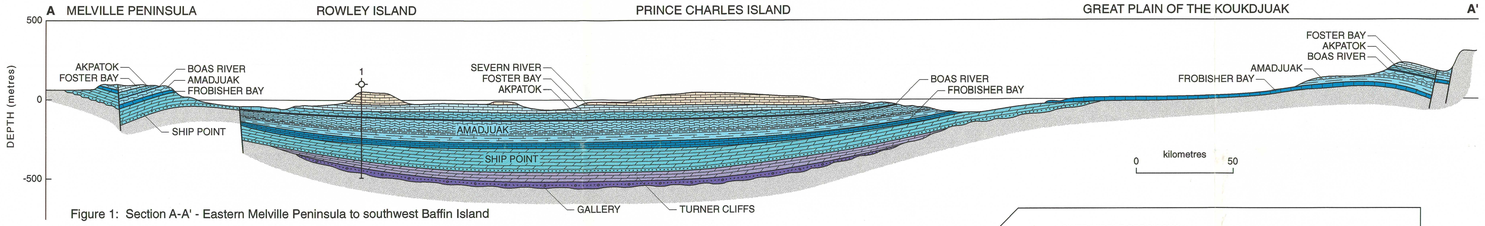
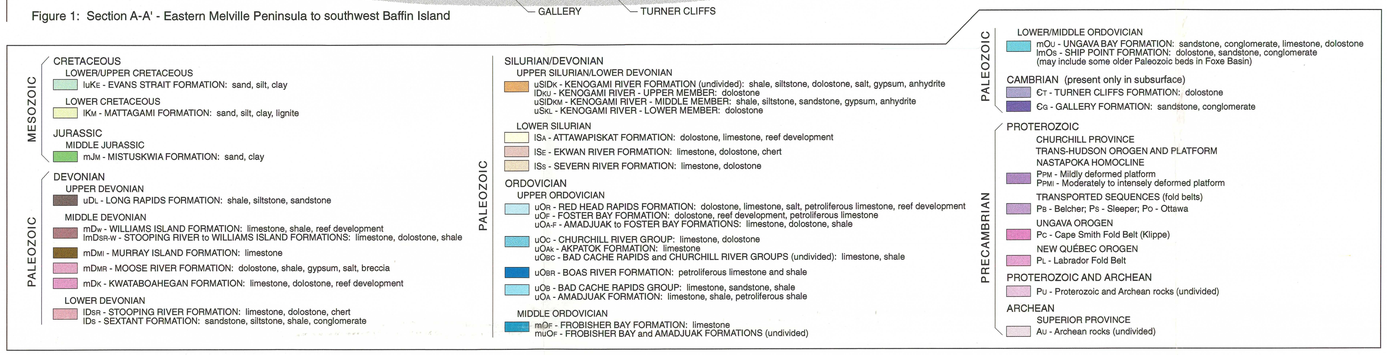


Figure 1: Section A-A' - Eastern Melville Peninsula to southwest Baffin Island



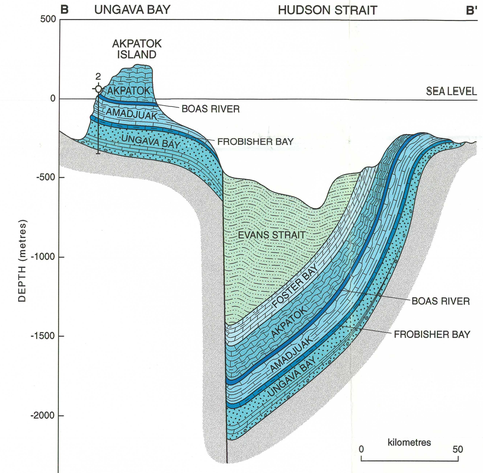


Figure 2: Section B-B' - Ungava Bay / Hudson Strait

STRATIGRAPHIC AND TECTONIC SUMMARY

The Paleozoic and Mesozoic rocks (Figures 1-5) that underlie the Hudson and southeast Arctic platforms, are erosional remnants of a much broader cratonic cover that once mantled much of the Canadian Shield. The Paleozoic part of the succession has many lithological and biostratigraphical similarities to its counterpart in the St. Lawrence, Arctic and Interior platforms, thus indicating periodic marine connection in Ordovician to Devonian time. The rocks are contained in four principal negative tectonic elements (Figures 6 and 7). They are the Hudson Bay, Moose River and Foxe basins, and the subcrogen style subbasins that underlie segments of Hudson and Evans straits and Foxe Channel, herein referred to as Ungava, Evans Strait and Southampton basins respectively. The regional positive tectonic elements (orthogonal arch systems) bordering and locally intersecting these regions were active at various issuevals of Paleozoic and Mesozoic times. They are, in decreasing order of structural significance: Boothia-Bell, Henrietta Maria-Transcontinental, Prasserdale, Central Hudson Bay, Koewatin and Severn arches. Major vertical movements of these elements were the most intensive near the close of the Early Silurian (late Llandoverylearly Wenlock), in Early Devonian (Siegenian-Emsian), and in the Cretaceous (Aptian to Cenomanian).

Ordovician.

Pre-Ordovician Paleozoic deposition in Foxe Basin apparently occurred in the Cambrian, and rocks of that probable age (Gallery and Turner Cliffs formations) are preserved only in subsurface as a remnant of their former distribution. The initial Ordovician transgression, from the north and northeast began in the late Early Ordovician(?) (Canadian Stage) in Foxe Basin and possibly eastern Hudson Strait/Ungava Bay area, and continued through Whiterockian to Chazyan(?) stages (Figure 5), leaving carbonates and terrigenous clastics (dolostones and sandstones) of the Ship Point and Ungava Bay formations (see Geological Map and sections A-A' and B-B'). The second, but somewhat more widespread Ordovician transgression, also confined to the southeast Arctic Platform, was during the Trentonian Stage depositing limestones of the Frobisher Bay Formation, that overlapped the previous cycle to lie directly on Precambrian rocks along the higher structural segment of the Transcontinental Arch, and truncating the eastern margin of the Boothia-Bell Arch. Following Frobisher Bay deposition, the Ordovician sea again transgressed the southeast Arctic Platform from the north and east, eventually spilling over the Boothia-Bell Arch barrier and onto the Hudson Platform in the mid-Edenian, a process that continued through Maysvillian and Richmondian stages (Figure 5). The rock units consisting largely of limestones and minor oil shales (Amadjuak, Boas River, Akpatok and Foster Bay formations) representing the Late Ordovician in eastern Hudson Strait and Foxe Basin have many lithological characteristics in common with their equivalents (Bad Cache Rapids Group, Boas River Formation, Churchill River Group and Red Head Rapid Formation) in the Hudson Platform (see sections A-A', B-B', C-C' and D-D').

Silurian.

The broad epeicontinental seaways characteristic of the Late Ordovician, after a brief hiatus, continued to prevail through much of the Early Silurian (mid to late Llandovery and early Wenlock?). The limestones and dolostones of the Severn River and Ekwan River formations and extensive reef development of the Attawapiskat had wide distribution in the Hudson and southeast Arctic platforms, and were continuous across much of the Canadian Shield, interconnecting with the central and western Arctic, the Interior Platform to the west, and the St. Lawrence Platform to the south. The broad submergent conditions of the Early Silurian however, were terminated for all time in the late Llandoverylearly Wenlock(?). Major epeirogeny of the craton, presumably triggered by plate motions and orogeny along the southeast margins of the North American continent and Greenland created large segments of the Canadian Shield, principally the arch systems (Figure 7), so that the Hudson Platform was left as a large inland seaway open northward to the Arctic Platform, a condition that prevailed throughout the Late Silurian and early Early Devonian (Wenlock to Gedinnian).

Silurian/Devonian.

The very intensive arch movements bordering and intersecting the Hudson Platform near the close of the Early Silurian were accompanied by greatly accelerated subsidence of the Hudson Bay and Moose River basins, thus providing conditions conducive to the deposition of thick redbed terrigenous clastics, carbonates and evaporites (salt, gypsum/anhydrite) of the Kenogami River Formation. These rocks, undoubtedly at one time present in Foxe Basin and elsewhere in the southeast Arctic Platform, are absent due to subaerial erosion, and thus confined to deeper structural segments of the Hudson Bay and Moose River basins (see Geological Map, and sections C-C' and D-D').

Devonian.

Accelerated basin subsidence that prevailed through the Late Silurian and early Early Devonian continued into the Devonian (Siegenian to Famennian stages). The Prasserdale and Central Hudson Bay arches, both extensively rejuvenated in the early Wenlock(?) remained topographically high at the onset of Siegenian-Emsian deposition. This is particularly evident for the latter structural element where Kenogami River to lower Williams Island strata are locally absent due to non-deposition along its higher structural axis (see section C-C'). Lithological and biostratigraphical comparisons of the Devonian rock units with their counterparts in the St. Lawrence, Arctic and Interior platforms, indicate periodic connections and especially so with the St. Lawrence Platform where connections were largely continuous from Emsian to Famennian time. The rock units, largely of marine origin, consist of limestones, dolostones, shales, sandstones and evaporites (gypsum/halite) that are referred to the Sextant, Stooping River, Kwatabohegan, Moose River, Murray Island, Williams Island and Long Rapids formations (see cross-sections C-C' and D-D' and Figure 5).

Jurassic/Cretaceous.

Renewed uplift of the arch systems bordering and intersecting Hudson and southeast Arctic platforms in Middle Jurassic and Early Cretaceous led to extensive block faulting, dispersal and continental and marine deposition of terrigenous clastics into the Moose River and Hudson Bay basins, and half graben subbasins beneath Evans and Hudson Straits and Foxe Channel. Although Jurassic (Mistuskwia Formation) and Cretaceous (Mattagami Formation) in Moose River Basin are of continental origin, the marine clastics of Aptian to Cenomanian age referred to Evans Strait Formation in offshore areas (see Geological Map) were apparently deposited in a seaway extending from the Labrador Sea, through Hudson Strait, Hudson Bay, thence crossing the Severn Arch to interconnect with the Cretaceous seas that inundated the Interior Platform of western Canada during those periods of geological time.

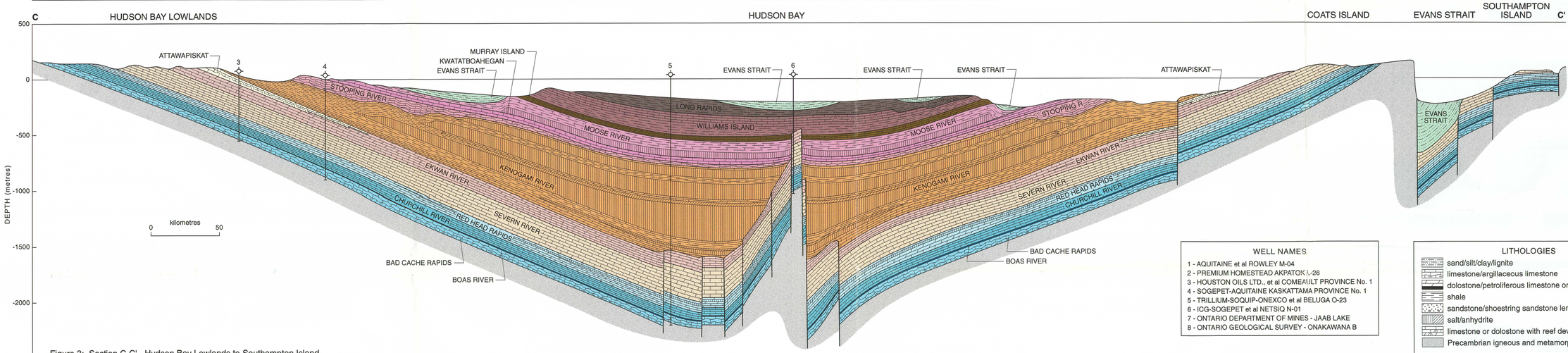


Figure 3: Section C-C' - Hudson Bay Lowlands to Southampton Island

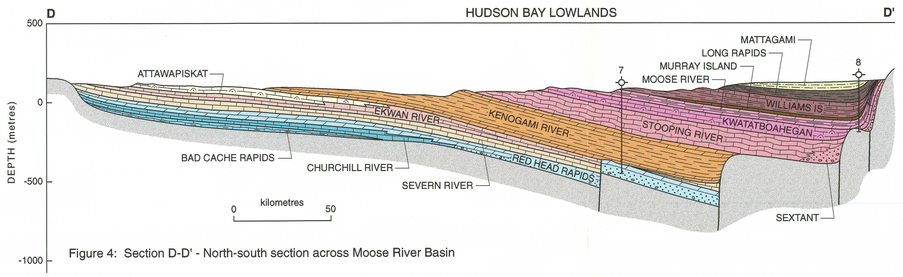


Figure 4: Section D-D' - North-south section across Moose River Basin

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PALEOZOIC AND MESOZOIC GEOLOGY OF THE HUDSON AND SOUTHEAST ARCTIC PLATFORMS

by: B.V. Sanford and A.C. Grant

Paleozoic and Mesozoic geological framework constructed from data obtained from field and marine surveys mainly by the authors and fellow officers of the Geological Survey of Canada. Additional information was obtained from provincial Geological Survey agencies, university thesis projects, and exploration data from private industry. Simplified Precambrian geology adapted from newly published Geological Map of Canada (Geological Survey of Canada Map 1860-A).

Cartographical layout and digitization of geological cross-sections (Sheet 2) coordinated by G.M. Grant. Poster production at GSC Atlantic, Electronic Publishing by R.L. Sutherland, Paragon Services. Recommended citation: Sanford, B.V. and Grant, A.C. (1998): Paleozoic and Mesozoic Geology of the Hudson and Southeast Arctic Platforms; Geological Survey of Canada, Open file 3595

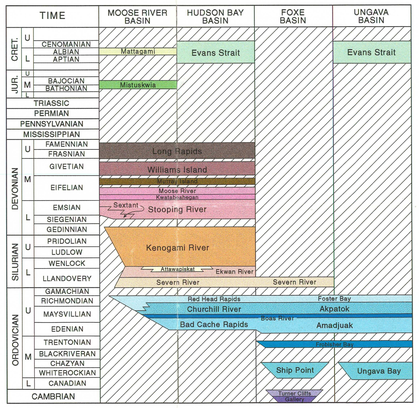

Figure 5: Time-stratigraphic framework of Paleozoic and Mesozoic sequences

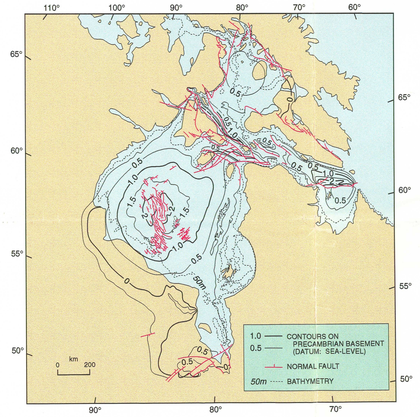

Figure 6: Regional structural framework of Hudson and southeast Arctic platforms

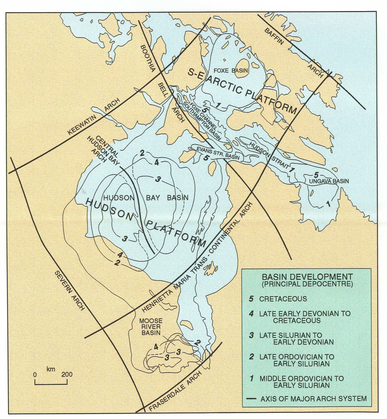

Figure 7: Tectonic elements of Hudson and southeast Arctic platforms

WELL NAMES

1 - AQUITAINE et al ROWLEY M-04
2 - PREMIUM HOMESTEAD AKPATOK L-26
3 - HOUSTON OILS LTD., et al COMEAULT PROVINCE No. 1
4 - SOGEPET-AQUITAINE KASKATTAMA PROVINCE No. 1
5 - TRILLIUM-SOQUIP-ONEXCO et al BELUGA O-23
6 - ICG-SOGEPET et al NETSIQ N-01
7 - ONTARIO DEPARTMENT OF MINES - JAAB LAKE
8 - ONTARIO GEOLOGICAL SURVEY - ONAKAWANA B

LITHOLOGIES

- sand/silt/clay/lignite
- limestone/argillaceous limestone
- dolostone/petroliferous limestone or dolostone
- shale
- sandstone/shoestring sandstone lenses/conglomerate
- salt/anhydrite
- limestone or dolostone with reef development
- Precambrian igneous and metamorphic rocks undivided

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SHEET 2 OF 2
FEUILLET 2 DE 2

Published 1998

Sheet 2 of 2.
Poster with stratigraphic and tectonic summary, 4 regional cross sections, a time-stratigraphic diagram, and maps of regional structural framework and tectonic elements.

Recommended citation:
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1998: Paleozoic and Mesozoic Geology of the Hudson and Southeast Arctic Platforms; Geological Survey of Canada, Open file 3595