Geo-mapping for Energy and Minerals program activities in the lower Paleozoic Franklinian succession in the Canadian Arctic Islands

K. Dewing[1*] and T. Hadlari[1]

Dewing, K. and Hadlari, T., 2022. Geo-mapping for Energy and Minerals program activities in the lower Paleozoic Franklinian succession in the Canadian Arctic Islands; in *Sedimentary basins of northern Canada: contributions to a 1000 Ma geological journey and insight on resource potential, (ed.) D. Lavoie and K. Dewing; Geological Survey of Canada, Bulletin 609, p. 23–35. https://doi.org/10.4095/326085*

Abstract: The Geo-mapping for Energy and Minerals program addressed four questions related to the lower Paleozoic succession of the Arctic Islands that were identified as key deficiencies in regional geological knowledge: 1) geochemical and geological data were not fully digital or available; 2) there were gaps in information on petroleum systems; 3) there was no geological map for the northwestern part of Victoria Island; and 4) the geological history of the Pearya composite terrane on northern Ellesmere Island was unclear. These gaps were addressed by 1) the publication of 17 open files that make geological and geochemical data sets publicly available; 2) studies on source rock, thermal maturity, and oil-source correlation; 3) the production of a geological map for northwestern Victoria Island; and 4) a series of geological, geochemical, and geochronological studies that support a geological model in which the southeastern structural slice of Pearya was a fragment of ancient North America that rifted and returned, rather than a far-travelled continental fragment.

Résumé : Le programme Géocartographie de l'énergie et des minéraux s'est attaqué à quatre questions relatives à la succession du Paléozoïque inférieur dans l'archipel Arctique. Ces questions ont été définies sur la base des lacunes majeures dans les connaissances géologiques à l'échelle régionale suivantes : 1) les données géochimiques et géologiques n'étaient pas entièrement numériques ou disponibles; 2) il y avait des lacunes dans l'information sur les systèmes pétroliers; 3) il n'y avait pas de carte géologique pour la partie nord-ouest de l'île Victoria; et 4) l'histoire géologique du terrane composite de Pearya dans le nord de l'île d'Ellesmere était ambiguë. Ces lacunes ont été comblées à l'aide des éléments suivants : 1) la publication de 17 dossiers publics qui ont rendu disponibles dans le domaine public des ensembles de données géologiques et géochimiques; 2) la réalisation d'études sur la roche mère, la maturité thermique et la corrélation roche mère-pétrole; 3) la production d'une carte géologique du nord-ouest de l'île Victoria; et 4) la réalisation d'une série d'études géologiques, géochimiques et géochronologiques à l'appui d'un modèle géologique dans lequel l'écaille structurale sud-est de la Pearya constituait un fragment du protocontinent nord-américain qui avait dérivé suite à un rifting avant de rebrousser chemin, plutôt qu'un fragment d'un continent lointain.

---

[1] Geological Survey of Canada, 3303–33rd Street N.W., Calgary, Alberta T2L 2A7
*Corresponding author: K. Dewing (email: keith.dewing@nrcan-rncan.gc.ca)

INTRODUCTION

The goal of the Geo-mapping for Energy and Minerals (GEM) program was to improve geological knowledge in areas of northern Canada that have natural resource potential. The GEM program started in 2008, was renewed in 2013, and ended in March 2020. Both GEM-1 and GEM-2 had a project focus on sedimentary basins in the Canadian Arctic Islands. This contribution describes advances made on lower Paleozoic rocks in the Arctic Islands.

The key deficiencies in geoscience knowledge for lower Paleozoic rocks identified in the planning for the GEM-2 Western Arctic project were 1) the difficulty in accessing geochemical and geological data digitally; 2) the gaps in information on petroleum systems; 3) the absence of a geological map of northwestern Victoria Island; and 4) the lack of clarity regarding the geological history of the Pearya terrane on northern Ellesmere Island. The first of these deficiencies was addressed by the release of 17 Geological Survey of Canada (GSC) open file publications combining both geological and geochemical data; and digital geological maps of the Arctic with a unified legend compiled by Harrison and co-authors (e.g. Harrison et al., 2016). The second shortfall was mitigated by field and laboratory studies undertaken in areas of resource potential, including studies on the origin of the Polaris lead-zinc deposit (Reid et al., 2013a, b), Bent Horn oil field (Obermajer et al., 2010; Wendte, 2012), and source-rock thermal maturity (Dewing and Obermajer, 2009). Fieldwork in 2009–2011 resolved the third issue, resulting in a new geological map of northwestern Victoria Island (Dewing et al., 2013, 2015). Finally, radiometric dating techniques were applied to archived samples from northern Ellesmere Island and other locations in the Arctic Islands to help decipher the tectonic history of the Pearya terrane.

HISTORY OF THE FRANKLINIAN MARGIN

Lower Paleozoic strata are present across the Canadian Arctic Islands, from Banks Island in the southwest to Ellesmere Island in the northeast, a distance of about 1700 km (Fig. 1, 2). The Franklinian margin of northern Laurentia

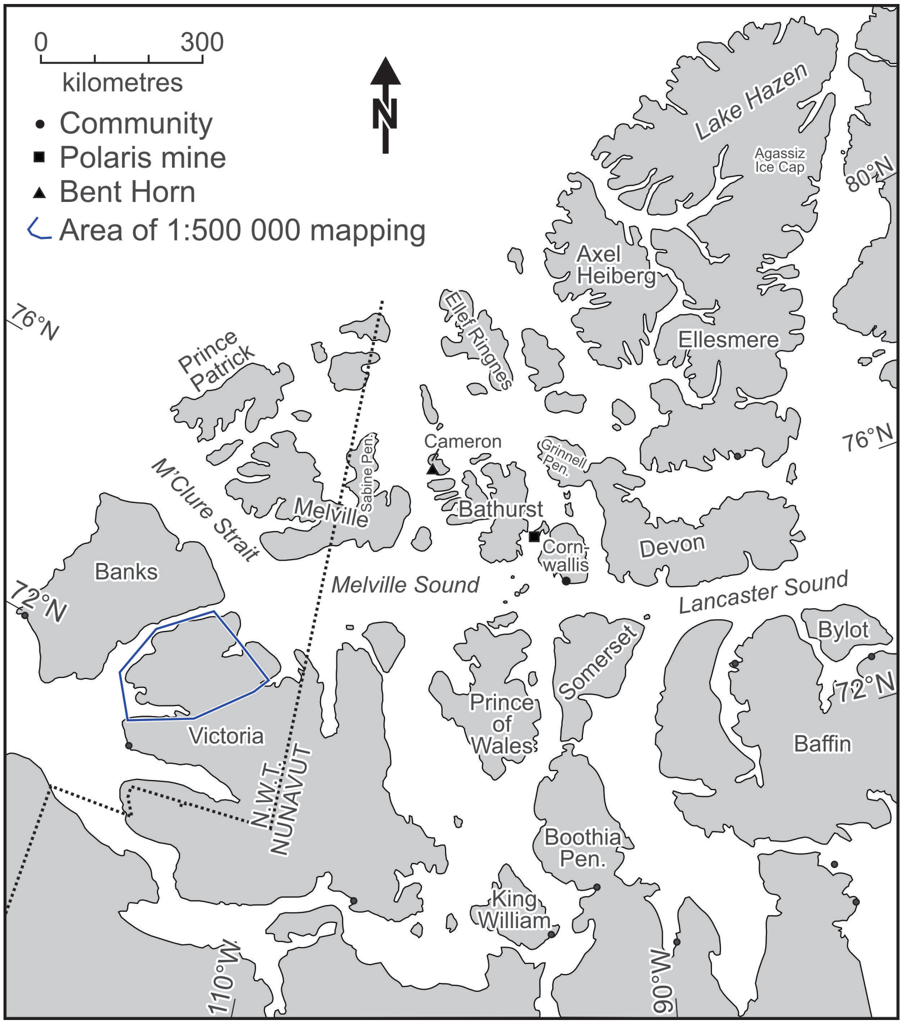

Figure 1. The Canadian Arctic Islands. Locations of islands, mineral and oil deposits, and study areas mentioned in text are shown.

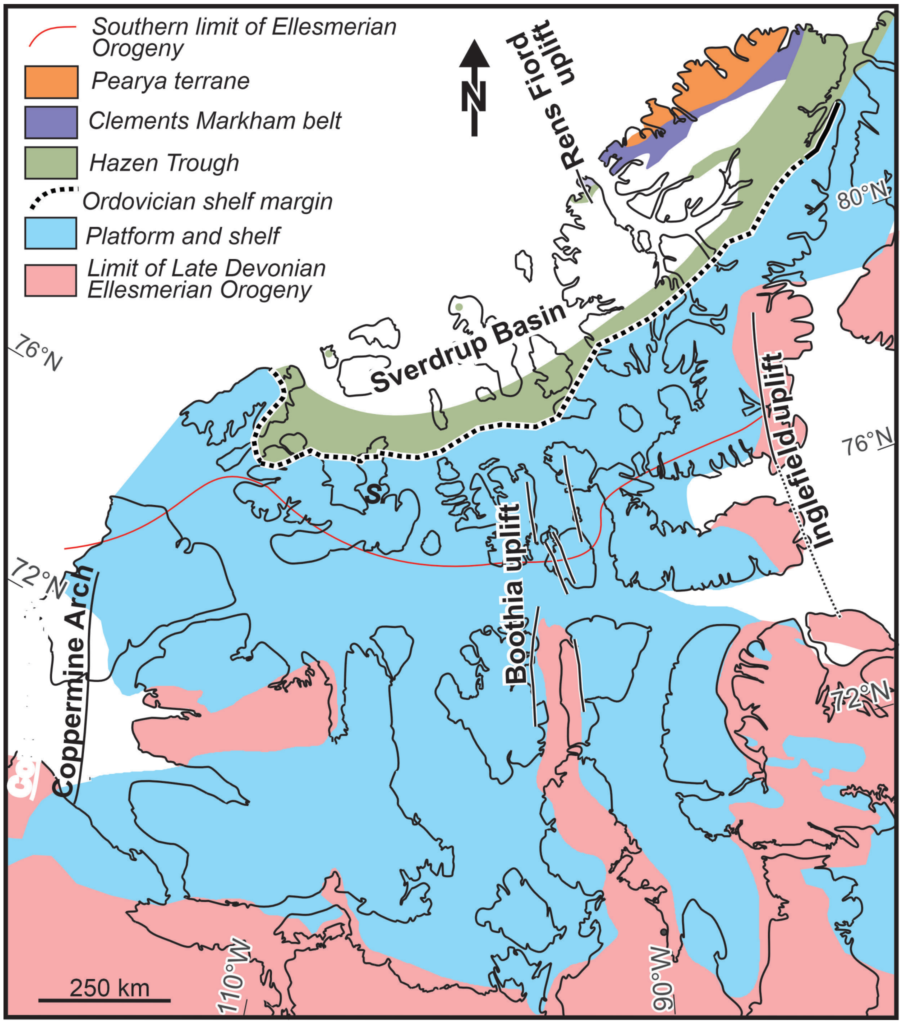

Figure 2. Tectonic elements of the lower Paleozoic in the Canadian Arctic Islands. The Ordovician shelf margin is inferred to be located where upper Paleozoic strata of the overlying Sverdrup Basin plunge steeply to the north. The approximate southern limit of the Late Devonian Ellesmerian Orogeny is shown in red. Note the abrupt change in direction of the Ellesmerian deformation front between Melville and Banks islands in the western Arctic.

encompasses all the lower Paleozoic strata in the Canadian Arctic Islands and northern Greenland, as well as some parts of northern Alaska that were originally situated west of Banks and Prince Patrick islands, but were subsequently rifted away during the Mesozoic. The Franklinian margin initiated with rifting related to the breakup of the Rodinia supercontinent in the Neoproterozoic, followed by the development of a passive margin from Cambrian to Early Ordovician time. The margin changed to an unstable convergent margin in the Early Ordovician (Dewing et al., 2019). Intraplate deformation that created the Boothia fold belt and related uplifts in the Canadian Arctic Islands was synchronous with the late Silurian to Early Devonian Scandian phase of the Caledonian Orogeny in Greenland, whereas later in the Early Devonian, extension in the Scandinavian Caledonides was synchronous with the re-establishment of a carbonate platform in the central Canadian Arctic (Tucker et al., 2004). The Franklinian margin transitioned to a foreland basin during Middle to Late Devonian time (Embry and Klovan, 1976), culminating in the widespread, Late Devonian to earliest Carboniferous Ellesmerian Orogeny (Harrison, 1995) as a result of arcs and continental block(s) converging and colliding from the north (present-day direction).

The Franklinian margin has six main components:

1. _Platform and shelf._ The platform and shelf component of the Franklinian margin comprises carbonate, evaporite, and clastic units. South of Lancaster–Melville Sound, these units range in age from Cambrian to Early Devonian and are 0 to 4 km thick. North of Lancaster–Melville Sound (Fig. 1), the units span the Ediacaran to Late Devonian and thicken to 12 to 16 km. The shelf to deep-water transition during the Cambrian to Late Ordovician is inferred to run diagonally (southwest–northeast) across the Arctic Islands beneath younger strata of the Sverdrup Basin.
2. _Deep-water basin._ The deep-water basin preserved north of the carbonate platform is divided into the southern, shale- and chert-dominated Hazen belt and the northern Clements Markham belt containing shale, chert, and volcanic units (Fig. 2, 3; Trettin, 1998). By the Silurian (Wenlock), the Hazen and Clements Markham belts were dominated by turbidite and submarine fans, presumably derived from the Caledonian Mountains of east Greenland (Surlyk, 1995). The deep-water basin was

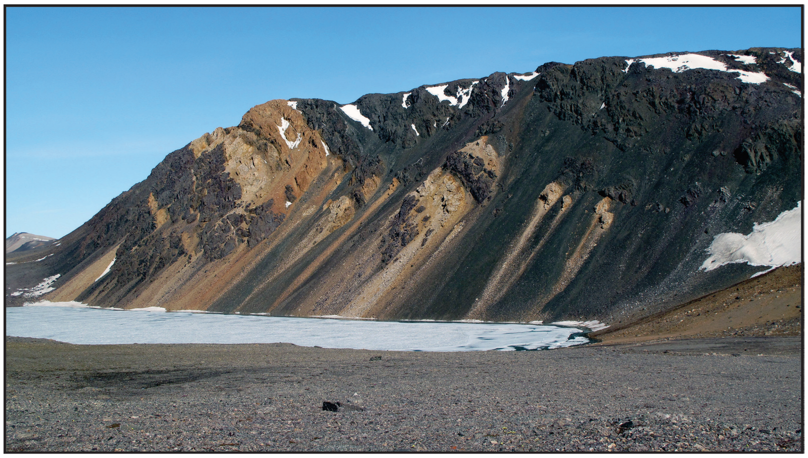

Figure 3. Interbedded carbonate and volcanic rocks of the Jaeger Lake assemblage of probable Cambrian age (Hadlari and Madronich, 2017), Greenstone Lake, northern Axel Heiberg Island. This is typical of the style in the Clements Markham belt. Photograph by K. Dewing. NRCan photo 2021-001

filled with clastic rocks by mid-Silurian (Ludlow) time, after which it was dominated by shallow-water mixed carbonate-clastic units.

3. *Pearya terrane.* The Pearya composite terrane is located on northernmost Ellesmere Island (Fig. 2; Trettin 1987, 1998) and consists of a basement dated at ca. 1.0 Ga, metasediments of Ediacaran to Ordovician age as well as Ordovician and Silurian sediments, and volcanic rocks. Three structural domains were described by Trettin (1987, 1998), but the contact relationships between the domains remain uncertain. The two structural slices on the western (outboard) side of Pearya contain basement and presumed Neoproterozoic to Cambrian strata. The northeastern Pearya (inboard) structural slice has exposed Neoproterozoic to Silurian strata, and the basement of this domain is not exposed. The timing and mechanism(s) of amalgamation of the various components of the Pearya terrane remain unclear.
4. *Boothia and related fold belts.* Four north-trending arches developed during the late Silurian to Early Devonian (Fig. 2). From west to east, these are the Coppermine Arch (Brock Inlier; Cook and Aitken, 1969), Boothia uplift (Somerset and Cornwallis islands; Thorsteinsson and Uyeno, 1980), Rens Fiord uplift (northern Axel Heiberg Island; Trettin 1979), and Inglefield uplift (central Ellesmere Island; Smith and Okulitch, 1987). These arches are contemporaneous with the uplift in the central part of Hudson Bay (Norris, 1993).
5. *Ellesmerian clastic wedge and fold belt.* A foreland basin developed across much of the Canadian Arctic in the Middle Devonian (Embry and Klovan, 1976). The Middle to Upper Devonian clastic wedge that filled this foreland basin is dominated by nonmarine sandstone in the northern and eastern areas of the Arctic Islands and by slope and delta environment interbedded shale and sandstone in the more distal, western parts of the islands. The youngest preserved strata are of Famennian age (Harrison, 1995), but Embry (1988) reported clasts containing Famennian to Tournaisian spores in the basal units of the overlying Sverdrup Basin, indicating that sedimentation on the Franklinian margin may have continued into the earliest Carboniferous.
6. Late Devonian to (?)Carboniferous deformation related to the Ellesmerian Orogeny (Thorsteinsson and Tozer, 1970) had a southerly principal shortening direction, which resulted in east-trending folds. Folds on Prince Patrick and Banks islands in the western Canadian Arctic are oriented at an angle of approximately 70° to the trend in the central islands (Harrison and Brent, 2005), although it is unclear if this is caused by a second event or if the orientation of folds is controlled by local rheology changes.
7. *Rifted parts of the Franklinian margin.* Jurassic–Cretaceous rifting, which resulted in the formation of the Arctic Ocean, rotated parts of the Franklinian margin to their current locations in Arctic Alaska and Chukotka, Russia. The North Slope subterrane of Arctic Alaska (Strauss et al., 2013, 2018) was likely located west of Banks and Prince Patrick islands in Neoproterozoic to Devonian time, as part of the Franklinian margin. The arcs and continental blocks that amalgamated with the Franklinian margin during collisional events between the Late Ordovician and Late Devonian rifted away and are now located in either Alaska or northeastern Russia (Grantz et al., 1979).

ECONOMIC GEOLOGY

Sixty-eight hydrocarbon exploration wells were drilled into the lower Paleozoic succession of the Arctic Islands between 1962 and 1987 (Dewing and Embry, 2007). One oil discovery was made at Bent Horn on Cameron Island in porous Devonian carbonate rocks, which produced about 2 million barrels (Mayr, 1980; Wendte, 2012). Procter et al. (1984) estimated a mean expectation of 1.6 billion barrels (BBO) of recoverable oil and 16.1 trillion cubic feet (TCF) of recoverable gas from the lower Paleozoic succession in the Canadian Arctic Islands. Hannigan et al. (1999) estimated a mean of 4.6 BBO of in-place oil and 11.7 TCF of in-place gas on Bathurst Island alone. Mineral exploration between 1960 and 2001 located numerous lead-zinc showings in lower Paleozoic strata, but only the Polaris lead-zinc deposit was brought into production, starting in 1982 and closing when the ore was exhausted in 2002 (Dewing et al., 2006; Reid, 2013a, b).

KEY FINDINGS IN THE LOWER PALEOZOIC

Question: Are there data that could help inform exploration decisions, which are not available to the public?

Findings. Numerous geochemical and geological data sets were located in project files, as paper records, and in proprietary GSC databases and therefore not readily publicly accessible.

Objective. Compile, digitize, and release geological and geochemical data that could be useful for exploration decisions.

Importance. The data in these reports are useful for petroleum-system modelling and basin analysis, which are important tools in predicting the size and location of hydrocarbon resources.

Methods and areas. Paper records from contracts, GSC databases, theses supported by the GSC, and other publicly available records were compiled, and the data in paper format were digitized. Wells were given a consistent naming convention, and formation tops were published for the wells. All samples from the wells were then coded with the formation at the given depth for ease of comparison. Field samples were given GSC catalogue numbers; the location information is curated in the GSC Sample Management System database.

Main outcomes. Data pertaining to exploration are now available for free download. Data were released as 17 GSC open files (OF), all using a common title starting with "Geological and geochemical data from the Canadian Arctic Islands" (*see* Appendix A for all published contributions):

Part I: Stratigraphic tops from Arctic Islands' oil and gas exploration boreholes (OF 5442; Dewing and Embry, 2007).

Part II: Rock-Eval/TOC data (OF 5459; Obermajer et al., 2007a).

Part III: Organic-matter reflectance data (OF 5476; Dewing et al., 2007).

Part IV: Gasoline range and saturate-fraction gas chromatograms of oil samples (OF 5483; Obermajer et al., 2007b).

Part V: Saturate-fraction gas chromatograms of organic extracts from cuttings and core samples from petroleum exploration boreholes (OF 5534; Obermajer et al., 2007c).

Part VI: Saturate-fraction gas chromatograms of organic extracts from outcrop and mining core samples (OF 5591; Obermajer et al., 2007d).

Part VII: Composition of gas from petroleum exploration borehole cuttings (OF 5611; Dewing et al., 2010).

Part VIII: Saturate-fraction gas chromatography–mass spectrometry data for organic extracts (OF 5642; Obermajer et al., 2008a).

Part IX: Saturate-fraction gas chromatography–mass spectrometry data for hydrocarbon samples (OF 5683; Obermajer et al., 2008b).

Part X: Core petrophysical data from petroleum exploration boreholes (OF 6669; Hu and Dewing, 2011).

Part XI: Testing and fluid analysis data for the Canadian Arctic Islands (OF 6716; Grasby et al., 2011).

Part XII: Descriptions and lithologs of upper Paleozoic core (OF 7569; Kabanov and Dewing, 2014).

Part XIII: New bulk geochemical and Rock-Eval data from upper Paleozoic cores and preliminary results for basinal shales (OF 7848; Kabanov and Dewing, 2015).

Part XIV: Compilation of Rock-Eval/TOC and mineralogical data from upper Paleozoic strata of the Sverdrup Basin (OF 8154; Galloway, 2016).

Part XV: Basal strata of Devonian clastic wedge on Banks Island and correlation with mainland Northwest Territories (OF 8354; Kabanov, 2018).

Part XVI: Permafrost thickness determination from petroleum exploration wells (OF 7306; Hu et al., 2018).

Part XVII: Detrital zircon geochronology and stratigraphic interpretations for upper Paleozoic strata of the Sverdrup Basin (OF 8473; Galloway, 2018).

Question: What Paleozoic strata are present on northwestern Victoria Island?

Findings. Northwestern Victoria Island is underlain by Cambrian sandstone and carbonate units and by younger Cambrian to Lower Devonian carbonate units.

Objective. Lower Paleozoic strata on northwestern Victoria Island had not been divided into formations or mapped. The objective was to produce a 1:500 000 scale map of the bedrock geology of northwestern Victoria Island (Fig. 1). This covers an area of approximately 28 500 km^2, which is about half the size of Nova Scotia.

Importance. The units exposed on northwestern Victoria Island continue in the subsurface underneath Banks Island and offshore under the Banks Island Shelf, where they can be traced on seismic images. Mapping surface exposures on Victoria Island improves confidence when interpreting offshore seismic data. This decreases the uncertainty in predicting resource endowment in the area.

Methods and areas. Geological fieldwork in the summers of 2009–2011 was supported by helicopter from Ulukhaktok and two field camps near the head of Minto Inlet. Sites were visited by helicopter or during foot traverses (Fig. 4). Samples of rock were collected for chemical and microfossil analysis; outcrop sections were measured using a 1.5 m Jacob's staff. Given the huge area covered and the general lack of outcrop, much of the mapping was done using air photos, satellite images, and aeromagnetic surveys.

Main outcomes. The lower Paleozoic succession was divided into eight map units, four of which are new. The distribution of these units was mapped and released as Geological Survey of Canada Canadian Geoscience Map 171 (Dewing et al., 2015).

Results and conclusions. In addition to formations being defined on northwestern Victoria Island, the ages of three units were established using paleontological data. Furthermore, two normal fault trends were identified: an apparently older northwest-trending set of faults and a closely spaced northeast-trending set. A meteor impact structure about 28 km in diameter was found on the northwestern side of Victoria Island (Dewing et al., 2013).

Question: What are the distribution and thermal maturity of source rocks in the lower Paleozoic of the Arctic Islands?

Findings. The organic-rich Silurian Cape Phillips Formation is the source rock for the Bent Horn oil field (Fig. 5; Obermajer et al., 2010). Peak maturity for the Cape Phillips Formation over most of the Arctic Islands is within the temperature range at which gas generation occurs, and maximum burial occurred in the Late Devonian. A narrow zone along the Ordovician shelf margin remained as a structural high throughout the Devonian, and the Cape Phillips Formation in that area generated oil during burial by strata of the Sverdrup Basin in the Cretaceous.

Objective. The objectives were to document and quantify potential source-rock units in the lower Paleozoic of the Arctic Islands and to estimate time of maximum burial.

Importance. Source-rock richness and thermal maturity are key elements of petroleum-system analysis. Data from this project were included in resource assessments that contributed to the creation of the Tallurutiup Imanga National Marine Conservation Area in Lancaster Sound.

Methods and areas. Analytical results were compiled from existing data sets, and new geochemical analyses were performed to fill gaps, especially in the Cape Phillips Formation. Methods used to determine hydrocarbon potential/thermal maturity included Rock-Eval pyrolysis (Obermajer et al., 2007a) and reflectance of zooclasts (Dewing et al., 2007). Results were interpreted in Dewing and Obermajer (2009), in which the geographic distribution of thermal maturity is shown, and the timing of maximum burial is estimated from one-dimensional burial-history models.

Main outcomes. Over 3400 reflectance values and 1630 Rock-Eval results were published, along with publications on thermal maturity (Dewing and Obermajer, 2009), timing of hydrocarbon migration (Wendte, 2012), and source-oil correlation at the Bent Horn field (Obermajer et al., 2010).

Results and conclusions. The thick and organic-rich Cape Phillips Formation of Late Ordovician to Silurian age is the most likely unit to have been an effective source rock in the lower Paleozoic; it is the demonstrated source for the oil discovery at Bent Horn. Such organic-rich units of Late

Figure 4. Typical outcrop of Lower Paleozoic platform dolostone exposed on Victoria Island, Northwest Territories. Outcrop is discontinuous and near flat lying. Photograph by K. Dewing. NRCan photo 2021-002

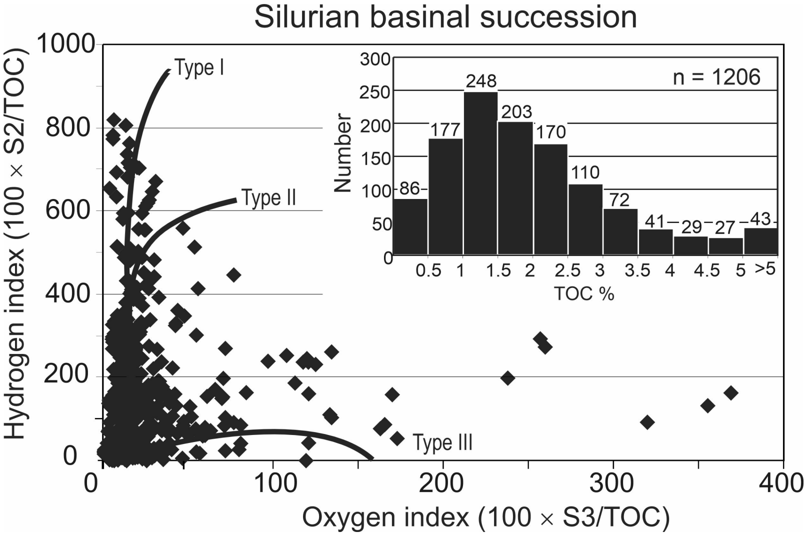

Figure 5. Pseudo van Krevelen diagram from Geological Survey of Canada Open File 5459 (Obermajer et al., 2007d) showing total organic carbon (TOC%) and Rock-Eval hydrogen index versus oxygen index for samples from the Cape Phillips, Devon Island, and Eids formations in the Canadian Arctic. The 17 open file reports on geological and geochemical data include summary diagrams similar to this, as well as spreadsheets of the data.

Ordovician–early Silurian age are important source rocks in many areas of the world, including New York (Utica shale formation) and Jordan (Mudawwara Formation), as well as the source of several huge discoveries in Saudi Arabia (Tayarat, Qalibah formations). In the Canadian Arctic Islands, peak maturation is estimated to have occurred in the Late Devonian, about 370 million years ago, and analytical results show that most of the Cape Phillips Formation was in the gas window at that time. Preserving oil or gas for hundreds of millions of years is difficult due to loss by leakage and due to degradation by water washing and microbes. This limits the chance of a large discovery in the lower Paleozoic over much of the Arctic Islands. There is a narrow (~100 km) strip under the edge of the Sverdrup Basin running from the Sabine Peninsula to Cameron Island, and possibly north of Bathurst and Devon islands, where the Ordovician shelf edge appeared to remain as a high in the Devonian and was subsequently buried in the Triassic through Cretaceous by strata of the Sverdrup Basin. In these areas, the Cape Phillips did not reach peak maturity until the Mesozoic and, therefore, the chance for hydrocarbon preservation in that area is higher (Dewing and Obermajer, 2009; Wendte, 2012).

Question: Where was the Pearya terrane during the early Paleozoic?

Findings. The southeastern structural slice of the Pearya composite terrane on northern Ellesmere Island was probably always close to its current location.

Objective. The geological history of the Pearya terrane on northern Ellesmere Island has been controversial, with several models proposed for its origin. Some authors theorize that the Pearya was transported by tectonic processes from a great distance (Trettin, 1987), whereas others prefer a pericratonic theory, in which the Pearya was rifted a short distance from northern North America and then pushed back close to its original location (like modern Madagascar, but without the lemurs; Hadlari et al., 2014). The objective of this activity was to test different geological models for the Pearya to determine the most likely scenario.

Importance. The tectonic/geological history of Pearya helps constrain models for the opening of the Arctic Ocean during the Mesozoic. The geological history of the Arctic Ocean is a major outstanding problem in global plate tectonics and an important consideration in Canada's claims under the United Nations Convention on the Law of the Sea.

Methods and areas. Archival samples were used to obtain detrital zircon U-Pb ages (Anfinson et al., 2012a, b, 2013; Hadlari et al., 2012, 2014; Beranek et al., 2015) for provenance studies. Anfinson et al. (2012a, b, 2013) examined detrital zircons from the Devonian clastic wedge across the Arctic Islands; Beranek et al. (2015), from the Silurian of Ellesmere Island; and Hadlari and co-authors, from Cambrian successions around the Laurentian paleocontinent (Hadlari et al., 2012), Pearya, and the adjacent deep-water basin (Hadlari et al., 2014). Hadlari et al. (2014) looked for linkages between the Pearya and the Cambrian and Ordovician deep-water basin that might indicate that the Pearya was shedding sediment into the deep-water basin prior to the Silurian. This would test the far-travelled hypothesis according to which the Pearya only came to its current location in Silurian or Devonian time. Dewing et al. (2019) followed the same approach as Hadlari et al. (2014) but used other geological information (e.g. Sm-Nd isotopes, isopachs, cross-sections) to test for linkages between the Pearya and the Arctic Islands prior to the Silurian.

Main outcomes. A large data set of detrital zircon ages was published in seven journal articles.

Results and conclusions. Hadlari et al. (2014) provided evidence from detrital zircons that the Pearya shed sediments from the north into the deep-water basin during Cambrian time. Dewing et al. (2019) demonstrated that tectonic events in the Pearya were synchronous with the timing of unconformities on the carbonate shelf and that a major tectonic event (collision?) took place in the latest Ordovician, as shown by a major change in sediment source and shelf configuration at that time. These results can only be compared to the southeastern structural slice of the Pearya because the two northwestern slices do not preserve Cambrian to Silurian stratigraphy. Anfinson et al. (2012a) demonstrated that detrital zircons that are exotic to Laurentia only arrived after the end of the Middle Devonian, ca. 380 Ma.

ACKNOWLEDGMENTS

The authors are grateful to N. Bingham-Koslowski and L. Currie for their careful and insightful reviews of this paper.

REFERENCES

Anfinson, O.A., Leier, A.L., Embry, A.F., and Dewing, K., 2012a. Detrital zircon geochronology and provenance of the Neoproterozoic to Late Devonian Franklinian Basin, Canadian Arctic Islands; Geological Society of America Bulletin, v. 124, p. 415–430. https://doi.org/10.1130/B30503.1

Anfinson, O.A., Leier, A.L., Gaschnig, R., Embry, A.F., and Dewing, K., 2012b. U–Pb and Hf isotopic data from Franklinian Basin strata: insights into the nature of Crockerland and the timing of accretion, Canadian Arctic Islands; Canadian Journal of Earth Sciences, v. 49, p. 1316–1328. https://doi.org/10.1139/e2012-067

Anfinson, O.A., Leier, A.L., Dewing, K., Guest, B., Stockli, D.F., and Embry, A.F., 2013. Insights into the Phanerozoic tectonic evolution of the northern Laurentian margin: detrital apatite and zircon (U–Th)/He ages from Devonian strata of the Franklinian Basin, Canadian Arctic Islands; Canadian Journal of Earth Sciences, v. 50, p. 761–768. https://doi.org/10.1139/cjes-2012-0177

Beranek, L.P., Pease, V., Hadlari, T., and Dewing, K., 2015. Silurian flysch successions of Ellesmere Island, Arctic Canada, and their significance to northern Caledonian palaeogeography and tectonics; Journal of the Geological Society, v. 172, p. 201–212. https://doi.org/10.1144/jgs2014-027

Cook, D.G. and Aitken, J.D., 1969. Erly Lake, District of Mackenzie; Geological Survey of Canada, Preliminary Map 5-1969, scale 1:250 000. https://doi.org/10.4095/109207

Dewing, K. and Embry, A.F., 2007. Geological and geochemical data from the Canadian Arctic Islands. Part I: Stratigraphic tops from Arctic Islands' oil and gas exploration boreholes; Geological Survey of Canada, Open File 5442, 7 p. https://doi.org/10.4095/223386

Dewing, K. and Obermajer, M., 2009. Lower Paleozoic thermal maturity and hydrocarbon potential of the Canadian Arctic Archipelago; Bulletin of Canadian Petroleum Geology, v. 57, no. 2, p. 141–166. https://doi.org/10.2113/gscpgbull.57.2.141

Dewing, K., Sharp, R.J., and Muraro, T., 2006. Exploration history and mineral potential of the central Arctic Zn-Pb district, Nunavut; Arctic, v. 59, p. 415–427.

Dewing, K., Obermajer, M., and Goodarzi, F., 2007. Geological and geochemical data from the Canadian Arctic Islands. Part III: Organic-matter reflectance data; Geological Survey of Canada, Open File 5476, 8 p. https://doi.org/10.4095/223574

Dewing, K., Obermajer, M., and Snowdon, L.R., 2010. Geological and geochemical data from the Canadian Arctic Islands. Part VII: Composition of gas from petroleum exploration boreholes; Geological Survey of Canada, Open File 5611, 10 p. https://doi.org/10.4095/263412

Dewing, K., Pratt, B.R., Hadlari, T., Brent, T., Bédard, J., and Rainbird, R.H., 2013. Newly identified "Tunnunik" impact structure, Prince Albert Peninsula, northwestern Victoria Island, Arctic Canada; Meteoritics & Planetary Science, v. 48, p. 211–223. https://doi.org/10.1111/maps.12052

Dewing, K., Hadlari, T., Rainbird, R.H., and Bédard, J.H., 2015. Phanerozoic geology, northwestern Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 171 (preliminary edition), scale 1:500 000. https://doi.org/10.4095/295530

Dewing, K., Hadlari, T., Pearson, D.G., and Matthews, W., 2019. Early Ordovician to Early Devonian tectonic development of the northern margin of Laurentia, Canadian Arctic Islands; Geological Society of America Bulletin, v. 131, p. 1075–1094. https://doi.org/10.1130/B35017.1

Embry, A.F., 1988. Middle–Upper Devonian sedimentation in the Canadian Arctic Islands and the Ellesmerian Orogeny; *in* Devonian of the World, (ed.) N.J. McMillan, A.F. Embry, and D.J. Glass; Canadian Society of Petroleum Geologists, Memoir 14, p. 15–51.

Embry, A.F. and Klovan, J.E., 1976. The Middle–Upper Devonian clastic wedge of the Franklinian geosyncline; Bulletin of Canadian Petroleum Geology, v. 24, p. 486–639.

Galloway, B.J., 2016. Geological and geochemical data from the Canadian Arctic Islands. Part XIV: Compilation of Rock-Eval/TOC and mineralogical data from upper Paleozoic strata of the Sverdrup Basin; Geological Survey of Canada, Open File 8154, 26 p. https://doi.org/10.4095/299485

Galloway, B.J., 2018. Geological and geochemical data from the Canadian Arctic Islands. Part XVII: Detrital zircon geochronology and stratigraphic interpretations for upper Paleozoic strata of the Sverdrup Basin; Geological Survey of Canada, Open File 8473, 7 p. https://doi.org/10.4095/313023

Grantz, A., Eittreim, S., and Dinter, D.A., 1979. Geology and tectonic development of the continental margin north of Alaska; Tectonophysics, v. 59, p. 263–291. https://doi.org/10.1016/0040-1951(79)90050-7

Grasby, S.E., Chen, Z., Dewing, K., and Yang, L., 2011. Geological and geochemical data from the Canadian Arctic Islands. Part XI: Testing and fluid analysis data for the Canadian Arctic Islands; Geological Survey of Canada, Open File 6716, 32 p. https://doi.org/10.4095/287973

Hadlari, T. and Madronich, L.I., 2017. Stratigraphic revision of the Franklinian stratigraphy of the northern Axel Heiberg fold belt, Nunavut; Geological Survey of Canada, Open File 8238, 14 p. https://doi.org/10.4095/300534

Hadlari, T., Davis, W.J., Dewing, K., Heaman, L.M., Lemieux, Y., Ootes, L., Pratt, B.R., and Pyle, L.J., 2012. Two detrital zircon signatures for the Cambrian passive margin of northern Laurentia highlighted by new U-Pb results from northern Canada; Geological Society of America Bulletin, v. 124, p. 1155–1168. https://doi.org/10.1130/B30530.1

Hadlari, T., Davis, W.J., and Dewing, K., 2014. A pericratonic model for the Pearya terrane as an extension of the Franklinian margin of Laurentia, Canadian Arctic; Geological Society of America Bulletin, v. 126, p. 182–200. https://doi.org/10.1130/B30843.1

Hannigan, P., Harrison, J.C., and Osadetz, K., 1999. Energy resources and assessment; *in* Mineral and energy resource assessment of Bathurst Island and area, Nunavut (parts of NTS 68G, 68H, 69A, 69B and 79A), (ed.) C.D. Anglin and J.C. Harrison; Geological Survey of Canada, Open File 3714, p. F1–F95. https://doi.org/10.4095/210397

Harrison, J.C., 1995. Melville Island's salt-based fold belt, Arctic Canada; Geological Survey of Canada, Bulletin 472, 344 p. https://doi.org/10.4095/203576

Harrison, J.C. and Brent, T.A., 2005. Basins and fold belts of Prince Patrick Island and adjacent area, Canadian Arctic Islands; Geological Survey of Canada, Bulletin 560, 208 p. https://doi.org/10.4095/220345

Harrison, J.C., Lynds, T., Ford, A., and Rainbird, R.H., 2016. Geology, simplified tectonic assemblage map of the Canadian Arctic Islands, Northwest Territories–Nunavut; Geological Survey of Canada, Canadian Geoscience Map 80 (preliminary edition), scale 1:2 000 000. https://doi.org/10.4095/297416

Hu, K. and Dewing, K., 2011. Geological and geochemical data from the Canadian Arctic Islands. Part X: Core petrophysical data from petroleum exploration boreholes; Geological Survey of Canada, Open File 6669, 1 CD-ROM. https://doi.org/10.4095/287314

Hu, K., Brent, T.A, and Dewing, K., 2018. Geological and geochemical data from the Canadian Arctic Islands. Part XVI: Permafrost thickness determination from petroleum exploration wells; Geological Survey of Canada, Open File 7306, 243 p. https://doi.org/10.4095/311129

Kabanov, P., 2018. Geological and geochemical data from the Canadian Arctic Islands. Part XV: Basal strata of Devonian clastic wedge on Banks Island and correlation with mainland Northwest Territories; Geological Survey of Canada, Open File 8354, 39 p. https://doi.org/10.4095/306368

Kabanov, P.B. and Dewing, K.E., 2014. Geological and geochemical data from the Canadian Arctic Islands. Part XII: Descriptions and lithologs of upper Paleozoic core; Geological Survey of Canada, Open File 7569, 121 p. https://doi.org/10.4095/293754

Kabanov, P. and Dewing, K., 2015. Geological and geochemical data from the Canadian Arctic Islands. Part XIII: New bulk geochemical and Rock-Eval data from upper Paleozoic cores and preliminary results for basinal shales; Geological Survey of Canada, Open File 7848, 155 p. https://doi.org/10.4095/296803

Mayr, U., 1980. Stratigraphy and correlation of lower Paleozoic formations, subsurface of Bathurst Island and adjacent smaller islands, Canadian Arctic Archipelago; Geological Survey of Canada, Bulletin 306, 52 p. https://doi.org/10.4095/102157

Norris, A.W., Grant, A.C., Sanford, B.V., and Cowan, W.R., 1993. Hudson Platform — geology; *in* Sedimentary cover of the craton in Canada, (ed.) D.F. Stott and J.D. Aitken; Geological Survey of Canada, Geology of Canada, no. 5, p. 653–700 (also Geological Society of America, The geology of North America, v. D-1). https://doi.org/10.4095/192378

Obermajer, M., Dewing, K., and Fowler, M.G., 2007a. Geological and geochemical data from the Canadian Arctic Islands. Part IV: Gasoline range and saturate-fraction gas chromatograms of oil samples; Geological Survey of Canada, Open File 5483, 5 p. https://doi.org/10.4095/223759

Obermajer, M., Dewing, K., and Fowler, M.G., 2007b. Geological and geochemical data from the Canadian Arctic Islands. Part V: Saturate-fraction gas chromatograms of organic extracts from cuttings and core samples from petroleum exploration wells; Geological Survey of Canada, Open File 5534, 5 p. https://doi.org/10.4095/223772

Obermajer, M., Dewing, K., and Fowler, M.G., 2007c. Geological and geochemical data from the Canadian Arctic Islands. Part VI: Saturate-fraction gas chromatograms of organic extracts from outcrop and mining core samples; Geological Survey of Canada, Open File 5591, 8 p. https://doi.org/10.4095/224040

Obermajer, M., Stewart, K.R., and Dewing, K., 2007d. Geological and geochemical data from the Canadian Arctic Islands. Part II: Rock-Eval/TOC data; Geological Survey of Canada, Open File 5459, 27 p. https://doi.org/10.4095/223457

Obermajer, M., Dewing, K., and Fowler, M.G., 2008a. Geological and geochemical data from the Canadian Arctic Islands. Part VIII: Saturate-fraction gas chromatography–mass spectrometry data for organic extracts; Geological Survey of Canada, Open File 5642, 1 CD-ROM. https://doi.org/10.4095/224969

Obermajer, M., Dewing, K., and Fowler, M.G., 2008b. Geological and geochemical data from the Canadian Arctic Islands. Part IX: Saturate-fraction gas chromatography–mass spectrometry data for hydrocarbon samples; Geological Survey of Canada, Open File 5683, 1 CD-ROM. https://doi.org/10.4095/226238

Obermajer, M., Dewing, K., and Fowler, M.G., 2010. Geochemistry of crude oil from Bent Horn field (Canadian Arctic Archipelago) and its possible Paleozoic origin; Organic Geochemistry, v. 41, p. 986–996. https://doi.org/10.1016/j.orggeochem.2010.04.001

Procter, R.M., Taylor, G.C., and Wade, J.A., 1984. Oil and natural gas resources of Canada, 1983; Geological Survey of Canada, Paper 83-31, 63 p. https://doi.org/10.4095/119739

Reid, S., Dewing, K., and Sharp, R., 2013a. Polaris as a guide to northern exploration: ore textures, paragenesis and the origin of the carbonate-hosted Polaris Zn–Pb mine, Nunavut, Canada; Ore Geology Reviews, v. 51, p. 27–42. https://doi.org/10.1016/j.oregeorev.2012.11.003

Reid, S., Dewing, K., and Sharp, R., 2013b. Structural and diagenetic origin of breccias in the carbonate-hosted Polaris Zn–Pb deposit, Nunavut, Canada; Ore Geology Reviews, v. 55, p. 110–124. https://doi.org/10.1016/j.oregeorev.2013.05.003

Smith, G.P. and Okulitch, A.V., 1987. The Inglefield uplift: a Devonian tectonic element, Ellesmere Island, Arctic Canada; Bulletin of Canadian Petroleum Geology, v. 35, p. 75–78.

Strauss, J.V., Macdonald, F.A., Taylor, J.F., Repetski, J.E., and McClelland, W.C., 2013. Laurentian origin for the North Slope of Alaska: implications for the tectonic evolution of the Arctic; Lithosphere, v. 5, p. 477–482. https://doi.org/10.1130/L284.1

Strauss, J.V., Johnson, B.G., Colpron, M., Nelson, L.L., Perez, J.L., Benowitz, J.A., Ward, W.P., and McClelland, W.C., 2018. Pre-Mississippian stratigraphy and provenance of the North Slope of Arctic Alaska II: basinal rocks of the northeastern Brooks Range and their significance in circum-Arctic evolution; *in* Circum-Arctic structural events: tectonic evolution of the Arctic margins and trans-Arctic links with adjacent orogens, (ed.) K. Piepjohn, J.V. Strauss, L. Reinhardt, and W.C. McClelland; Geological Society of America, Special Paper 541, p. 525–572. https://doi.org/10.1130/2018.2541(23)

Surlyk, F., 1995. Deep-sea fans valleys, channels, lobes and fringes of the Silurian Peary Land Group, North Greenland; *in* Atlas of deep water environments: architectural style in turbidite systems, (ed.) K.T. Pickering, R.N. Hiscott, N.H. Kenyon, F. Ricci Lucchi, and R.D.A. Smith; Springer, Dordrecht, p. 124–138. https://doi.org/10.1007/978-94-011-1234-5_20

Thorsteinsson, R. and Tozer, E.T., 1970. Geology of the Arctic Archipelago; *in* Geology and economic minerals of Canada (fifth edition), (ed.) R.J.W. Douglas; Geological Survey of Canada, Economic Geology Report 1, p. 547–590. https://doi.org/10.4095/106153

Thorsteinsson, R. and Uyeno, T.T. (ed.), 1980. Stratigraphy and conodonts of upper Silurian and Lower Devonian rocks in the environs of the Boothia uplift, Canadian Arctic Archipelago; Geological Survey of Canada, Bulletin 292, 75 p. https://doi.org/10.4095/119467

Trettin, H.P., 1979. Middle Ordovician to Lower Devonian deep-water succession at southeastern margin of Hazen Trough, Cañon Fiord, Ellesmere Island; Geological Survey of Canada, Bulletin 272, 84 p. https://doi.org/10.4095/106343

Trettin, H.P., 1987. Pearya: a composite terrane with Caledonian affinities in northern Ellesmere Island; Canadian Journal of Earth Sciences, v. 24, p. 224–245. https://doi.org/10.1139/e87-025

Trettin, H.P., 1998. Pre-Carboniferous geology of the northern part of the Arctic islands; Geological Survey of Canada, Bulletin 425, 401 p. https://doi.org/10.4095/209572

Tucker, R.D., Robinson, P., Solli, A., Gee, D.G., Thorsnes, T., Krogh, T.E., Nordgulen, Ø., and Bickford, M.E., 2004. Thrusting and extension in the Scandian hinterland, Norway: new U-Pb ages and tectonostratigraphic evidence; American Journal of Science, v. 304, p. 477–532. https://doi.org/10.2475/ajs.304.6.477

Wendte, J.C., 2012. Core, petrographic, and rock petrophysical evaluation of the Blue Fiord Formation from wells in the Canadian Arctic Islands; Geological Survey of Canada, Open File 6984, 126 p. https://doi.org/10.4095/289887

Appendix A

Published contributions on the lower Paleozoic from the Western Arctic project, 2008–2022

DATA

2022

VandenBerg, R.D., Kabanov, P.B., Dewing, K.E., and Atkinson, E.A., 2022. Geological and geochemical data from the Canadian Arctic Islands, part XVIII: XRF and TOC data, and formation tops in exploration wells from the Devonian clastic wedge and underlying strata, Northwest Territories and Nunavut; Geological Survey of Canada, Open File 8870, 10 p. https://doi.org/10.4095/329642

2019

Dockman, D.M., Hadlari, T., and Dewing, K., 2019. Geochemistry of the Neoproterozoic to Cambrian mafic volcanic rocks of the Jaeger Lake assemblage and the Yelverton Formation, Nunavut; Geological Survey of Canada, Open File 8555, 13 p. https://doi.org/10.4095/314659

2018

Hu, K., Brent, T.A., and Dewing, K., 2018. Geological and geochemical data from the Canadian Arctic Islands. Part XVI: Permafrost thickness determination from petroleum exploration wells; Geological Survey of Canada, Open File 7306, 243 p. https://doi.org/10.4095/311129

Kabanov, P., 2018. Geological and geochemical data from the Canadian Arctic Islands. Part XV: Basal strata of Devonian clastic wedge on Banks Island and correlation with mainland Northwest Territories; Geological Survey of Canada, Open File 8354, 39 p. https://doi.org/10.4095/306368

Synnott, D.P., Dewing, K., Ardakani, O.H., and Obermajer, M., 2018. Correlation of zooclast reflectance measurements with Rock-Eval Tmax values within Upper Ordovician Cape Phillips Formation, a potential petroleum source rock from the Canadian Arctic Islands; Fuel, v. 227, p. 165–176. https://doi.org/10.1016/j.fuel.2018.04.096

2011

Grasby, S.E., Chen, Z., Dewing, K., and Yang, L., 2011. Geological and geochemical data from the Canadian Arctic Islands. Part XI: Testing and fluid analysis data for the Canadian Arctic Islands; Geological Survey of Canada, Open File 6716, 32 p. https://doi.org/10.4095/287973

Hu, K. and Dewing, K., 2011. Geological and geochemical data from the Canadian Arctic Islands. Part X: Core petrophysical data from petroleum exploration boreholes; Geological Survey of Canada, Open File 6669, 1 .zip file. https://doi.org/10.4095/287314

2010

Grasby, S.E., Chen, Z., and Dewing, K., 2010. Temperature–depth plots for selected petroleum exploration wells, Canadian Arctic Islands; Geological Survey of Canada, Open File 6567, 16 p. https://doi.org/10.4095/262738

2008

Obermajer, M., Dewing, K., and Fowler, M., 2008. Geological and geochemical data from the Canadian Arctic Islands Part IX: Saturate fraction gas chromatography–mass spectrometry data for hydrocarbon samples; Geological Survey of Canada, Open File 5683, 1 .zip file.

MINERAL AND HYDROCARBON SYSTEMS

2013

Reid, S., Dewing, K., and Sharp, R., 2013. Polaris as a guide to northern exploration: ore textures, paragenesis and the origin of the carbonate-hosted Polaris Zn–Pb mine, Nunavut, Canada; Ore Geology Reviews, v. 51, p. 27–42. https://doi.org/10.1016/j.oregeorev.2012.11.003

Reid, S., Dewing, K., and Sharp, R., 2013. Structural and diagenetic origin of breccias in the carbonate-hosted Polaris Zn–Pb deposit, Nunavut, Canada; Ore Geology Reviews, v. 55, p. 110–124. https://doi.org/10.1016/j.oregeorev.2013.05.003

2011

Dewing, K. and Obermajer, M., 2011. Thermal maturity of the Sverdrup Basin, Arctic Canada and its bearing on hydrocarbon potential; Chapter 38 *in* Arctic petroleum geology, (ed.) M. Spencer, D. Gautier, A. Stoupakova, A. Embry, and K. Sørensen; Geological Society of London, Memoir, v. 35, p. 567–580. https://doi.org/10.1144/M35.38

2010

Obermajer, M., Dewing, K., and Fowler, M., 2010. Geochemistry of crude oil from Bent Horn field in the Canadian Arctic Archipelago and its possible Paleozoic origin; Organic Geochemistry, v. 41, p. 986–996. https://doi.org/10.1016/j.orggeochem.2010.04.001

2009

Dewing, K. and Obermajer, M., 2009. Lower Paleozoic thermal maturity and hydrocarbon potential of the Canadian Arctic Archipelago; Bulletin of Canadian Petroleum Geology, v. 57, no. 2, p. 141–166. https://doi.org/10.2113/gscpgbull.57.2.141

MAPPING AND STRATIGRAPHY

2020

Kabanov, P., Vandenberg, R., Pelchat, P., Cameron, M., and Dewing, K., 2020. Lithostratigraphy of Devonian basinal mudrocks in frontier areas of northwestern Canada augmented with ED-XRF technique; Arktos, v. 7, p. 39–42. https://doi.org/10.1007/s41063-020-00074-z

2018

Harrison, J.C., 2018. Intersecting fold belts in the Bathurst Island region, Nunavut; Journal of Geodynamics, v. 118, p. 82–105. https://doi.org/10.1016/j.jog.2017.11.003

2017

Hadlari, T. and Madronich, L.I., 2017. Stratigraphic revision of the Franklinian stratigraphy of the northern Axel Heiberg fold belt, Nunavut; Geological Survey of Canada, Open File 8238, 14 p. https://doi.org/10.4095/300534

2016

Harrison, J.C., Lynds, T., Ford, A., and Rainbird, R.H., 2016. Geology, simplified tectonic assemblage map of the Canadian Arctic Islands, Northwest Territories–Nunavut; Geological Survey of Canada, Canadian Geoscience Map 80 (preliminary edition), scale 1:2 000 000. https://doi.org/10.4095/297416

2015

Bédard, J.H., Rainbird, R.H., Dewing, K., and Hadlari, T., 2015. Geology, Imaiqtaqtuq, Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 191, scale 1:50 000. https://doi.org/10.4095/297280

Dewing, K., Hadlari, T., Rainbird, R.H., and Bédard, J.H., 2015. Phanerozoic geology, northwestern Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 171, scale 1:500 000. https://doi.org/10.4095/295530

Durbano, A.M., Pratt, B.R., Hadlari, T., and Dewing, K., 2015. Sedimentology of an early Cambrian tide-dominated embayment: Quyuk formation, Victoria Island, Arctic Canada; Sedimentary Geology, v. 320, p. 1–18. https://doi.org/10.1016/j.sedgeo.2015.02.004

Rainbird, R.H., Bédard, J.H., Dewing, K., and Hadlari, T., 2015. Geology, Qikigtalik, Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 177 (preliminary edition), scale 1:50 000. https://doi.org/10.4095/296801

2014

Rainbird, R.H., Bédard, J.H., Dewing, K., and Hadlari, T., 2014. Geology, Kangiryuaqtihuk / Minto Inlet, Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 82 (preliminary edition), scale 1:50 000. https://doi.org/10.4095/293460

2013

Dewing, K. and Nowlan, G., 2013. The early Cambrian to Early Ordovician carbonate platform and shelf margin, Canadian Arctic Islands; *in* The Great American Carbonate Bank: the geology and petroleum potential of the Cambrian–Ordovician Sauk sequence of Laurentia, (ed.) J.R. Derby, R.D. Fritz, S.A. Longacre, W.A. Morgan, and C.A. Sternbach; American Association of Petroleum Geologists, Memoir 98, p. 627–647.

Dewing, K., Pratt, B.R., Hadlari, T., Brent, T., Bédard, J., and Rainbird, R.H., 2013. Newly identified "Tunnunik" impact structure, Prince Albert Peninsula, northwestern Victoria Island, Arctic Canada; Meteoritics & Planetary Science, v. 48, p. 211–223. https://doi.org/10.1111/maps.12052

Rainbird, R.H., Bédard, J.H., Dewing, K., Hadlari, T., and Thomson, D., 2013. Geology, Qiqittiivik, Victoria Island, Northwest Territories; Geological Survey of Canada, Canadian Geoscience Map 59, scale 1:50 000. https://doi.org/10.4095/293259

TECTONICS

2019

Dewing, K., Hadlari, T., Pearson, G., and Mathews, W., 2019. Early Ordovician to Early Devonian tectonic development of the northern margin of Laurentia, Canadian Arctic Islands; Geological Society of America Bulletin, v. 131, p. 1075–1094. https://doi.org/10.1130/B35017.1

Embry, A.F., Beauchamp, B., Dewing, K., and Dixon, J., 2019. Episodic tectonics in the Phanerozoic succession of the Canadian High Arctic and the "10-million-year flood"; *in* Circum-Arctic structural events: tectonic evolution of the Arctic margins and trans-Arctic links with adjacent orogens, (ed.) K. Piepjohn, J.V. Strauss, L. Reinhardt, and W.C. McClelland; Geological Society of America, Special Paper 541. https://doi.org/10.1130/2018.2541(11)

2018

Piepjohn, K., Atkinson, E., Dewing, K., Smith, R., and Galloway, J., 2018. Styles of deformation on northern Banks Island, N.W.T. Canada; Arktos, v. 4, p. 1–5. https://doi.org/10.1007/s41063-018-0046-y

2017

Midwinter, D., Powell, J., Schneider, D.A., and Dewing, K., 2017. Investigating the Paleozoic–Mesozoic low-temperature thermal history of the southwestern Canadian Arctic: insights from (U–Th)/He thermochronology; Canadian Journal of Earth Sciences, v. 54, no. 4, p. 430–444. https://doi.org/10.1139/cjes-2016-0088

2015

Beranek, L., Pease, V., Hadlari, T., and Dewing, K., 2015. Silurian flysch successions of Ellesmere Island, Arctic Canada, and their significance to northern Caledonian palaeogeography and tectonics; Journal of the Geological Society, v. 172, p. 201–212. https://doi.org/10.1144/jgs2014-027

2014

Hadlari, T., Davis, W.J., and Dewing, K., 2014. A pericratonic model for Pearya Terrane as an extension of the Franklinian margin of Laurentia, Canadian Arctic; Geological Society of America Bulletin, v. 126, p. 182–200. https://doi.org/10.1130/B30843.1

2013

Anfinson, O.A., Leier, A.L., Guest, B., Stockli, D.F., Dewing, K., and Embry, A.F., 2013. Insights into the Phanerozoic tectonic evolution of the northern Laurentian margin: detrital apatite and zircon (U–Th)/He ages from Devonian strata of the Franklinian Basin, Canadian Arctic Islands; Canadian Journal of Earth Sciences, v. 50, no.7, p. 761–768. https://doi.org/10.1139/cjes-2012-0177

2012

Anfinson, O.A., Leier, A.L., Embry, A.F., and Dewing, K., 2012. Detrital zircon geochronology and provenance of the Neoproterozoic to Late Devonian Franklinian Basin, Canadian Arctic Islands; Geological Society of America Bulletin, v. 124, p. 415–430. https://doi.org/10.1130/B30503.1

Anfinson, O.A., Leier, A.L., Gaschnig, R., Embry, A.F., and Dewing, K., 2012. U–Pb and Hf isotopic data from Franklinian Basin strata: insights into the nature of Crockerland and the timing of accretion, Canadian Arctic Islands; Canadian Journal of Earth Sciences, v. 49, p. 1316–1328. https://doi.org/10.1139/e2012-067