

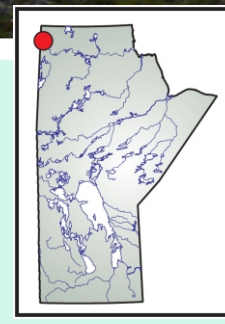
Quaternary geology in northernmost Manitoba - drift exploration in regions of complex ice flow

by **M.T. Trommelen¹**, **M. Ross²**, and **A. Chan³**

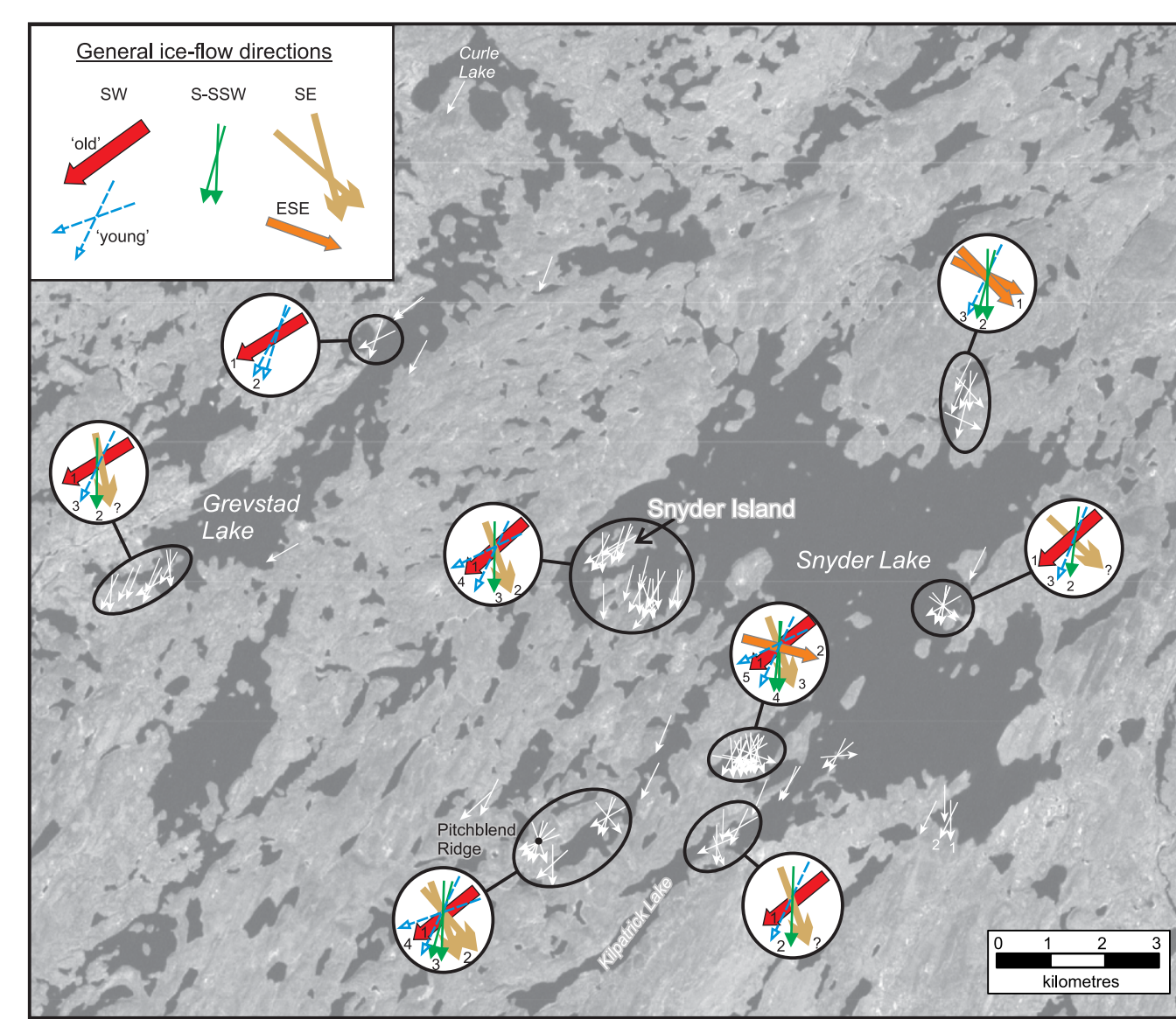
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² Department of Earth and Environmental Sciences, University of Waterloo

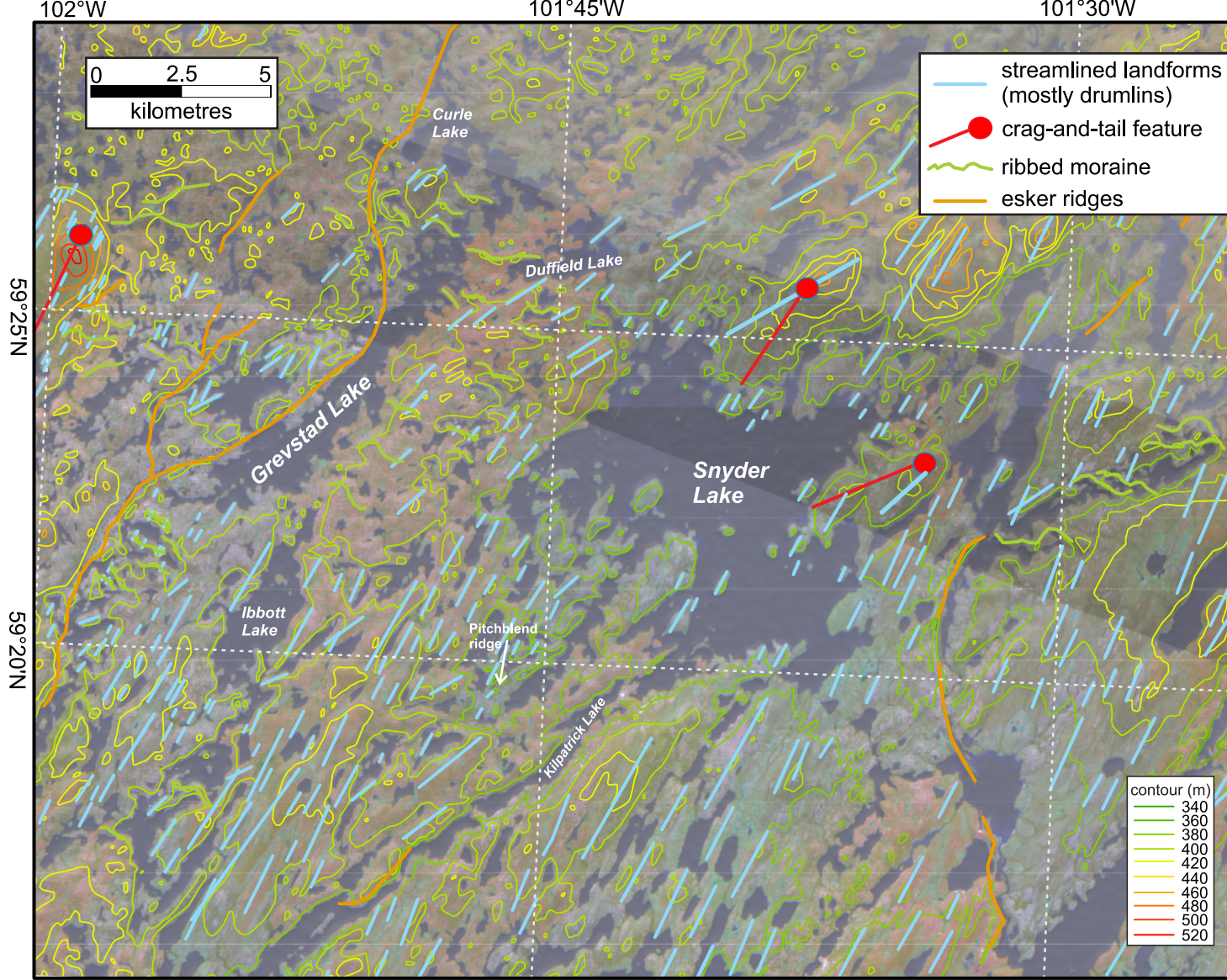
³ University of Manitoba



Northwest Manitoba

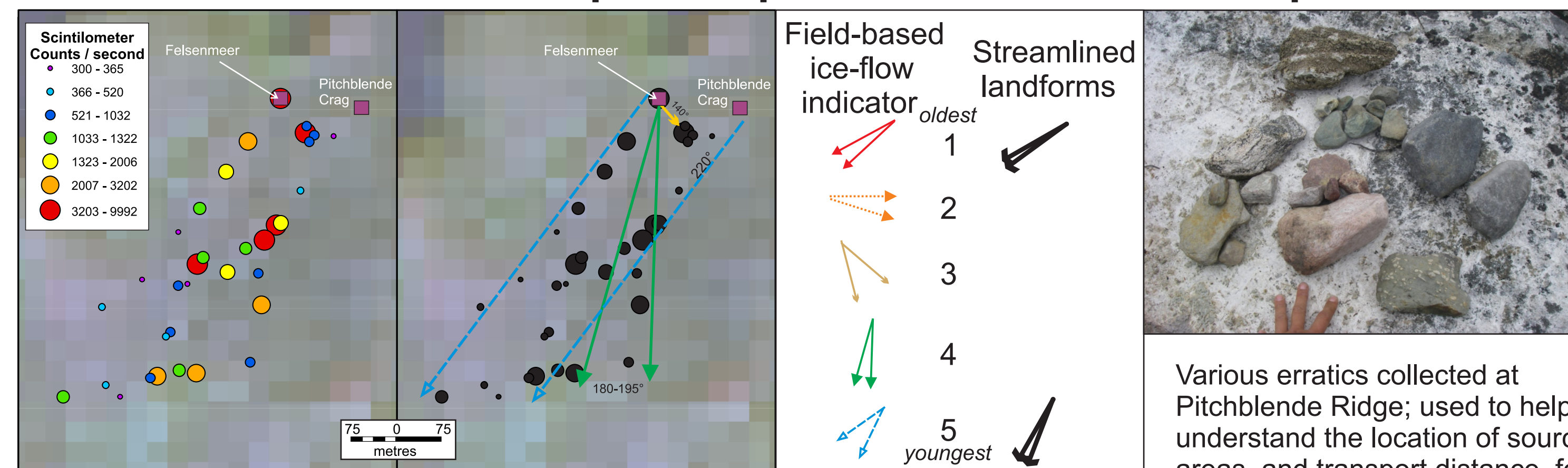


5 field-based ice-flow indicator flowsets



3 streamlined landform flowsets

Short-distance palimpsest boulder dispersal



A boulder study was conducted by traversing a ~450m x ~300m area southwest of Pitchblende Ridge. The objective is to map the extent of boulder dispersal from the 2 outcrops. Mapped boulders have a higher-than background radioactivity.



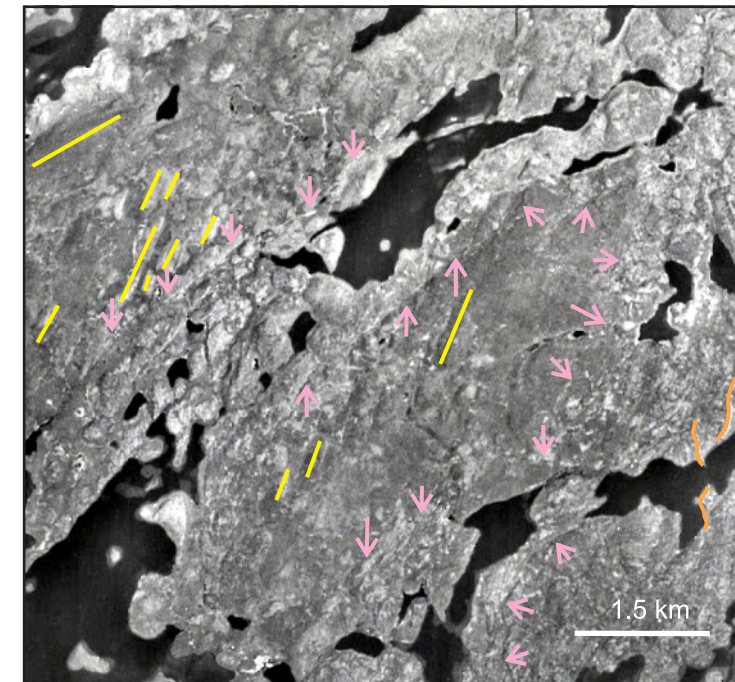
Various erratics collected at Pitchblende Ridge; used to help understand the location of source areas, and transport distance, for till at the site

Watch out for eroded till when sampling

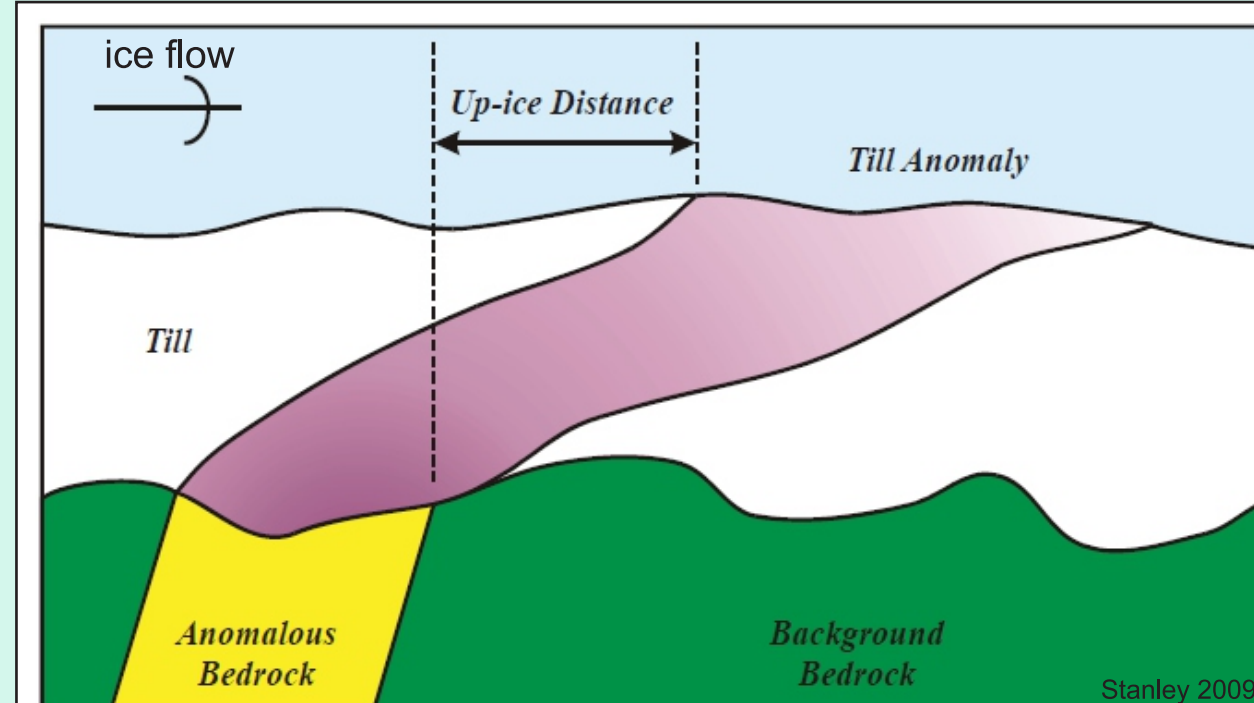


There are numerous 0.1 to 4 km wide meltwater corridors in the Snyder and Grevstad Lake areas. These corridors contained sheet floods during late deglaciation which mostly eroded the landscape.

Material is a mix of till, eroded till and glaciofluvial sediments - not suitable for regional till sampling



Dispersal of mineralized detritus



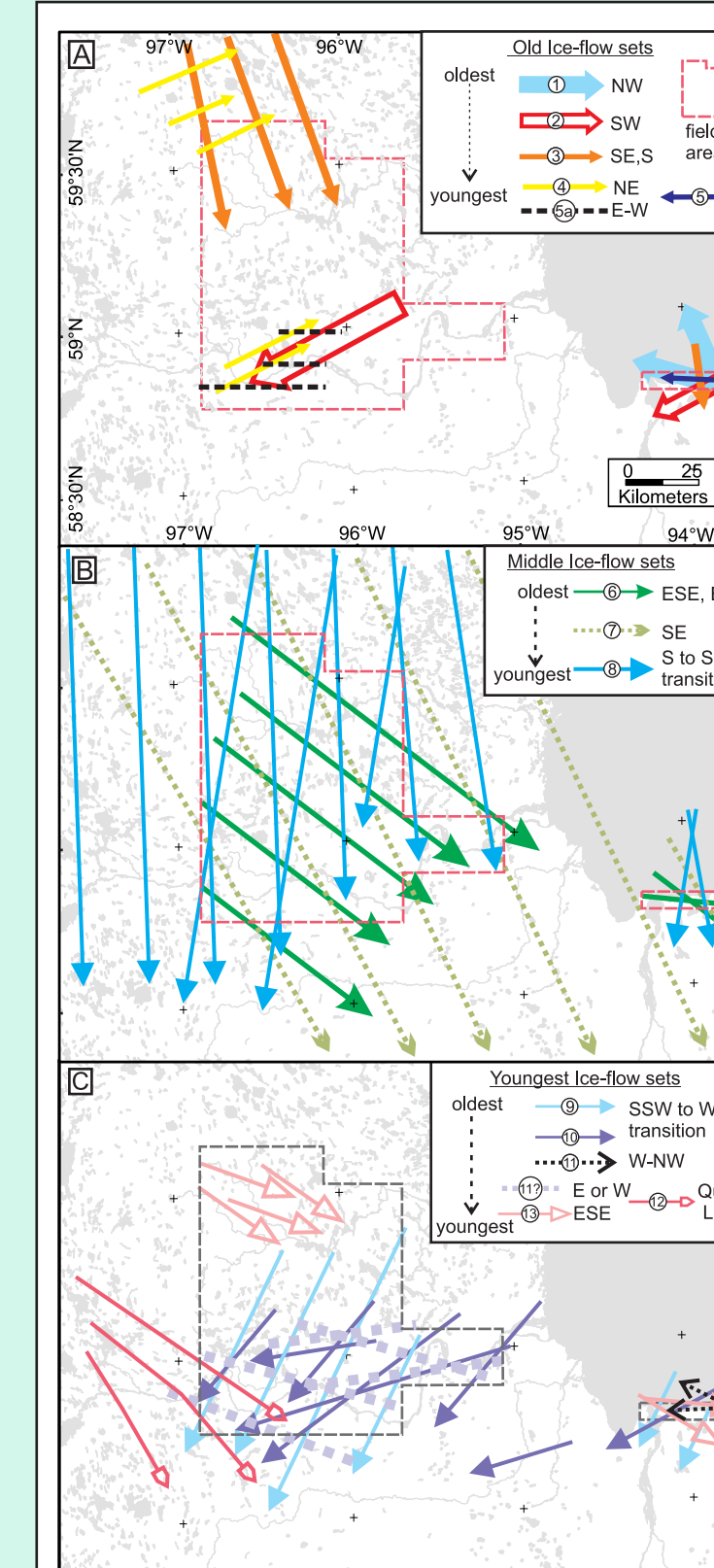
Simplified model of a dispersal train

Systematic increase in element concentrations (from till) in the up-ice direction suggests an increase in source proximity.

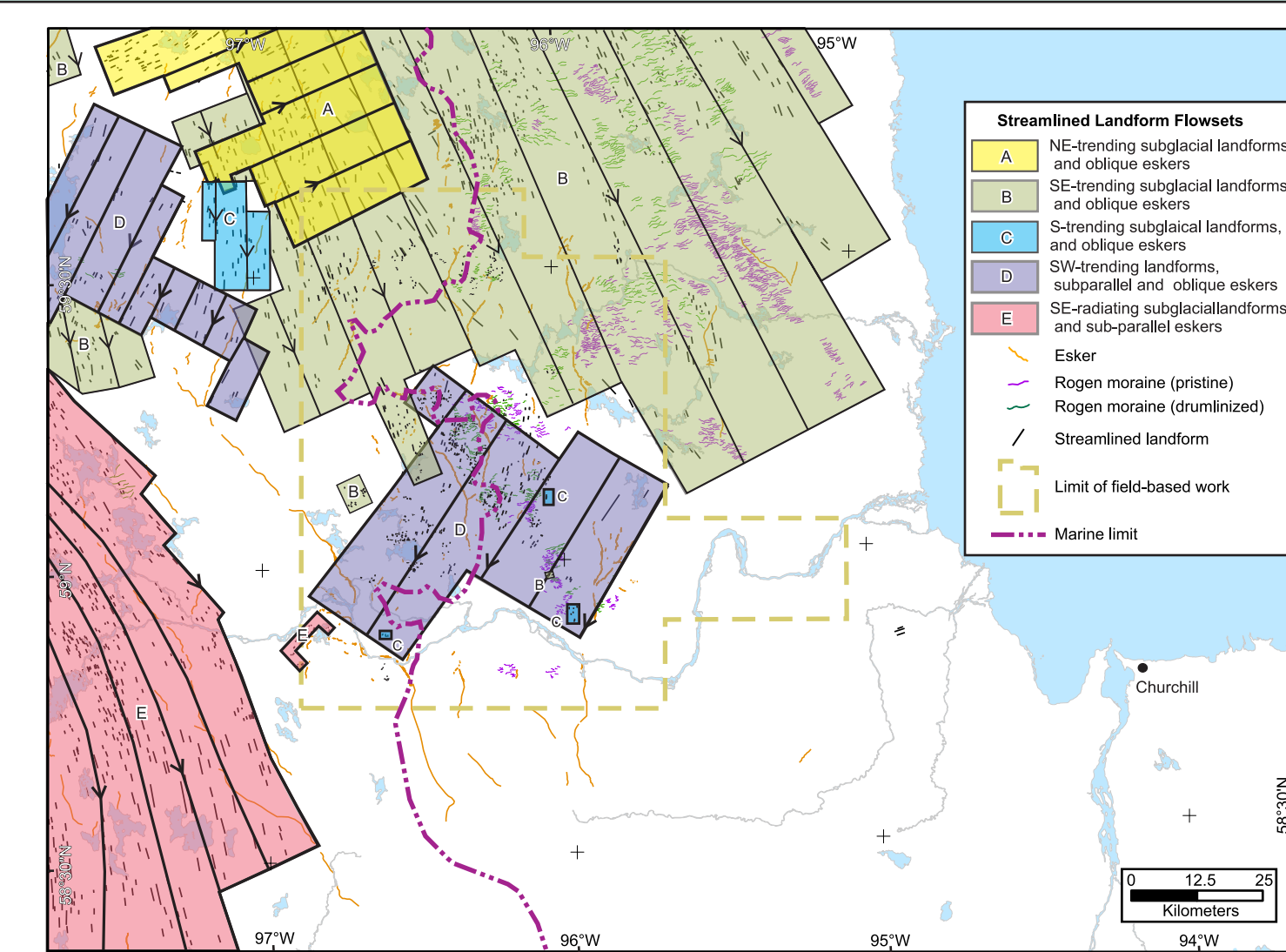
Intensity of dispersal in any direction varies with ice-flow velocity, till thickness, mineralized outcrop shape and exposure, till facies, and more.

Ribbon		1 ice-flow direction Down-ice dispersal in a narrow band.
Palimpsest		2 or more ice-flow directions Significant dispersal in one direction, then re-entrainment and dispersal in a new direction.
Amoeboid		3 or more ice-flow directions Dispersal in one direction, followed by partial to complete re-entrainment in a new direction, and then repeated in yet another new direction.
Relict		2 or more ice-flow directions Dispersal in one old direction followed by dispersal in one or more new directions, with incomplete re-entrainment of a part of the old dispersal train – due to frozen-based (non-moving) or slow, sluggish ice velocities.

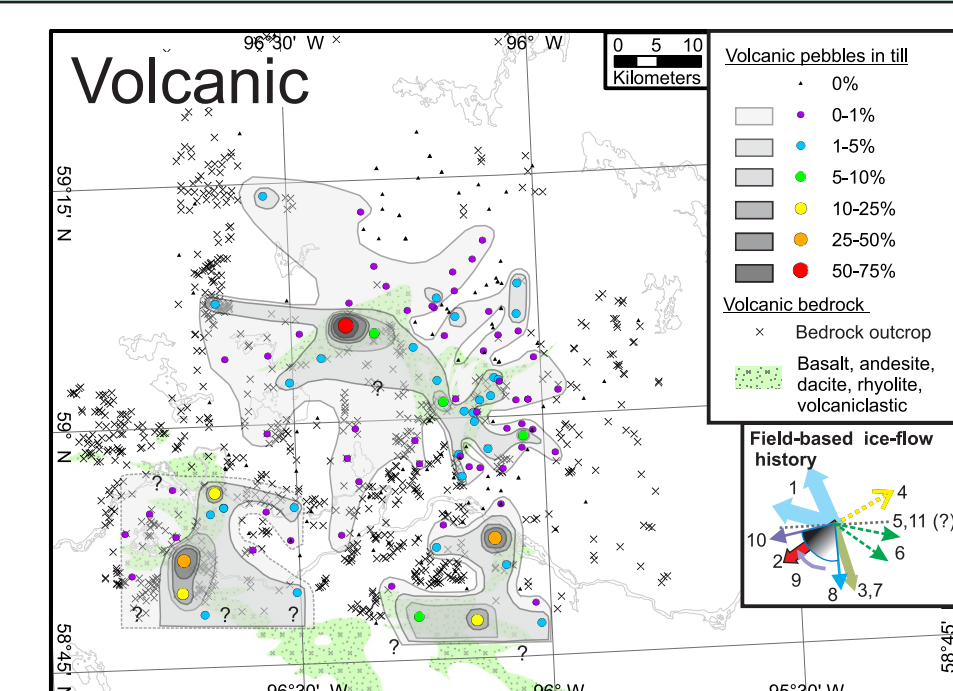
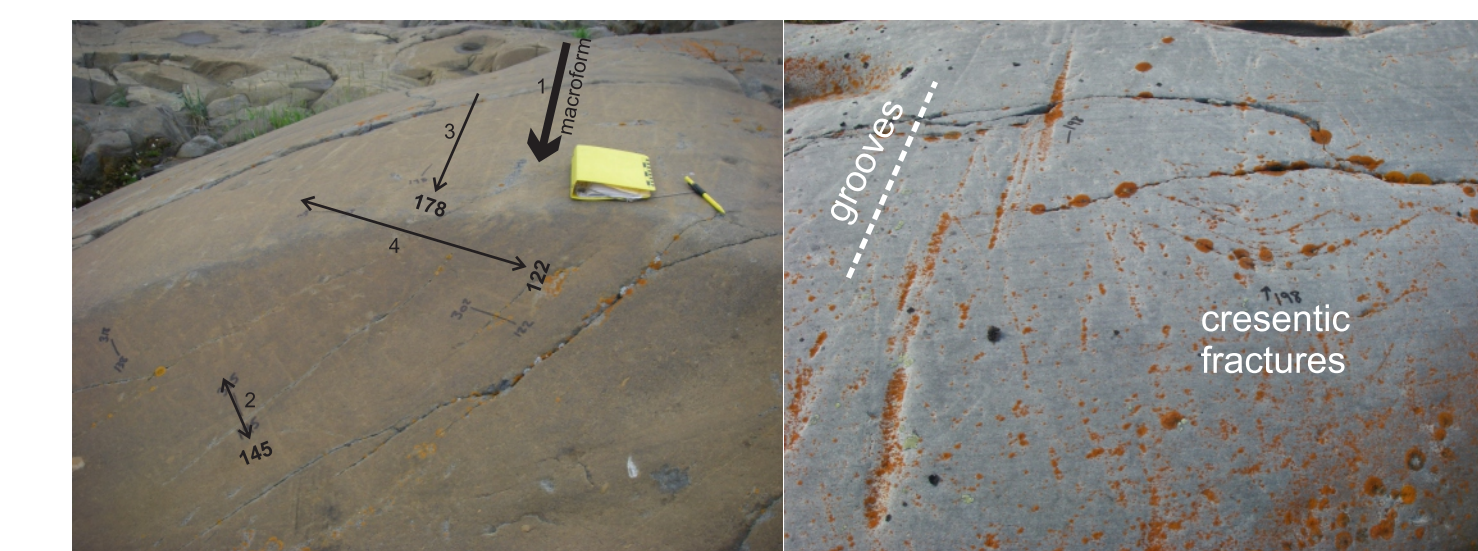
Northeast Manitoba



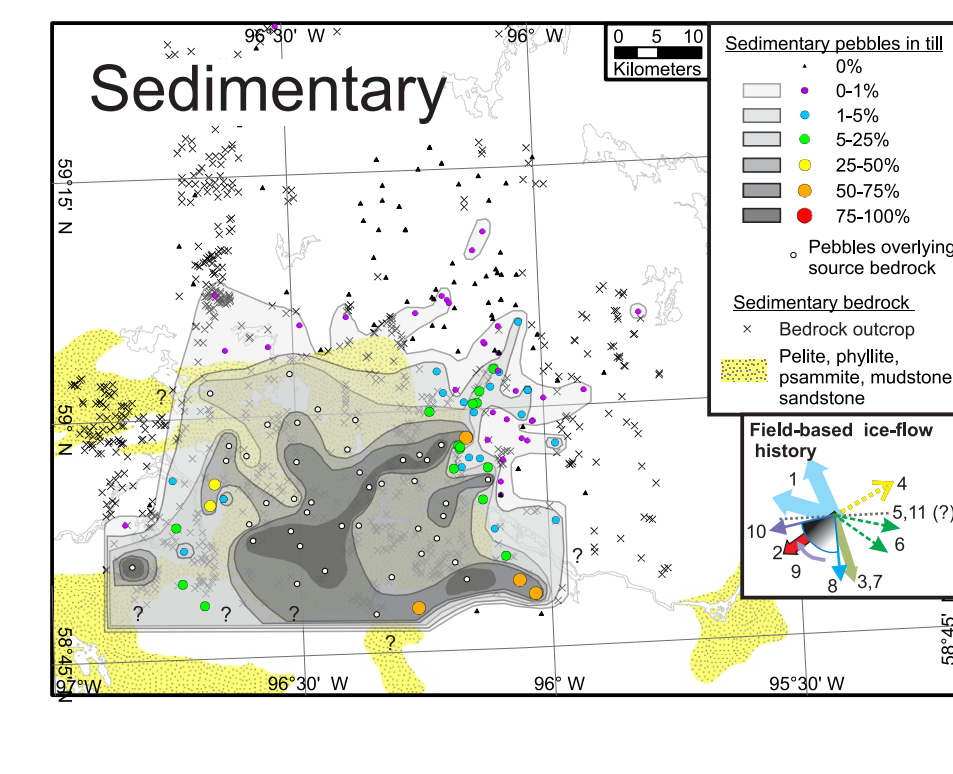
13 Field-based ice-flow indicator flowsets



5 Streamlined Landform Flowsets

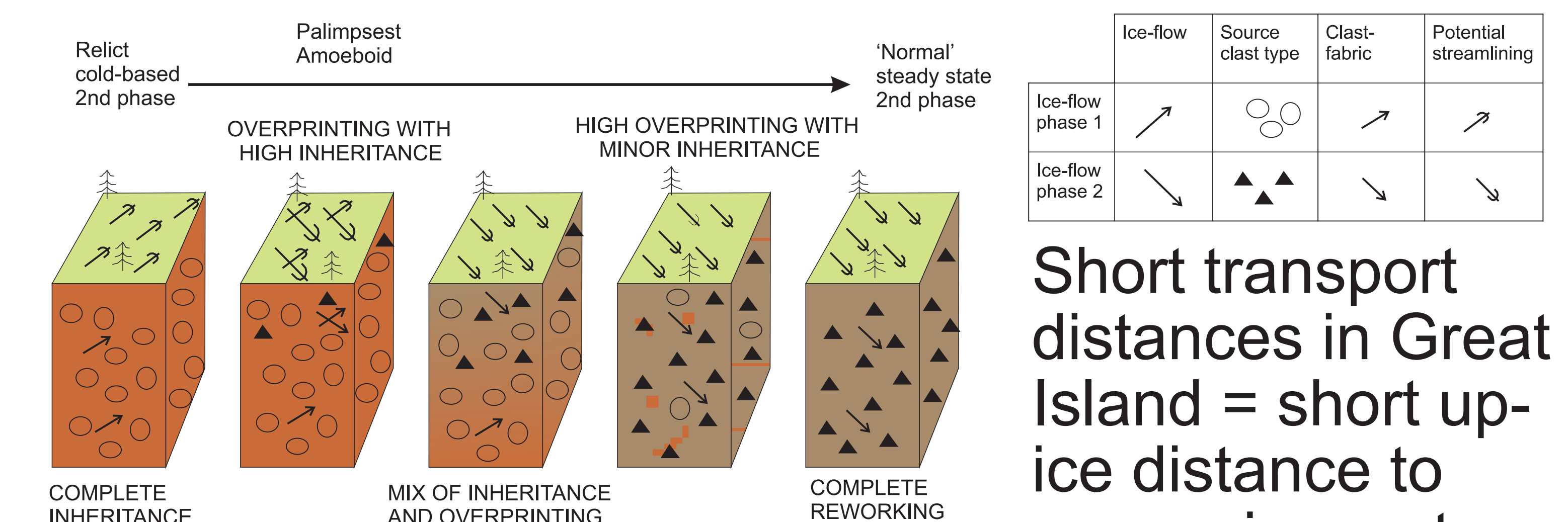


Amoeboid pebble dispersal, with 3-15 km transport distances to the NW, NE, E, SE, SW, and W



What does it mean?

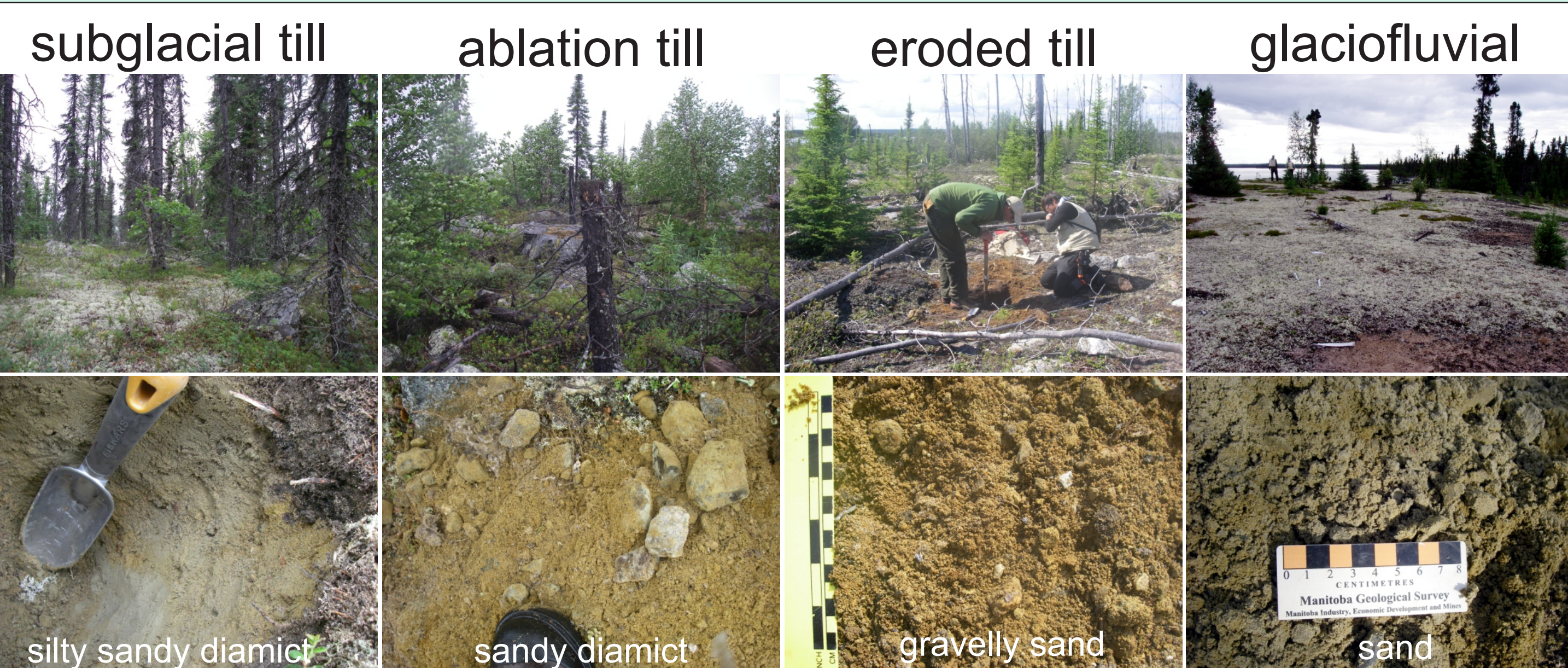
Generally thin till reflective of local bedrock, but with varying degrees of re-entrainment of previously deposited till (amoeboid, palimpsest and relict dispersal types)



Short transport distances in Great Island = short up-ice distance to source in most cases

References

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Know what you are sampling - different facies have different properties and shouldn't be analysed as one data set.



Acknowledgements

These two projects were completed as a partnership between the Geological Survey of Canada (Far North GEM project), the Manitoba Geological Survey and the University of Waterloo. Advice from J. Campbell (GSC) is greatly appreciated. Samples were prepared by the GSC Sedimentology Laboratory