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London 2021 GAC–MAC Joint Annual Meeting Field Trips

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GAC–MAC: FIELD GUIDE SUMMARY

London 2021 GAC–MAC Joint Annual Meeting Field Trips

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GAC–MAC FIELD GUIDE SUMMARY

GAC–MAC London 2021 is offering five field trips; four that will run virtually or in person depending on circumstances dictated by the state of the pandemic, and one that will run virtually only. Conference participants will have the option to take part in visiting:

1) The deep karstic basin of Crawford Lake on the Niagara Escarpment to examine varves containing light inorganic and dark organic couplets;
2) The geological wonders of the Niagara Escarpment in the Hamilton area, including the sedimentary deposits, fossils, and lateral changes in lithological characteristics that have been affected by continuous erosion;
3) The 1140 to 1105 Ma volcanic and intrusive rocks of the Early Midcontinent Rift from the spectacular Lake Superior shoreline to as far east as Timmins (virtual only), including 'visits' to dykes, interlayered alkaline and tholeiitic basalt, and alkaline rocks of the Coldwell Complex;
4) The well-preserved outcrops of the Paleoproterozoic Huronian Supergroup, including evidence of early life, glacial activity, and effects of the Sudbury meteorite impact; this trip is dedicated to the memory of Grant Young;
5) An informative field trip for earth science educators that will take participants to the Oil, Gas and Salt Resources Library and Hungry Hollow to learn about the paleoenvironment and to create a fossil collection for use in their classrooms, and a tour of the newly-renovated Arkona Lions Museum and Information Centre.

Further field trip details are given below, and updates may be found on the GAC–MAC London 2021 website: https://gacmac2021.ca/.

The Unusual Hydrology and Sedimentary Record of Crawford Lake

Leader: Francine McCarthy (Brock University)
[1 day and/or virtual]

Sediments containing varves accumulate in the deep karstic basin of Crawford Lake on the Niagara Escarpment, allowing changes in water chemistry and the lake ecosystem to be dated with annual resolution. These disturbances were primarily anthropogenic, and archeological evidence of Iroquoian and subsequent Euro-Canadian activities can still be seen in its small watershed. Calcite precipitates in the alkaline waters of the mixolimnion (upper wind-mixed layer) of this permanently stratified lake, forming a summer light-coloured layer, and the dark part of the couplet is organic matter, primarily from mass mortality of plankton after fall turnover. Unlike most meromictic lakes, the bottom waters are highly oxygenated, and a diverse micro-invertebrate fauna is found below the chemocline, including ostracods, cladocerans, copepods and rotifers. Groundwater flowing into this sinkhole via aquifers in the Lockport Group contains enough dissolved oxygen to allow aerobic metabolism year-round in the monimolimnion (lower water layer). Because light inorganic- dark organic couplets accumulate in a non-reducing environment, the varved sequence of Crawford Lake is being assessed as a potential Global Stratotype Section and Global Standard Stratotype Section and Point for the Anthropocene Epoch.

Crawford Lake view from interpretive boardwalk on dolomitic bedrock. Photo taken by Francine McCarthy.

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A Drive Through the City of Waterfalls: Exploring the Niagara Escarpment in Hamilton, Ontario

Leaders: Rebecca Lee (McMaster University), Carolyn Eyles (McMaster University), Alexander Peace (McMaster University)

[1 day and/or virtual]

The Niagara Escarpment is a steep-sloped cuesta that stretches from New York State through Ontario and into Michigan and Wisconsin. It is composed of Ordovician to Devonian sedimentary deposits, primarily dolostones, shales and sandstones. Across the length of the escarpment, there is significant variation in its lithological characteristics, including unit thicknesses and jointing patterns. This field trip will explore outcrops of the Niagara Escarpment in the city of Hamilton, an area that shows significant change in the nature of exposed sedimentary rocks. The escarpment runs through Hamilton, separating the lower and upper city which are connected by 19 access roads. Hamilton is also known as the "city of waterfalls", a moniker related to the over 100 waterfalls that cascade over the escarpment edge. The escarpment here is of interest to the local community, to researchers, and to city planners as its continuous erosion and change cause issues with the safety of the roads and complicate building near its edge. The trip will include stops at the Devil's Punchbowl in east Hamilton, the Jolley Cut in central Hamilton, and the Chedoke Radial Trail in west Hamilton. At each of these locations the sedimentary deposits, fossils, and other features of interest will be discussed in detail. Throughout the trip, the lateral changes in lithological characteristics occurring across the escarpment within the city will be discussed and highlighted. Other sites may be included, time permitting, to further elucidate the lithological characteristics of the Niagara Escarpment.

One of the many waterfalls highlighting the sedimentary strata of the Niagara Escarpment. Photo taken by Rebecca Lee.

A Virtual Field Trip to the Eastern Midcontinent Rift – Canada

Leader: David Good (Western University)

[virtual only]

This field trip will focus on ca. 1140–1105 Ma volcanic and intrusive rocks related to the Early Midcontinent Rift, emplaced onto or into the Archean terrane northeast of Lake Superior. Because we are virtual, we can visit many of the best outcrop exposures located off the beaten path, from the spectacular Lake Superior shoreline to as far east as Timmins. We will look at a very diverse range of alkaline and tholeiitic igneous rocks with planned stops at: 1) Chippewa Falls and Mamainse Point to see pahoehoe lava flows and interflow conglomerates, 2) Rift perpendicular dykes including the Great Abitibi and Kipling dykes, 3) Rift parallel alkaline dykes in Pukaskwa National Park, 4) interlayered alkaline and tholeiitic basalt at Penn Lake, 5) the Coldwell Complex, the largest alkaline intrusion in North America, to see partial melting at the Archean footwall contact and classic intrusive relationships between nepheline syenite and alkaline gabbro at Neys Provincial Park, and 7) Pebble beach in Marathon. We will finish the field trip by examining some of the highly unusual but distinguishing igneous textures at two of the best-known copper-palladium deposits located in the eastern Midcontinent Rift, i.e. the Geordie Lake and Marathon deposits within the Coldwell Complex.

Pukaskwa dyke (~ 1106 Ma) intruded along plane of weakness in deformed Archean pillow basalt (in left cliff face). Photo taken by David Good.

Geology of the Huronian Supergroup North of Lake Huron, Canada – a Fieldtrip in Memory of Grant M. Young

Leaders: Patricia Corcoran (Western University), Gordon Osinski (Western University), Carolyn Hill-Svehla (Western University)

[4 days and/or virtual]

The rocks of the Paleoproterozoic Huronian Supergroup will be examined at various locations in Ontario. We will view most Huronian sedimentary formations, including: 1) the Matinenda Formation, which hosts the uranium-rich deposits in Elliot Lake, 2) the mudstone-siltstone deposits of the McKim and Gowganda formations in Espanola, 3) the dropstones, varves and other glaciogenic deposits of the Gowganda and Ramsey Lake formations near Iron Bridge, Elliot Lake and Whitefish Falls, 4) the carbonate-rich Espanola Formation in Espanola, 5) the quartz-rich sandstone deposits of the Lorrain, Bar River, and Serpent formations at various localities, and 6) evidence for early life in the Gordon Lake Formation near Flack Lake. Participants will also visit the Sudbury basin, which is host to the Sudbury Igneous Complex, Whitewater Group and Huronian sedimentary rocks containing impact-related structures. A short trip to Manitoulin Island will introduce participants to Ordovician oil shales and fossil-rich carbonate units, as well as the Huronian–Ordovician unconformity.

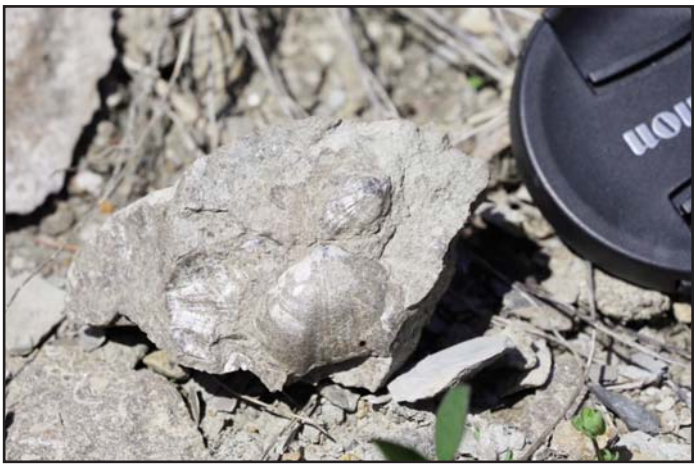
Paleoproterozoic Lorrain quartzite of the Huronian Supergroup, exposure overlooking Whitefish Falls, Ontario. Photo taken by Patricia Corcoran.

Earth Sciences Field Trip for Educators – London and Arkona

Leaders: Lesley Hymers (Mining Matters), Deana Schwarz (Association of Professional Geoscientists of Ontario Education Foundation)

[1 day and/or virtual]

The field trip will include 3 site visits, beginning with the Oil, Gas and Salt Resources Library. Participants will tour the facility, learn about the Paleozoic geology of Ontario, and be introduced to cutting samples, core, and well information. Next, participants will visit the Hungry Hollow site near Arkona, with permission and guidance from Bob O'Donnell, to learn about the paleoenvironment of the location and to create a fossil collection for use in their classrooms. The field trip will conclude with a tour of the newly renovated Arkona Lions Museum and Information Centre, led by Bob O'Donnell, the Museum Steward. Here, educators will learn more about the geology of the area, the history of fossil collecting in southwestern Ontario, and how to identify the fossils they discovered at Hungry Hollow. Transportation to and from Western University will be included.



Brachiopod fossils at Hungry Hollow, Arkona, Ontario. Photo taken by Deana Schwarz.

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GAC-MAC London 2021

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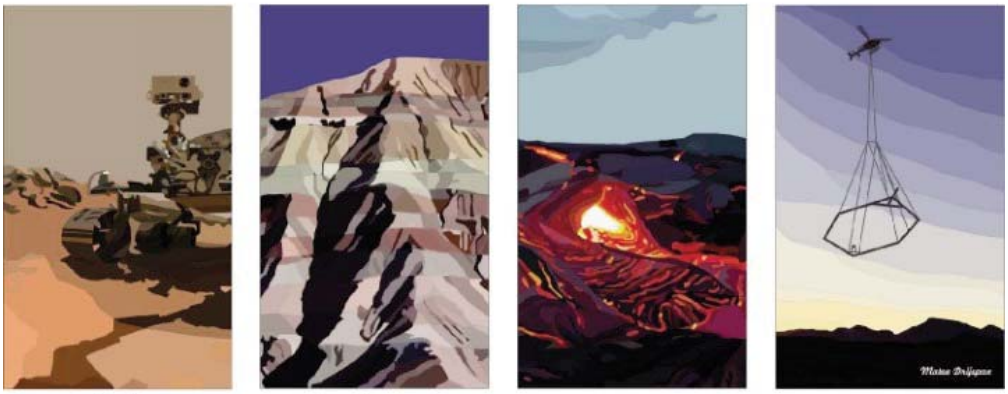

Earth & Planetary Systems | Life, Climate & Environment | Tectonic Processes & Geohazards | Resource Geoscience

MEETING THEMES

Make this your meeting!

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