A PRELIMINARY REPORT ON DRIFT PROSPECTING STUDIES IN LABRADOR [1]

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Abstract

A study of glacial history and till geochemistry was begun in east-central Labrador during 1982. Field observations, chiefly of striae trends, indicate that regional directions of ice movement were eastward to southeastward in the southern part of the area, and northeastward in the northern part. Erratics of sedimentary rock derived from bedrock located west of the study area can be a significant component of glacial sediments.

Introduction

During 1982, the Geological Survey of Canada began a study of Quaternary geology in east-central Labrador that is designed to identify directions of ice movement, regional variation in till composition, and geochemical properties of till. This work is intended to provide a basis for future mineral exploration using glacial deposits in Labrador. This report is a preliminary account of field operations and observations; no laboratory results are presently available. Observations of ice flow direction and lithology of erratic clasts presented here provide a basis for determining the provenance of glacial dispersal trains, and for understanding variations in till composition.

Acknowledgments

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Location and Geology

The area studied is located in east-central Labrador and includes the west half of Rigolet (13J) and east half of Snegamook Lake (13K) map areas (Fig. 49.1). It occupies parts of the Nain and Grenville structural geological provinces and is underlain by Aphebian acidic intrusive and metamorphic rocks, Helikian and Aphebian sedimentary and volcanic rocks of Aillik and Croteau groups, Aphebian and older metamorphic rocks of quartzo-feldspathic lithologies, and Helikian and Aphebian metamorphic equivalents of Labrador Trough rocks and Seal and Croteau groups (Greene, 1974, Fig. 5). Uranium occurrences are known at various locations within the area, and include the Michelin deposit (Gandhi, 1978).

Previous Work

Few published Quaternary studies have been directly concerned with the area of Labrador described here. Surficial materials have been mapped at 1:250 000 scale by Fulton et al. (1980a, b). A brief report on ice flow directions in the central part of the study area has been given by Vanderveer (1982).

Methods

During August 1982, a field program of Quaternary geological mapping and till sampling was carried out in the study area using helicopter support. Base camp was located at 'Melody Lake', about 70 km southwest of the community of Makkovik (Fig. 49.1). During reconnaissance mapping flights, till samples were collected systematically at a density of about one per 10-20 km^2. Coverage of the entire area, however, was not uniform. Near known trains of mineralized boulders and sites of bedrock mineralization, sample density was increased to about one per 1-2 km^2. At this higher density it was more difficult to locate suitable landing sites and further decrease in spacing between samples was not practical. Near one boulder train, samples were collected at spacings of 75-250 m on foot traverses oriented perpendicular to directions of regional ice flow.

Pits were dug in till to depths of 40-100 cm, and samples were collected from the least oxidized soil horizon near the pit base. In all cases an attempt was made to sample below the zone of obvious iron staining, although commonly either bedrock or large clasts restricted sampling to the oxidized zone. Where soils were well developed, or where sample sites were located near known mineralization, multiple samples were collected from each pit and identified with regard to depth of burial and position within the weathering sequence. In all, 225 samples were collected.

Where possible, measurements of striation orientations and examination of lithologies of erratic clasts were made at the collection sites. In general, observations of this kind were best made in exposed locations where vegetation did not obscure outcrops and boulders.

Results and Discussion

Direction of Movement

Within the study area glacial striae vary in orientation from about southeast to northeast (Fig. 49.1) and are similar to patterns of ice flow outlined by Prest et al. (1968). Based on the streamlined shape of outcrops, ice flow had an eastward component and no evidence of westward movement was observed. Most measurements were made on hilltops, and the striae are thought to be the product of regional ice movement. They are, for the most part, aligned with the long axes of topographic ridges, suggesting a relation between landform and ice flow direction. At some locations,

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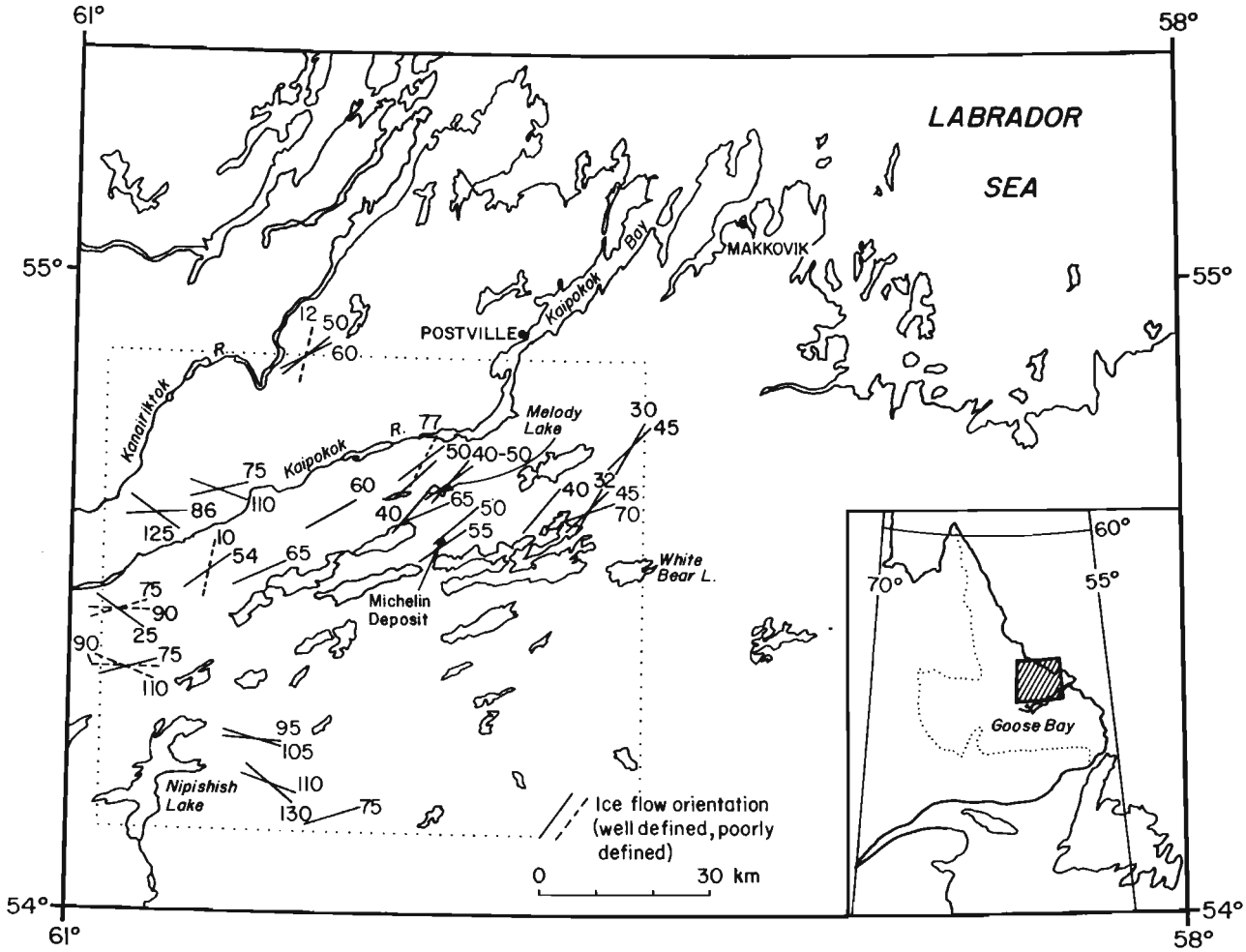

Figure 49.1. *Ice flow trends within the study area (outlined), based chiefly on glacial striae. Regional movement is thought to be generally eastward, based on streamlined bedrock landforms. Numbers indicate orientation in degrees east of north; magnetic declination N32°W assumed throughout the study area.*

however, for example in the area of Melody Lake, striae were oriented obliquely to the trend of valleys and ridges, and obliquely to directions of ice flow indicated by ribbed moraine deposits which trend across valley floors. There, the ribbed moraine may have been formed later than the striae on neighbouring hilltops, during a phase of ice flow that was controlled topographically.

Several striae orientations were commonly observed at each site, with one set being more common and better developed than all others. If the best developed sets are contemporaneous and formed during the same phase of flow, the data indicate collectively that ice entered the area from the west and northwest, and moved easterly to southeasterly across the southern part of the area, and northeasterly across the northern part. Ice in the northern part moved towards the valley of Kaipokok River and Kaipokok Bay, and these low-lying areas were likely main pathways of ice movement to the outer coast.

Other striae, which are presumed to be older because they are fewer in number and do not occur in the glacial polish of outcrops, indicate a west-east trend of ice movement. At two sites poorly developed striae of possible glacial origin trended nearly north-south, although directions of ice movement during that phase of ice flow are not known; this trend was also shown by a single measurement made by Vanderveer (1982, Fig. 2).

Lithologies of Erratics

At many sites, erratics of distinctive appearance were found, some of which are not known to have bedrock sources within the study area. The types of erratics identified most easily include red and pink quartzite, red arkose, mudstone, and polymictic conglomerate; of these, the quartzites were found throughout the study area, the others were seen chiefly in the northwestern part. The erratics of red quartzite are most likely derived from Helikian sedimentary formations lying west of the study area, possibly the Red Quartzite Formation of the Seal Group. They are up to ten per cent by weight of the 4-6 mm size fraction of till samples, and they demonstrate that till of the study area can have a significant component of far-travelled (>50 km) debris. The other sedimentary erratics, mentioned above, are most likely derived from sedimentary rocks of the Croteau Group that outcrops near the headwaters of Kaipokok River.

Conclusions

This study is currently at a preliminary stage and conclusions presented here are based chiefly on field observations. The main conclusions are:

1. During the last regional glaciation ice moved into the study area from the west and northwest. Flow directions were generally towards the east and southeast in the southern part, and towards the northeast in the northern part of the study area. In some areas later ice flow may have been channelled topographically within valleys, based on orientations of ribbed moraine.

2. Erratics derived from bedrock sources located west of the study area include sedimentary rocks such as red quartzite, and this far-travelled (>50 km) debris can constitute significant proportions of till.

References

Fulton, R.J., Hodgson, D.A., Mining, G.V., and Thomas, R.D.
1980a: Surficial materials, Rigolet, Labrador; Geological Survey of Canada, Map 26-1979, scale 1:250 000.

Fulton, R.J., Hodgson, D.A., and Mining, G.V.
1980b: Surficial materials, Snegamook Lake, Labrador; Geological Survey of Canada, Map 29-1979, scale 1:250 000.

Gandhi, S.S.
1978: Geological setting and genetic aspects of uranium occurrences in the Kaipokok Bay-Big River area, Labrador; Economic Geology, v. 73, no. 8, p. 1492-1522.

Greene, B.A.
1974: An outline of the geology of Labrador; Information Circular No. 15, Department of Mines and Energy, Newfoundland, 64 p.

Prest, V.K., Grant, D.R., and Rampton, V.N.
1968: Glacial map of Canada; Geological Survey of Canada, Map 1253A, 1:5 000 000.

Vanderveer, D.G.
1982: Reconnaissance glacial mapping in the Melody Lake – Anna Lake area, Labrador; in Current Research, Report 82-1, ed. C.F. O'Driscoll and R.V. Gibbons; Department of Mines and Energy, Newfoundland and Labrador, p. 235-236.