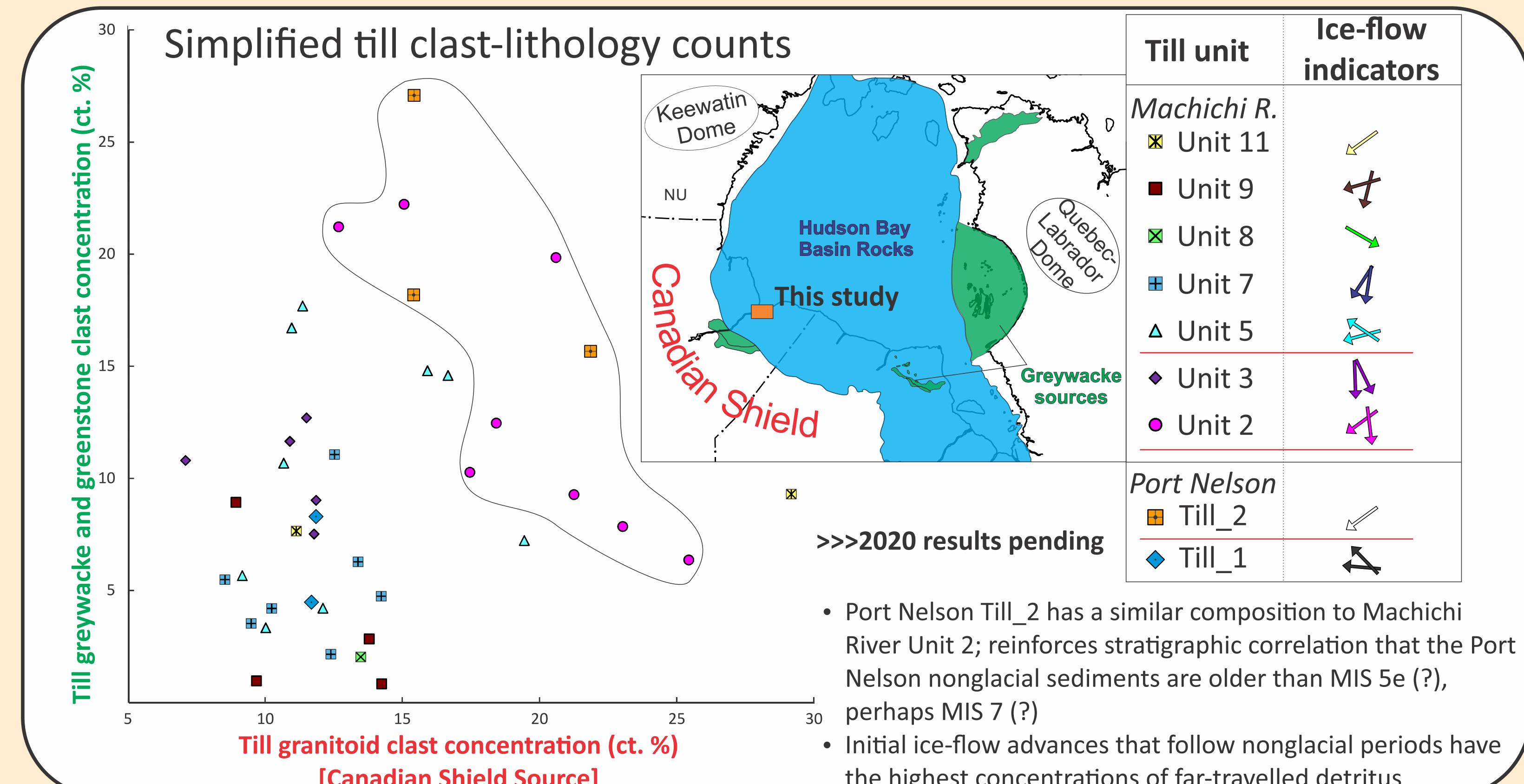
Port Nelson nonglacial unit

Composite based on 2002 and 2020 observations



- Two infinite ¹⁴C ages obtained from wood confirm that the MIS 3 TL ages are underestimations (anomalous fading) and till stratigraphy correlations suggest that these nonglacial units also belong to separate nonglacial periods
- Nonglacial units observed at sections should not be automatically assigned to the last interglacial

Simplified till clast-lithology counts



>>2020 results pending

- Port Nelson Till 2 has a similar composition to Machichi River Unit 2; reinforces stratigraphic correlation that the Port Nelson nonglacial sediments are older than MIS 5e (?), perhaps MIS 7 (?)
- Initial ice-flow advances that follow nonglacial periods have the highest concentrations of far-travelled detritus

Concluding remarks

- The fragmented nature of the stratigraphic record has hindered stratigraphic correlations and the sedimentary archive likely spans a longer time interval
- There are 3 or 4 subtilt organic-bearing nonglacial units within this postage stamp of the HBL stratigraphic record
- Previous MIS 3 TL ages are underestimations and chronological constraints for nonglacial units are needed to facilitate correlations across the HBL
- Future work will further resolve the stratigraphic record with OSL age estimates and continued till provenance analysis (multivariate; provenance tracers)

References

- Berger, G.W. and Nielsen, E. 1990: Evidence from thermoluminescence dating for Middle Wisconsinan deposition in the Hudson Bay Lowland of Manitoba; Canadian Journal of Earth Sciences, v. 28, p. 240-249.
 Dredge, L.A., Morgan, A.V. and Nielsen, E. 1990: Sangamon and pre-Sangamon interglaciations in the Hudson Bay Lowlands of Manitoba; Geographic Physique et Quaternaire, v. 44, no. 3, p. 319-336.
 Dyke, A.S., Andrews, J.T., Clark, P.U., England, J.H., Miller, G.H., Shaw, J. and Vézette, J.J. 2002: The Laurentide and Innuitian ice sheets during the Last Glacial Maximum; Quaternary Science Reviews, v. 21, p. 9-31.