

Geological Atlas of the Northern Canadian Mainland Sedimentary Basin

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Abstract

Increasing energy demand has led to an urgent need for easily accessible geoscience information for less explored areas of North America including the northern mainland region of Canada. The heavily explored regions of Mackenzie Delta north of 70°N and of the Western Canada Sedimentary Basin south of 60°N are covered by well-known geological atlas compilations. There is no comparable atlas-style source document for the relatively unexplored northern Canadian mainland part of the Western Sedimentary Basin. The “Geological Atlas of the Northern Canadian Sedimentary Basin” is intended to address the need for publicly accessible geoscience information across the northern Canadian mainland including the “Mackenzie Corridor” route for the proposed Mackenzie Valley Pipeline. This will be a digital GIS-based atlas. The intent is to provide a common geoscience reference for territorial and aboriginal groups, for resource exploration and for pipeline companies engaged in resource development activities. The standard base map for the northern mainland atlas has same scale as that for the CSPG Atlas of Western Canada with a common junction along the 60th parallel and extending from 110°W longitude westward to the international boundary with Alaska. Like the Western Canadian Sedimentary Basin Atlas, this Northern Mainland Atlas will include a series of time-stratigraphic chapters (e.g. “Upper Cretaceous and Tertiary Stratigraphy”) and theme chapters (e.g. “Resources and Infrastructure”) and are being published initially as a series of GSC Open File Reports.

Discussion

The atlas chapter concerning surficial geology, which is in preparation, outlines the geology of surficial deposits across the entire atlas area and particularly along the proposed Mackenzie Valley Pipeline route. It represents a summary of the rich heritage of the extensive surficial geology mapping conducted by the Geological Survey of Canada across the Northern Interior Plains in the previous several decades. This chapter will also provide a synopsis of terrain-related geotechnical hazards.

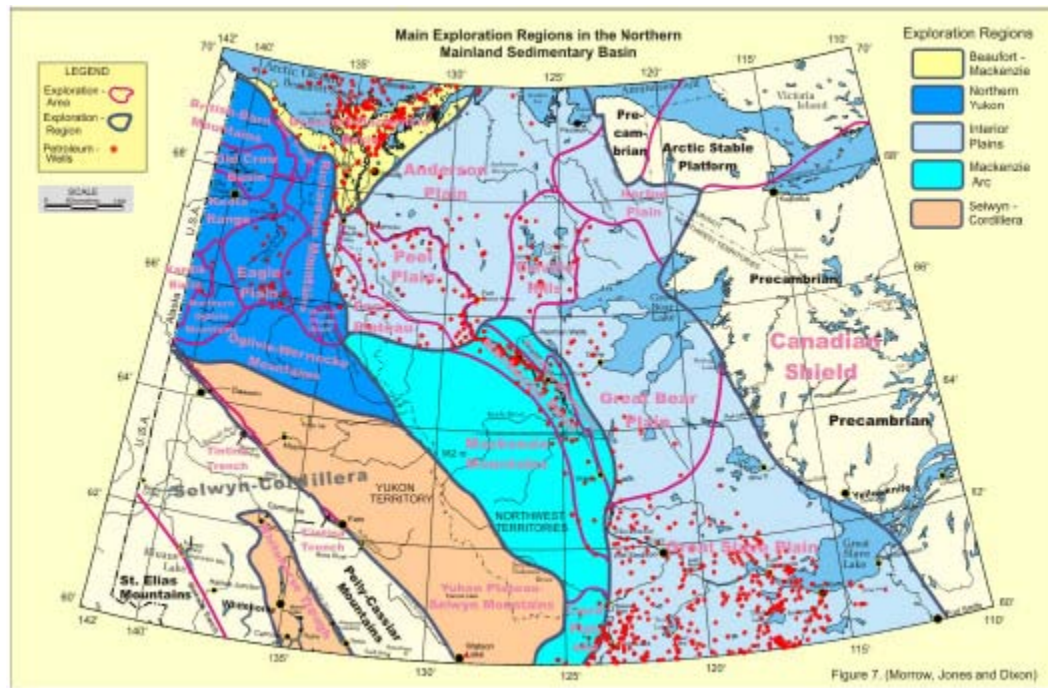


Figure 7. (Morrow, Jones and Dixon)

Figure 1. Map of petroleum exploration areas across the northern mainland sedimentary basin. Exploration areas are grouped within larger exploration regions that exhibit physiographic and geological commonalities (Morrow et al., 2006).

Figure 1 is an introductory map illustration using the standard map base for a chapter outlining the current transportation and utility infrastructure, and the existing energy and mineral resource endowment (Morrow et al., 2006). This recently published chapter includes correlation charts, maps and illustrations concerning the stratigraphic, geographic and geological setting of oil and gas resources and of organic-rich source rocks. These types of geological information will permit northern communities and private industry to make more informed decisions concerning land usage questions that arise during local pipeline and resource development and during resource exploration.

Figure 2 illustrates the Table of Formations for the Beaufort-Mackenzie Basin. This Table of Formations is one of a series of time-stratigraphic representations of a standardized formational nomenclature that will be compiled for each of the exploration areas outlined in Figure 1. These stratigraphic correlation charts illustrate petroleum resource information qualitatively as discovered oil and gas, significant oil and gas shows, and documented and/or potential petroleum source rocks. Major unconformities and important tectonic features (e.g. Aklavik Arch - Figure 2) that influenced deposition and erosion are noted on these charts. These charts are also keyed to the time-slice chapters (Dixon, 2004a and b) outlining the development of major stratigraphic intervals that were influenced by these tectonic features. A series of time-slice chapters will outline the tectono-sedimentologic development of the entire Proterozoic and Phanerozoic succession.

In addition to time-slice chapters, a series of theme chapters, such as the “Infrastructure and Resources chapter” will outline aspects of a more thematic nature. Published theme chapters include Majorowicz and Morrow (1998) which deals with the subsurface temperature regime, and Park et al. (1998), concerning the interpretation of paleomagnetic data across the atlas area.

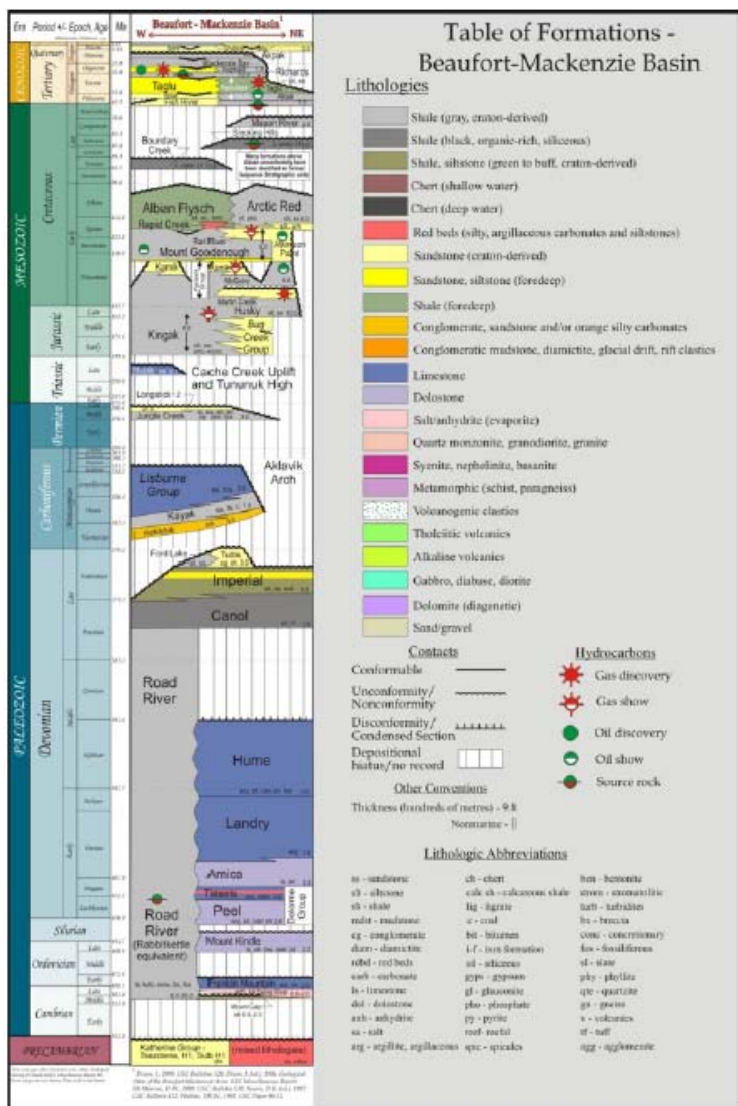


Figure 2. Table of formations across the Beaufort-Mackenzie Basin exploration area. This is one of a series of time-stratigraphic charts that summarize the stratigraphic nomenclature across the exploration areas outlined in Figure 1.

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