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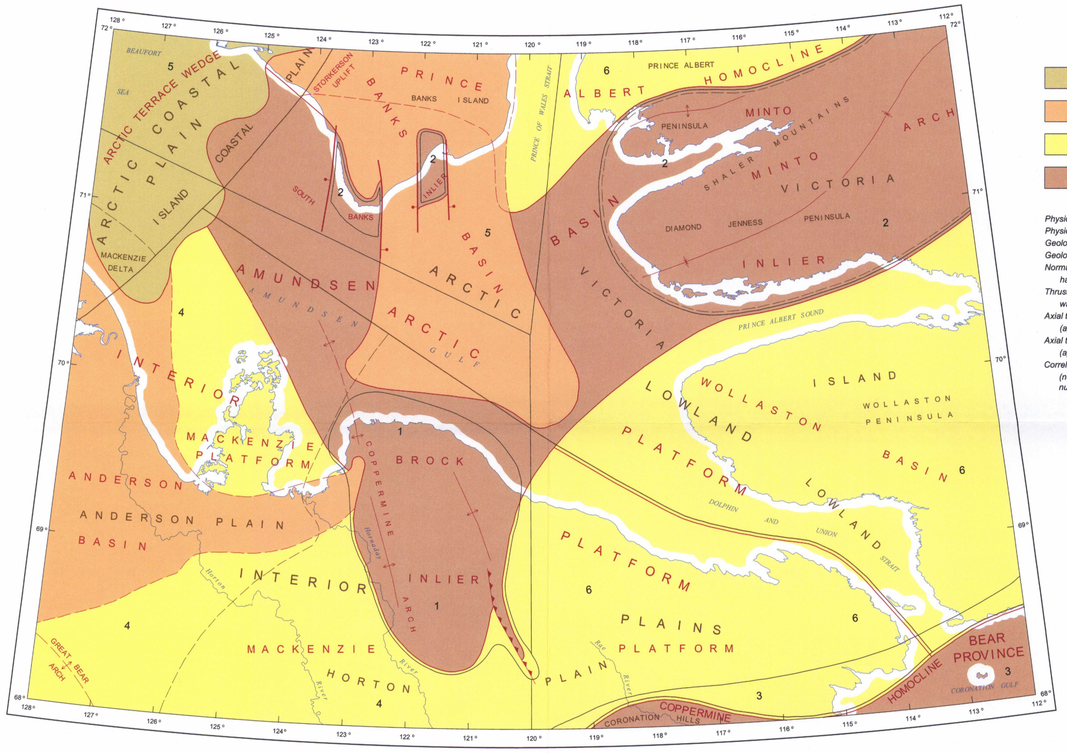
Geological Survey of Canada
Commission géologique du Canada



PHYSIOGRAPHIC AND TECTONOSTRATIGRAPHIC FEATURES

LEGEND

- Cenozoic continental shelf
- Phanerozoic sedimentary basin
- Phanerozoic platform
- Proterozoic sedimentary basin

- Physiographic region boundary
- Physiographic division boundary
- Geological province boundary
- Geological subprovince boundary
- Normal fault (solid circle on hanging wall; approximate)
- Thrust fault (teeth on hanging wall; approximate)
- Axial trace of arch, anticline (approximate, subsurface)
- Axial trace of syncline (approximate)
- Correlation chart boundary (number represents column number on correlation charts) — 2

DESCRIPTIVE NOTES

The Horton River map area covers 275,000 km^2 and contains the northern Interior Plains, western Arctic Lowlands and a small portion of the Arctic Coastal Plain. The Interior Plains and Arctic Lowlands are poorly drained, gently undulating surfaces mantled by glacial drift and underlain by flat to gently-dipping strata. Morainal hills with up to 200 m relief are present on southeastern Banks Island, much of Victoria Island and in the Melville Hills south of Amundsen Gulf. Dissected uplands are common on southwestern Banks Island and, on Victoria Island the Shaler Mountains form a low range with numerous cuestas and buttes carved from resistant sills and flows. Flights of elevated marine shorelines are common on Banks and Victoria islands. The map area is underlain by Proterozoic strata of the Amundsen Basin and Great Bear Arch, and by Paleozoic strata of the Interior and Arctic platforms. These are limited on the southeast by Proterozoic strata of the Coppermine Homocline and divided by the Minto Arch into the Prince Albert Homocline, and the contiguous Wollaston Basin and Mackenzie Platform. The Coppermine Arch and, locally uplifts of the South Banks Inlier influence the form of the Cretaceous Anderson and Banks basins. The Tertiary to Holocene Arctic Terrace Wedge mantles northwestern parts of the platforms, Cretaceous basins and adjacent parts of the Arctic Ocean Basin.

Hadrynian shallow marine clastic and carbonate strata occur in the Coppermine Homocline, and the Brock, Minto and South Banks inliers. East and south of the map area these deposits lie unconformably on Aphebian and Helikian rocks of the Bear Province of the Canadian Shield. Fluviodeltaic units were derived from the shield and carried by west- to northwest-flowing currents into Amundsen Basin which is bounded on the southwest by the Great Bear Arch. Periods of restricted circulation are indicated by two major evaporitic units. Minor faulting occurred during deposition in the Brock, and possibly Minto, inliers. Closely following broad uplift, erosion and coeval clastic deposition, basic magmas were injected to form numerous sills and dykes within these strata at 723±3 Ma and on Victoria Island were extruded as thick flows. Gentle folding affected strata of the Minto Inlier. Prior to deposition of Cambrian strata, the Minto Arch and Coppermine Homocline formed, and regional uplift and gentle tilting occurred in Brock and South Banks inliers.

The Arctic and Interior platforms developed upon a surface of low to moderate relief, locally of karstic nature. Locally derived clastics filled depressions in the peneplain during the Early Cambrian. Middle Cambrian evaporites and clastics were deposited disconformably on these, and were followed by Cambrian to Middle Devonian platformal, shallow water and intertidal carbonates during gradual southward transgression, interrupted by episodes of uplift, nondeposition and erosion. Northeastward transgression across the site of the Great Bear Arch occurred in the southwest part of the map area. Some development of the Coppermine and Minto arches occurred in the Siluro-Devonian and associated uplift significantly influenced platformal facies belts on Banks Island and the northern mainland. Normal and reverse faults, and folds of the Coppermine Arch may have formed at this time. In the Late Devonian, southwesterly prograding sediments, derived from orogenic belts on Ellesmere Island and Greenland, transgressed the platform and formed a clastic shelf within the Prince Albert Homocline.

No direct record exists of late Paleozoic events. Strata of this age may be present in the continental shelf southwest of Banks Island. Sparse faunal fragments and sedimentological evidence from Cretaceous units on Banks Island suggest a late Paleozoic provenance. Hydrocarbon maturation levels in Devonian strata are higher than in overlying Mesozoic rocks and burial by late Paleozoic strata which were removed by pre-Cretaceous erosion could explain such conditions.

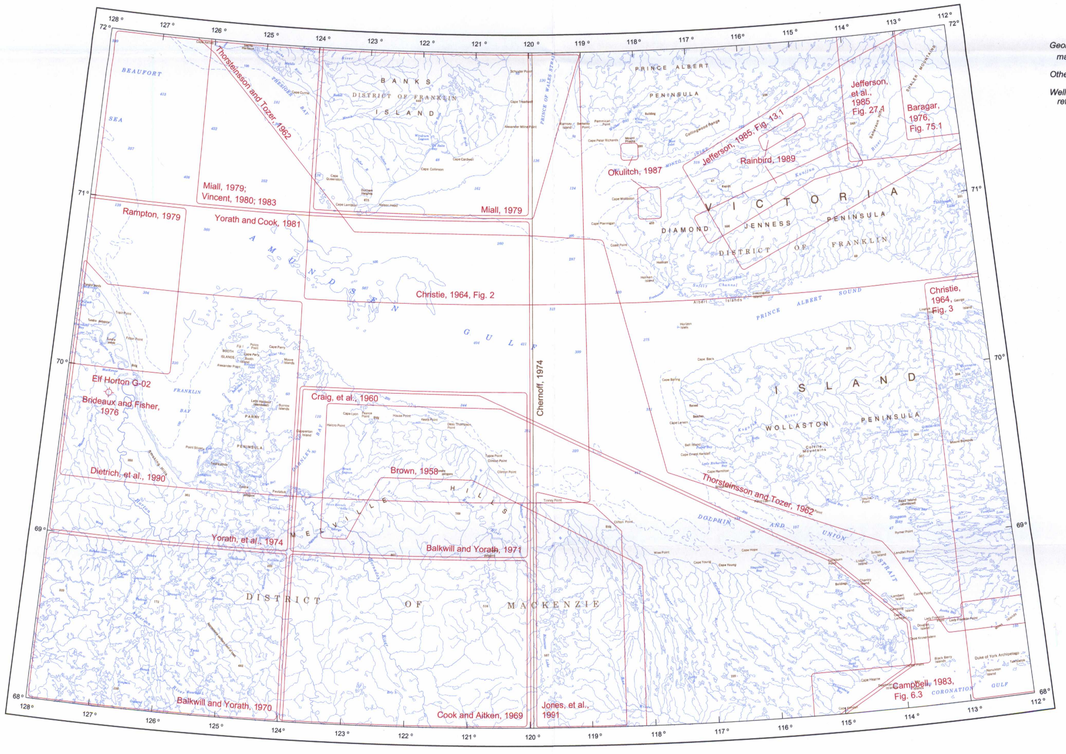
No Triassic units are known in the map area. Jurassic strata may occur in the subsurface of southwestern Banks Island as remnant shoreline deposits of a southwesterly-trending seaway.

During the Early Cretaceous, the Coppermine Arch underwent its principal development and much of the platform in the eastern half of the map area formed a land area with maximum relief at the Minto Arch. North trending faults of the South Banks Inlier were active and the Storkerson Uplift developed along western parts of Banks Island. These events were approximately coeval with rifting and initiation of the Arctic Ocean. Extensive erosion of all uplifted areas produced nonmarine clastic sediments that were deposited into the Anderson and Banks basins. Transgression of these basins resulted in deposition of epicontinental marine strata in the Albian and uplifts ceased to have substantial effect on sedimentation. The basins were uplifted and partly eroded in the mid-Cretaceous.

During the Late Cretaceous, marine transgression was initially restricted by resurgent uplifts on western Banks Island and west of the map area, which gave rise to euxinic conditions followed by normal marine deposition in Anderson and Banks basins. Distant, coeval volcanism contributed minor tuffaceous material to the basins. Regressive, mainly nonmarine deltas and alluvial plains, fed by broad uplifted areas to the east, developed by the end of the Cretaceous, persisted until the Eocene and formed the lower part of the Arctic Terrace Wedge to the northwest.

Oligocene to Miocene faulting and regional uplift, distal effects of the Eurekan Orogeny, produced a plateau with moderate relief whose drainage was inherited by present major river systems. Miocene and younger nonmarine clastic sediments were deposited on this dissected plateau, and formed the upper parts of the Arctic Terrace Wedge.

The economic potential of the map area is low. Little hydrocarbon potential has been discovered and only one well has been drilled in the area. No surface seeps are known on Banks and Victoria islands. Paleozoic strata in the subsurface north of the map area on Banks Island could yield dry gas but it is likely that most potential traps were breached by pre-Mesozoic erosion. Minor oil seeps and small gas pools are known from lower Paleozoic strata immediately west and southwest of the map-area. Small, low-grade coal deposits in Lower Cretaceous strata have been used locally but are otherwise uneconomic. Small native copper deposits occur in Hadrynian basalt flows.



INDEX MAP OF COMPILATION SOURCES

LEGEND

- Geological Survey of Canada map references — Miall, 1979
- Other map reference — Chernoff, 1974
- Well name, location and reference — Elf Horton G-02 ◇ Brideaux and Fisher, 1976

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Geological compilation by A.V. Okulitch, 1990

Geological cartography by A.V. Okulitch, Geological Survey of Canada

Digital image processing by Richard Salem, Handi-Can Consultants, Ottawa

HORTON RIVER

MACKENZIE-FRANKLIN

GEOLOGICAL ATLAS, MAP NR-9/10/11/12-G
SHEET 3 OF 3

GENERAL CO-ORDINATOR: A.V. OKULITCH

Scale 1: 2 000 000 - Échelle 1/2 000 000

Kilometres 50 0 50 100 150 Kilometres

Lambert Conformal Conic Projection
Standard Parallels 68°40'N and 71 20'N

Base map reduced from 1:1000 000 scale, published by Surveys and Mapping Branch in 1976 with some modification by the Geological Survey of Canada for this edition.

These 1:2 000 000 scale maps are part of the Geological Atlas of Canada and are plotted on the International Map of the World (IMW) base. Geology is one parameter being published in the National Earth Science Series.

Printed by Quality Color Press, Inc., Edmonton.
Published in 1992

HORTON RIVER
NORTHWEST TERRITORIES
GEOLOGICAL ATLAS, MAP NR-9/10/11/12-G
SHEET 3 OF 3
THE NATIONAL EARTH SCIENCE SERIES