



OPEN FILE 3502

## **SUBSURFACE AND SURFACE DISTRIBUTION OF PROTEROZOIC UNITS, NORTHWESTERN NWT: A CAMBRIAN SUB-CROP MAP**

**Bernard C. MacLean and Donald G. Cook**  
**Geological Survey of Canada (Calgary)**

NTS: 85 M,N,O;  
86B to G, J to O;  
87A(W), B, C, D(W);  
95M,N,O,P;  
96;  
97A,B,C,D;  
105M,N,O,P;  
106;  
107A,B,C,D

Note: Although every effort has been made to ensure accuracy, this Open File Report has not been edited for conformity with Geological Survey of Canada standards.

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Seismic analysis of Proterozoic strata underlying the northern Interior Plains, integrated with published outcrop data, permits the interpretation of a pre-Cambrian geological map extending from the northern Cordillera to Coppermine Homocline and Victoria Island.

The most striking feature on the map is a large east-west trending arch flanked by Neoproterozoic Sequence B strata (Shaler Supergroup to the north, e.g. Seismic Line A; Mackenzie Mountains Supergroup to the south and southwest, e.g. Lines E, G). Four small outliers on the arch (e.g. Lines C and F) indicate that sequence B was deposited across the region but has been largely eroded from the crest of the arch in latest Proterozoic time. The arch is interpreted to plunge to the west, but closure around the western nose is not well-constrained.

Strata within the arch are assigned, from oldest to youngest, to the Hornby Bay Assemblage (correlated with the Hornby Bay Group on Coppermine Homocline and the Wernecke Supergroup in the Cordillera), the Dismal Lakes Assemblage (correlated with the Dismal Lakes Group on Coppermine Homocline), and the Coppermine River Assemblage (correlated with the Coppermine River Group on Coppermine Homocline).

The Hornby Bay Assemblage is subdivided into three units each of which has an apparent counterpart on the Homocline. The Basinal Unit correlates with Lady Nye Formation and older strata; the Platformal Unit correlates with the platformal East River Formation; and the Syntectonic Unit correlates with the syntectonic Kaertok Formation. Steeply dipping thrust faults offsetting Hornby Bay strata on Coppermine Homocline are assigned to the ca. 1663 Ma Forward Orogeny. Counterpart structures in the subsurface are buried by Dismal Lakes Assemblage. They have no expression at the level of exposure of this map, but are imaged on Lines B, C, & D.

Subdivision of the Dismal Lakes Assemblage into lower, middle, and upper

units permits the definition of a variety of folds affecting the central area of the arch. The units occur in a westward thickening stratigraphic package but seismic quality deteriorates both eastward and westward and detailed relationships of facies changes and potential overstepping are obscure. The absence of regionally persistent markers in the Dismal Lakes Assemblage precludes unit-to-unit correlation with the Dismal Lakes Group on Coppermine Homocline. Dismal Lakes and Hornby Bay assemblages are both undivided in two large areas of poor seismic data quality, one west of Mackenzie River, the other east of Norman Wells.

Dismal Lakes syn-depositional extension is marked by a few large half-grabens (e.g. Line D). This phase of extension may be weakly expressed on the homocline by thickness variations in the Dismal Lakes Group.

Basalts encountered in three wells are correlated with the Coppermine basalts. In the subsurface a layered sequence of basalt and/or equivalent sedimentary strata (Coppermine Homocline Assemblage) overlies an unconformity (Lines F and D), whereas on the homocline the Dismal Lakes/basalt contact appears conformable. Both subsurface and surface basalts are offset by extension faults which are probably related to the emplacement of the 1267 Ma Mackenzie Dyke swarm.

Two generations of long-wavelength folding affected the region. The older post-dates the Coppermine basalts and is expressed in the subsurface by a synclinal depression (Line D) and on the homocline by a prominent syncline which is truncated by the unconformable base of the Shaler Supergroup. The younger fold phase affected Sequence B and is recorded by folds in Brock Inlier. In the subsurface this phase of folding is expressed by the four synclinal outliers of Sequence B strata noted above and by a prominent syncline parallel to the Mackenzie River in the south-central part of the map-area. The long-wavelength fold phases are not well understood but appear to have generally northerly trends.