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Geoart in the south-central Mackenzie River valley region, Northwest Territories

David Huntley

Huntley, D., 2006: Geoart in the south-central Mackenzie River valley region, Northwest Territories; Geological Survey of Canada, Current Research 2006-A8, 5 p.

Abstract: Acrylic and oil paintings of the south-central Mackenzie River valley region, Northwest Territories depict the landscape as a product of multiple cycles of glacial and fluvial incision driven by plate-tectonic processes and climate change operating over millions of years. Folded and thrust-faulted mountain ranges were drained by rivers flowing eastward toward Hudson Bay and the northeastern Arctic coast prior to the last glaciation. As continental ice advanced westward into the region, this paleodrainage system was blocked and deranged. At its maximum extent, continental ice was confluent with local ice fields and valley glaciers. Some montane valleys remained unglaciated and were infilled with outwash, lake sediments, and landslide deposits. During glacial retreat, outwash and stagnant ice dammed meltwater outlets, creating an interconnected system of proglacial lakes. Retreating ice and postglacial uplift reordered meltwater flow directions so that these lakes, and subsequently the modern Mackenzie River, drained north into the Beaufort Sea.

Résumé : Des acryliques et des huiles sur toiles de la partie centrale sud de la région de la vallée du Mackenzie, dans les Territoires du Nord-Ouest, représentent le paysage comme tributaire de cycles multiples d'incision par les glaces et les cours d'eau engendrés par des processus de tectonique des plaques et de changement climatique qui ont agi pendant des millions d'années. Des chaînes de montagnes plissées et chevauchées étaient drainées par des cours d'eau coulant vers l'est en direction de la baie d'Hudson et du littoral nord-est de l'océan Arctique avant la dernière glaciation. À mesure que l'inlandsis s'avancait vers l'ouest dans la région, ce paléo-réseau de drainage a été obstrué et perturbé. À son étendue maximale, l'inlandsis a conflué avec des champs de glace et des glaciers de vallées locaux. Certaines vallées montagnardes sont restées libres de glace et ont été comblées de dépôts d'épandage fluvioglaciaire, de sédiments lacustres et de dépôts de glissements de terrain. Pendant le retrait des glaces, les dépôts d'épandage et de la glace stagnante ont obstrué des émissaires d'eaux de fonte, engendrant ainsi un réseau de lacs proglaciaires interconnectés. La glace en retrait et le soulèvement postglaciaire ont restructuré les directions d'écoulement des eaux de fonte de sorte que ces lacs et, par la suite, le fleuve Mackenzie contemporain, se sont drainés vers le nord dans la mer de Beaufort.

INTRODUCTION

The Geological Survey of Canada (GSC) is currently compiling regional-scale information on bedrock geology, surficial deposits, and landform processes as part of the Northern Energy Development Mackenzie Valley Project (Fig. 1). As an outreach initiative of this project, nine paintings highlighting conceptual and actual geological landscapes of the south-central Mackenzie River watershed have been produced by the author. Geoart cards accompanying the paintings include notes describing the works in the context of regional glacial and geomorphic histories (Huntley and Duk-Rodkin, 2006; Huntley et al., 2006a, b).

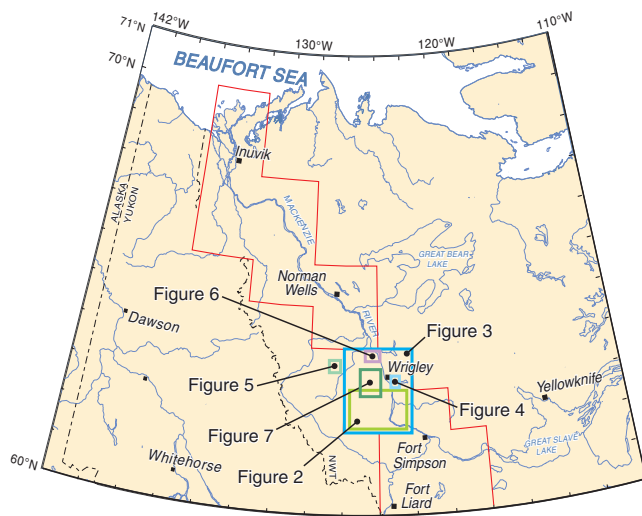


Figure 1. Subject locations (coloured boxes) shown with respect to the Mackenzie River valley transportation corridor (red polygon).



Figure 2. *Landscape Evolution*: landscape evolution of the Mackenzie River (Camsell Bend reach), North Nahanni River, and Root River, Northwest Territories.

PAINTINGS

Field geologists and artists link observations of colour, shape, and texture with interpretations of process over a range of spatial and temporal scales in an attempt to explain the landscape (e.g. Koch and James, 2005). Artists without a geoscience background, however, face a challenge in finding an appropriate visual language to describe landscapes, although exceptional paintings often result (e.g. Canadian landscapes of the Group of Seven). Geoartists (i.e. artists with a background in the geosciences), by comparison, can add extra dimensions to paintings through their intuitive understanding of the biogeoclimatic processes operating on a landscape through time and space.

Nine paintings were completed between 2005 and 2006: five were works in acrylic, the remainder in oil. Canvas sizes for acrylic paintings ranged from 13 x 18 cm to 25 x 36 cm; oil paintings were completed on 23 x 36 cm and 41 x 51 cm canvases. The original paintings are currently on display at GSC-Calgary, and a limited number of geoart cards have been printed and are available from the author by request. Geoart products could also be made available through the Natural Resources Canada website, GSC Bookstores, and government offices in northern communities.

Landscape Evolution

The four panels of this acrylic on cotton vellum (each panel measuring 25 x 36 cm) were completed in May 2005 after pre-typing of terrain and landforms on airphotos of the study area (Fig. 1). The view is westward, with north to the right of each panel (Fig. 2). Depicted is the geomorphic evolution of the Camsell Bend (NTS 95 J) and Root River (NTS 95 K) 1:250 000 scale map sheets at four intervals over the last 10 million years (i.e. since the Middle Miocene). From left to right and top to bottom, the panels depict the artist's impression of changes in the landscape ca. 10 Ma BP, 20 ka BP, 12 ka BP, and the present. This work was displayed at the Dene Spiritual Gathering in Wrigley (Pehdzeh Ki), Northwest Territories in August 2005.

Mackenzie Terrainscape

This 13 x 18 cm acrylic, finished in June 2005, represents the first artistic interpretation of the surficial geology of the Camsell Bend (NTS 95 J), Root River (NTS 95 K), Dahadinni River (NTS 95 N), and Wrigley (NTS 95-O) 1:250 000 scale map sheets, following pre-field season airphoto interpretation (Fig. 1, 3). The legend for the painting is as follows: folded and thrust-faulted Mackenzie Mountains and McConnell Range (blue and white); subglacial



Figure 3. *Mackenzie Terrainscape*: surficial geology of the 2005 field area, south-central Mackenzie River valley region, Northwest Territories; Wrigley is at centre of painting.



Figure 4. *Mountain View Lake*: McConnell Range and late-glacial spillway, viewed from Wrigley, Northwest Territories.

deposits (green); glacial-retreat outwash (orange); proglacial-lake deposits (purple); colluvial deposits (brown); modern river sediments (yellow); organic deposits (grey); north to the top. This work was on display at the Geoscience Forum in Yellowknife, Northwest Territories in November 2005.

Mountain View Lake

This 23 x 36 cm oil on canvas was sketched during the 2005 field season and completed in September 2005 (Fig. 4). The painting looks east toward the McConnell Range across a relict northwest-draining spillway of glacial Lake Mackenzie, 5 km southeast of Wrigley (Fig. 1). This outlet was abandoned as the postglacial Mackenzie River established its present channel.

Painted Mountains

This 41 x 51 cm oil on canvas, completed in September 2005 (Fig. 5), was sketched from an oblique airphoto taken on a traverse in the Mackenzie Mountains during the 2005 field season. The view is to the west and depicts the Painted Mountains in the Wrigley Lake map sheet (NTS 95 M; Fig. 1). This mountain range lay beyond the limit of the Laurentide Ice Sheet during the last continental glaciation of the region, ca. 30 to 10 ka BP.

Mackenzie Fireweed

This 23 x 36 cm oil on canvas was sketched from an oblique airphoto taken on traverse in the Dahadinni map sheet (NTS 95 N; Fig. 1) during the 2005 field season and completed in October 2005. The view to the west is of terraced glaciolacustrine deposits (containing discontinuous permafrost), exposed by mass wasting along the Mackenzie River (Fig. 6). Wildfires in the taiga, tributary channel incision, and river cutbank erosion contribute to slope instability and landslides in glacial sediments throughout the region.

Dahadinni Mountainscape

This 41 x 51 cm oil on canvas, completed March 2006, is a southward view of the Dahadinni River valley and the Mackenzie Mountains sketched from an oblique airphoto during a traverse of the Dahadinni River map sheet (NTS 92 N; Fig. 1). Depicted are folded and thrust-faulted Paleozoic carbonate and clastic sedimentary rocks; boulder- and clay-rich tills deposited by the continental (Laurentide) ice sheet, and local montane glaciers; and permafrost-rich clay and silt deposited in glacial lakes impounded by retreating ice masses, landslides, and fluvial outwash (Fig. 7).



Figure 5. *Painted Mountains*: vertically dipping carbonate strata exposed beyond the limit of continental glaciation in the Mackenzie Mountains, Northwest Territories.

Figure 6. *Mackenzie Fireweed*: taiga regenerating after wildfire in the Mackenzie River valley, Northwest Territories.



Figure 7. *Dahadinni Mountainscape*: Dahadinni River incising through Mackenzie Mountains and glacial deposits, Northwest Territories.

SUMMARY

Field geologists often work in remote areas of exceptional natural beauty that cannot easily be visited by the public. Traditionally, expeditions to northern Canada were documented and illustrated by landscape artists. These landscapes, seen through the eyes of artists, are depicted differently from the typically 'monochromatic' descriptions of geoscientists.

Geoscience research and outreach activities in the south-central Mackenzie River valley region, funded by Northern Energy Development, provide government agencies, industry, universities, and the public access to a wide range of secure and reliable geoscience data. Paintings and geart cards developed as part of the Mackenzie Valley Project describe regional landscapes and the geomorphic history from a geoartist's perspective. These products contribute to the geoscience knowledge base in a manner that is more accessible to nonscientists, and aim to increase public awareness and appreciation of Canada's natural resources and environmental issues. At present, geart products can be ordered directly from the author. In the future, they could be made available through the Natural Resources Canada website, GSC Bookstores, and government offices in northern communities.

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REFERENCES

- Huntley, D. and Duk-Rodkin, A.**
2006: Landslide processes in the south-central Mackenzie River valley region, Northwest Territories; Geological Survey of Canada, Current Research 2006-A9.
- Huntley, D. Duk-Rodkin, A., Couch, C., and Sidwell, C.**
2006a: Terrain inventory and geomorphic history of the south-central Mackenzie River valley region, Northwest Territories; Geological Survey of Canada, Current Research 2006-A11.
- Huntley, D., Duk-Rodkin, A., and Sidwell, C.**
2006b: Landslide inventory of the south-central Mackenzie River valley region, Northwest Territories; Geological Survey of Canada, Current Research 2006-A10.
- Koch, C. P. and James, D.T.**
2005: Visiting artist in northern Labrador: a new vision of the Nain Plutonic Suite; *in* Current Research (2005), Newfoundland and Labrador Department of Natural Resources, Geological Survey, Report 2005-1, p. 243–250.

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