# Prospecting Under Cover: Glacial Dispersal

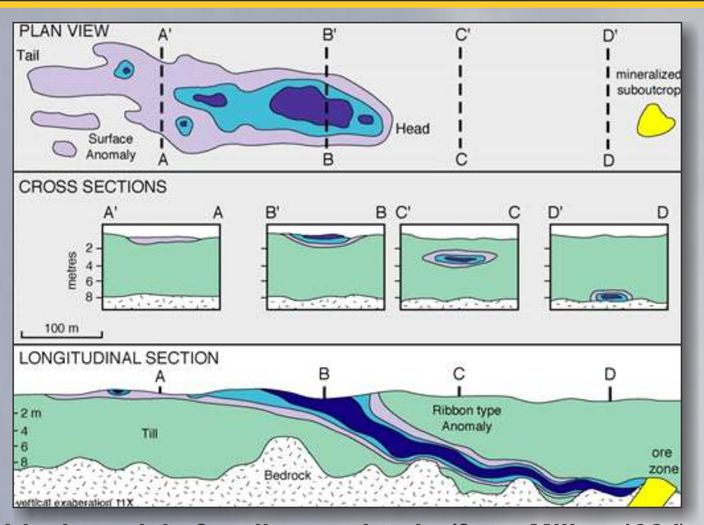
GEOLOGICAL SURVEY
NEWFOUNDLAND AND LABRADOR
*Celebrating 150 years*

Newfoundland Labrador
Natural Resources

Glacial dispersal includes the entrainment, deposition, and transport of glacial debris. If the bedrock source of this debris is visually or chemically distinctive, the path of ice movement may be recorded as a dispersal train which can be mapped using clast fractions (> 5mm: pebbles, cobbles, boulders), till (< 0.063 mm: geochemistry for diagnostic elements), and heavy minerals (0.25 to 2.0 mm).

The size, shape, orientation, and composition of glacial dispersal trains provide data on the specific location of the source of glacial dispersal and distances of glacial transport, whereas ice-flow mapping (striations and oriented landforms) only indicate the general direction of ice-flow.

## Glacial Dispersal Trains




***Ideal model of a dispersal train (from Miller, 1984*).**

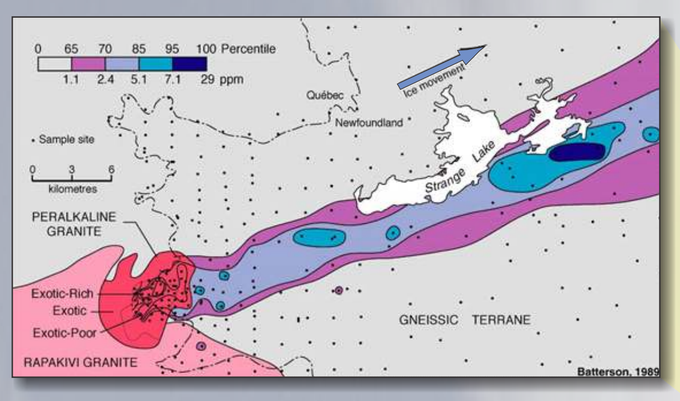
A mineralized dispersal train, defined by distinct boulders or anomalous geochemical samples, is typically an elongated lens of till, oriented parallel to ice flow and often hundred or thousands of times larger in area than the bedrock mineralization from which it is derived, making such features easier to detect, especially in drift-covered areas.

Near the source, at the 'head' of the train, concentrations of mineralization-derived material are greatest; further down-ice, towards the 'tail' they decline gradually to near normal levels. The third dimension, vertically through the till, is critical to the understanding of the dispersal train, and the focusing of trenching or drilling.

## Glacial Dispersal Patterns in Newfoundland and Labrador

The island of Newfoundland, and Labrador, have very different glacial histories which are reflected in their glacial dispersal patterns. The island was covered by multiple coalescent ice caps which are generally represented by short, diffuse dispersal patterns. Dispersal trains are commonly less well-defined, especially geochemically, due to compositional similarities between adjacent rock units.

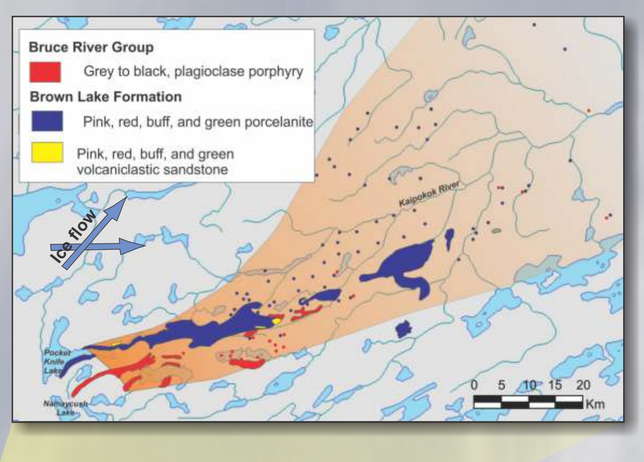
Labrador was covered by the eastern sector of the continental-scale Laurentide Ice Sheet with a dispersal centre in western Labrador. The shape and orientation of glacial dispersal trains in central Labrador are related to their location within the ice sheet. Dispersal patterns have an amoeboid pattern in the Labrador Trough, for example, shown by a series of dispersal trains in several directions, commonly of limited extent. Dispersal trains away from the ice dispersal centre are commonly longer and ribbon-shaped (e.g., Strange lake) or fan-shaped (e.g., Central Mineral Belt).



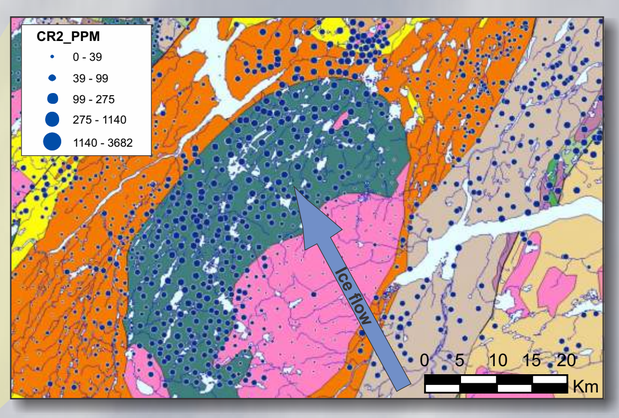

**Strange Lake, northern Labrador**

- Peralkaline granite-hosted mineralization discovered through boulder tracing during follow-up studies of lake-sediment anomalies.
- Ribbon-shaped (> 40 km long) geochemical and clast-dispersal trains from highly mineralized source over a plateau terrane from a single ice-flow direction (070°) towards the coast.
- Geochemical patterns for Be, Pb, U, Th, Y, and Zr and many other elements match train delineated by mineralized clasts.
- Clast concentration is highest on crag-and-tail hills (> 5 km long) on plateau.
- Atypical of dispersal in Newfoundland and Labrador.

**Moran Lake, Central Mineral Belt, Labrador**




- Uranium, base-metal and precious-metal exploration.
- Regional northeastward ice-flow event followed by topographically controlled eastward ice flow.
- Cross-cutting striations suggest limited erosion.
- Distribution of porcelanite and plagioclase porphyry clasts produce the clearest dispersal patterns.
- Dispersal trains are oriented eastward near Moran Lake (*i.e.*, parallel to most recent flow), but deflected northeastward (fan-shaped, 'dog-leg' pattern) east of Moran Lake, interpreted to reflect weakening influence of the eastward flow.




**Grand Falls - Glenwood, central Newfoundland**

- Mount Peyton Intrusive Suite: grey fine- to medium-grained gabbro ( ) and pink biotite granite ( ).
- Three ice-flow phases: an early regional eastward flow, a later regional north to northeastward flow, and a more recent eastward flow (recorded by fine striations overprinting those produced by the regional events).
- Dispersal of clasts and till geochemistry controlled by regional northward ice-flow.
- Glacial dispersal shown by low Cr in southern parts of the intrusive complex, and high values above the northern edge, interpreted to reflect dispersal of Cr-poor till (derived from Botwood Group sedimentary rocks ( )) over the SW edge of the batholith and dispersal of Cr-rich till from the batholith over Botwood rocks in the north. In both cases, dispersal distances are less than 5 km.

**Bay d'Espoir, southern Newfoundland**

- A ribbon-shaped Cr dispersal train, identified from lake-sediment data, appears to originate from several small ophiolite belts (shown in blue).
- Southward ice-flow (recorded by striations and bedrock stossing) in area where fast-flowing ice (ice streaming) may have played a role in dispersion.