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ABSTRACTS

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THE EDITORS

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Partitioning of trace elements between carbonated silicate/carbonatite melts and peridotite minerals

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An understanding of the behaviour of trace elements in the mantle is fundamental to the development of models of melting and mantle metasomatism. At present, there is a complete set of published partition coefficients for peridotite–basanite interaction but we lack the same complete set of partitioning data for carbonatite and carbonated silicate melts that are in equilibrium with peridotite minerals at high pressure. To determine partition coefficients, we use three different melt compositions: carbonated basanite, mixed carbonatite–basanite, and carbonatite. The basanite is a natural sample from the West Eifel, Germany and the carbonatite is a natural sample from Oka, Quebec, for which the major element composition has been adjusted to that defined for primary mantle carbonatite following published criteria. The peridotite minerals were hand-picked from a Kilbourne Hole lherzolite. The mineral separates were recombined to make a harzburgite, lherzolite, and wehrlite substrate for the melt. The experiments were run in the piston cylinder press at 1 GPa and 1250°C for 10 days. A long experiment duration is required to allow the charges to reach equilibrium. Mounting and polishing these charges allow us to collect data using the Scios SEM to choose the best crystals and melt pools for further analysis with EPMA and LA-ICPMS. The trace element behaviour in the minerals will be modelled with the double-fit elastic strain model which will give insight into site occupancies and potential variations in behaviour associated with multi-valence, particularly for Ti and V. The partition coefficients we determine for these melts will allow us to develop chemical parameters that will distinguish between different types of metasomatic agents. These data will also be used to develop numerical models of reactive transport of melts in the lithospheric mantle. [*Poster presentation*]

Searching for common lipid molecule biomarkers across three end-member serpentinite-hosted springs: analogues for other ultramafic planets

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Detecting past and/or present life on other planets is a complex and expensive process. By selecting sites which diverse microbial communities can/could have inhabited, we can create analogues for other terrestrial planets. Examples are ophiolites, such as The Tableland (Newfoundland, Canada), The Cedars (California, USA), and Aqua de Ney (California, USA). Ophiolites form when hydrated oceanic crust and upper mantle, which contain peridotite, are obducted onto the continental crust in subduction zones. When peridotites react with groundwater, they produce hydrogen gas (H_2), methane (CH_4), a high pH (11–12), and a reducing environment. The sites were chosen as they are end-members due to their methane source. The Tablelands has a non-microbial source, The Cedars has a predominantly microbial source, and Aqua de Ney has an abiogenic source. The samples taken were fluids from ultra-basic springs and carbonate rocks. Lipids are the fatty components of a cell, and can be preserved much longer than DNA, approximately hundreds of millions of years. Initially, the samples were analyzed to separate the non-polar components in the mixture. Then they were concentrated and run again to separate the polar components. In this study, I will be comparing the chromatograms from each site to find common peaks. This process will be done for the reverse phase for the non-polar components and hydrophilic interaction liquid chromatography analysis for the polar components. The purpose of the research is to find common lipids between each site to understand the microbial communities and to form analogues for other terrestrial planets. [Poster presentation]

Geology and economic mineral potential of the central Jeffers block, Cobequid Highlands, Nova Scotia, Canada*

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The geology of the central part of the Jeffers block in the Cobequid Highlands, northern mainland Nova Scotia, Canada, is not well known compared to other parts of Avalonia in the northern Appalachian orogen. Published maps show conflicting interpretations of the age and distribution of rock units, in large part because the older components are obscured by Devonian and Carboniferous volcanic and plutonic rocks. This study includes field mapping and petrological work to produce a new geological map that more accurately portrays the distribution of Neoproterozoic rock units, as well as to interpret their tectonic setting and assess their economic mineral potential. Three U–Pb zircon ages indicate that most of the area consists of early Ediacaran (ca. 625 Ma) volcanic and plutonic rocks but an older Tonian age of ca. 740 Ma for an intrusive porphyry shows that even older rocks are present.

Preliminary petrographic study of the ca. 625 Ma volcanic units has revealed abundant rhyolitic to dacitic crystal and lithic tuffs with less abundant mafic tuffs. Associated plutonic units consist of coarse-grained tonalite with less abundant granodiorite and diorite. The host rocks for the dated ca. 740 Ma plutons have not yet been recognized. Field relationships demonstrate that the Neoproterozoic rocks have been contact metamorphosed by surrounding Carboniferous gabbroic dykes and plutons. Current economic importance of these rocks is focused on aggregate quarries in both volcanic and plutonic rocks, but the abundant tuffaceous and porphyritic rocks of probably magmatic arc affinity suggest an unexplored potential for porphyry-type mineralization. *[Oral presentation]*

***Winner of the Frank S. Shea Memorial Award for best economic or applied geology-related presentation**

The taxa world sure can be taxing! Creating an open-source Windsor Group fossil database*

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The late Paleozoic Maritimes Basin had a 120-million-year history that included folding, faulting, exhumation, and salt tectonism. This plethora of structural activity resulted in complicated stratigraphy across the basin and between adjacent sub-basins. One way to effectively correlate stratigraphy across the Maritimes Basin is using biostratigraphy and one of the most fossiliferous units is the Visean Windsor Group. In addition to stratigraphic correlation, Windsor Group fossils are important paleoenvironmental and paleoclimatic indicators. Many researchers have studied these fossils; however, much of this work has not been published or is housed in governmental or industry reports that are inaccessible to the scientific community. The purpose of this project is to create an open-source Windsor Group fossil database by compiling fossil data from a variety of sources (e.g., journal publications, government reports, 3-D model websites). This project utilizes archival-based research alongside field work to focus on obtaining high-resolution images and creating 3-D models of the different fossil species observed in Windsor Group strata. This material will be compiled into an open-source, searchable database. This database can be used in future research projects as a comprehensive, coherent dataset and an effective tool for fossil identification, stratigraphic correlation, and data management. [Oral *presentation*]

***Canadian Energy Geoscience Association Award for the best petroleum geology-related paper.**

What are short transport tills and why are they important?

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Although knowledge of till genesis is advancing, the relationship between the deposition of tills and transport distances is poorly understood, limiting the efficiency of mineral exploration in glaciated terrains. The mechanism causing a short-distance till (sandy matrix, sub-angular clasts, and lacking exotic lithologies) to be deposited on long-distance tills (silty matrix, sub-rounded clasts, exotic clasts, and striated clasts), is unstudied. This study aims to address how short-transport tills can be deposited on long-transport tills and if there is a relationship between age and transport distance which would benefit prospectors in glaciated terrains. The Mavillette Beach, Salmon River, and Beaver River sections (~20 km north of Yarmouth, Nova Scotia) have some of the best preservation of multiple tills in Atlantic Canada which will be used for this study. It is hypothesized that short distance (<1 km from its source area) tills are derived from local bedrock knobs and deposited on other tills. It has been previously hypothesized that glacial deposition in the area began during Marine Isotope Stage 4 (MIS 4, 75 to 50 ka); however, preliminary field work suggests that the stratigraphically lowest tills are even older. To test these hypotheses, stratigraphic analysis (matrix lithology, pebble counts, till fabrics, till densities) of these tills was completed and confirms the presence of both short- and long-transport tills in the selected sections. Additionally, samples for cosmogenic nuclide burial dating were collected from the stratigraphically lowest tills at the Salmon River and Mavillette Beach sections. These samples are currently being processed at the Cosmic Ray Isotope Sciences at Dalhousie (CRISDal) Lab to constrain the timing of deposition and transport distance. Despite the abundance of till sampling in Atlantic Canada, transport distance and type of till are rarely considered when sampling, potentially leading to redundant results. Evaluating the fundamental differences between short- and long-transport tills may allow for quicker and more accurate mineral dispersal tracing. [*Oral presentation*]

Age distribution of *Lophelia pertusa* colonial scleractinian cold-water coral fragments from the northeastern Scotian margin

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The *Lophelia* Coral Conservation Area (LCCA) is a protected area on the Scotian Shelf known to contain living *Lophelia pertusa*, a deep-sea coral species of ecological significance. Although currently only a small volume of living coral at the site, extensive past coral growth is indicated by the large quantity of unconsolidated *Lophelia* rubble found there. However, the time period during which this growth occurred is unknown. Six fragments of coral rubble collected from within the LCCA were investigated with radiocarbon analysis to gain a better understanding of their age. Probability distributions were generated from these data, and photogrammetry was used to investigate the modern rate of calcification at the site. The coral fragments vary widely in age, with the oldest specimen dating to the 1st Century CE and youngest specimens to the 16th Century CE. Notably, none of the specimens were dated to the modern period, a finding which was supported by a probability distribution. These results suggest long-term and sustained growth of *Lophelia* within the LCCA across at least 15 centuries. As well, the mortality of these specimens appears to predate modern fisheries in the area, implying that their deaths were not caused by anthropogenic means, but by some other natural force. Paleoclimactic shifts, such as the long-term cooling trend in the Nova Scotia–Maine region, may be implicated. [*Oral presentation*]

Sinistrally deformed pegmatites in the Thubun Lakes area, Northwest Territories: their timing and relation to the dextral Great Slave Lake shear zone

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The Great Slave Lake shear zone (GSLsz) is a >1000 km long northeast trending shear zone in the Northwest Territories, Canada. It separates the Archean-Paleoproterozoic crustal domains Rae, Slave and Thelon tectonic zone (Ttz) to the north from the Rae, Buffalo Head and Taltson magmatic zone (Tmz) to the south. The Rae and Slave cratons began colliding at ~1.95 Ga, forming part of the composite Laurentian craton. This terminal Rae-Slave collision led to the formation of the Ttz and GSLsz with associated granulite-facies metamorphism at ~1.95 Ga. Continuous dextral ductile shearing associated with the Great Slave Lake shear zone spanned 1920–1740 Ma, supporting the formation of the GSLsz after peak metamorphism metamorphism associated with continental collision. The Tmz consists largely of crustally derived granites that formed in a collisional arc setting between the Rae craton and the Buffalo Head domain. There are many pegmatites throughout the Thubun Lakes area, which is immediately south of the GSLsz within the Tmz. These pegmatites vary from undeformed to mylonitic. The strongly deformed pegmatites commonly have a sinistral fabric, which is atypical of the dominant dextral fabric of the nearby GSLsz and the dextral drag fold map patterns in the northern Tmz. The ages and tectonic significance of the sinistral deformation of the Thubun Lakes pegmatites are currently unknown. By using oriented thin section petrography and in situ Rb–Sr dating of sinistral muscovite grains we hope to constrain the age of this sinistral fabric in the Tmz, and its relation to the GSLsz. [*Oral presentation*]

Determination of the origin and evolution of fluids in bitumen-carbonate-quartz veins in the Albert Formation, New Brunswick, Canada

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This research will evaluate whether the fluid inclusion record preserved in carbonate and quartz within bitumen-carbonate-quartz veins cutting through the hydrocarbon-bearing (e.g., bitumen, kerogen, oil, and gas) rocks of the Albert Formation, Moncton Subbasin, southern New Brunswick, can be used to constrain the physicochemical conditions of hydrothermal activity that pervaded this subbasin. Detailed fluid inclusion work has not been performed in this setting and will thus strengthen our understanding of the hydrothermal history affecting the subbasin. This work will be applied to elucidating, the hydrocarbon fertility and fossil fuel potential of southern New Brunswick. Microscope-based UV/VIS-petrography is being done to determine the relative timing of the vein phases, as well as establishing the timing and nature of fluid ingress (i.e., via fluid inclusion petrography). Raman spectroscopic analysis of the vein-hosted bitumen, as well as fragments of accidentally entrapped bitumen in petroleum-rich fluid inclusions, will determine maximum temperatures of vein formation. Microthermometric analysis of fluid inclusions will determine the minimum pressure and temperature of fluid entrapment. In-line, rock-crushing gas chromatography will be done on individual quartz crystals containing hydrocarbon fluid inclusions to determine the composition of volatile species in the fluid (up to C8 hydrocarbons). Preliminary results from petrography show that individual, euhedral, double-terminated quartz crystals in the vein contain large fluid inclusions. The fluid inclusions contain two fluid phases: a hydrocarbon liquid and a vapour bubble. Some inclusions also

have solid bitumen within them, which is likely not a daughter product of the fluid inclusion, as liquid to bitumen ratios vary dramatically. There are at least two types of hydrocarbon inclusions present in the quartz crystals, as some hydrocarbon fluid inclusions fluoresce blue while others fluoresce green, which suggests a compositional difference. Petrography, Raman spectroscopy, microthermometry, and GC-FID/TCD will continue to be done on samples from the Albert Formation to collect more data. [*Poster presentation*]

Soil chemistry and the preservation of materials at a World War II aircraft crash site in western Europe

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This research aims to investigate the influence of soil chemistry on the preservation of osseous and other materials recovered at a WWII aircraft crash. The aircraft crash site is in Eastern Austria, near the Hungarian border. The crash site marks the final resting place of a B-24D Liberator, downed during a bombing mission in 1943. Of the ten crewmembers aboard, two survived, four were confirmed deceased and subsequently recovered, whereas four are still unaccounted for. In the summer of 2024, a partner field activity associated with the United States Defense POW/MIA Accounting Agency (DPAA) included a forensic investigation of the crash site. During that time, sixty soil samples were collected from thirty locations across the site. Data collected included precise sample locations and sediment descriptions, including soil classifications for A and B soil horizons. Soil characteristics such as pH were also determined. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and X-ray fluorescence (XRF) will be used for elemental analysis of the soils to determine the metal content. The research objective is to better understand how the soil chemistry and soil metal content at the crash site impact the preservation of both organic and inorganic remains. The results of this study will provide insights into the DPAA's future recovery efforts, provide a framework for future recovery missions with similar soil types, and contribute to soil science and preservation studies. [*Oral presentation*]

High temperature phase behavior in environmental waste combustion

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This study explores the behavior of sodium bentonite (an absorbent, swelling clay composed of mainly montmorillonite) in high temperature furnaces and its effect on the compositional and physical properties of hard ash, in particular its ability to weaken ash structure. The objective of the study is to better understand how sodium bentonite additives mitigate "fouling" (adhesion of molten material to furnace surfaces) in furnaces that are utilized to burn environmental waste material, with the goal of maximizing furnace efficiency, and reducing operational costs. Using a high-temperature muffle furnace, pure samples of sodium bentonite, combusted fuel (e.g., hardwood ash), and varying mixtures of fuel and bentonite are being heated and held at T from 800 to 1500°C. Final melting points for pure bentonites, pure fuels, and mixtures are being determined, followed by run product imaging under a binocular microscope for visual analysis, looking out for partial melting at lower temperatures and ensuring complete melting has occurred at the determined melting points. The composition of glass melt products is being analyzed by scanning electron microscope (SEM-EDS). Compositional data will be used to calculate various engineering parameters (e.g., slagging factor) and melt viscosity, all of which are related to fouling tendencies. Future work will utilize these data in increasing our ability to understand how the chemical composition of the ashes will need to be altered, as well as determine the ideal sodium bentonite composition, within an ideal temperature range that would allow for the generation of more viscous and friable ashes. [*Poster presentation*]

Trace fossils in the Goldenville–Halifax group transition zone in eastern Nova Scotia, Canada

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The Meguma terrane in Nova Scotia is one of the most geologically intriguing regions of the northern Appalachian orogen. It lies adjacent to Avalonia, separated by the Cobequid-Chedabucto Fault Zone. Most of the Meguma terrane consists of a Cambrian to Ordovician deep-marine sedimentary succession, divided into the Goldenville and Halifax groups. The Goldenville Group, primarily composed of Cambrian metasandstone, is ~8 km thick and interpreted as a submarine fan or deep-marine channel system. The overlying Halifax Group consists of Ordovician black slate and organic-rich metamudstones, possibly deposited under anoxic conditions. This study focuses on the transition between the Goldenville and Halifax groups on Liscomb Island, along Nova Scotia's eastern shore. The research analyzes sedimentary structures, trace fossils, and ichnofacies to reconstruct the paleoenvironment and depositional

history. Detailed fieldwork was conducted to produce a stratigraphic log, highlighting facies variations between sandstone-dominated and mudstone-dominated horizons. Ichnofossils identified at Liscomb Island include *Treptichnus*, associated with the *Nereites* ichnofacies, typically found in deep-marine environments near submarine fan systems. *Skolithos,* an ichnofacies commonly found in high-energy environments, was also identified. The presence of *Zoophycos*, characteristic of the bathyal zone near the continental rise, further supports the interpretation of a deep-marine setting. Additionally, the potential identification of *Chondrites*, an ichnofossil indicative of low-oxygen conditions, suggests a shift towards anoxic environments during the transition from the Goldenville to Halifax Group. Preliminary interpretations indicate that the studied depositional environment was likely within a submarine fan system, characterized by periodic turbidity currents. The transition from dominantly metasandstone of the Goldenville Group to the fine-grained, organic-rich metamudstone of the Halifax Group marks a significant environmental shift, possibly driven by a drop in oxygen levels and changes in water depth. [*Poster presentation*]

The nature and role of mafic end-member magmas in the development of critical metal deposits in Late Devonian plutons in southwestern Nova Scotia, Canada

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The South Mountain Batholith (SMB) of Nova Scotia is host to plutons enriched in critical metals (e.g., Sn, W, Cu, Li). Various hypotheses have been proposed to explain the conditions that led to metal enrichment, but more research is needed regarding the diversity of source magmas to fully understand the geologic processes that resulted in the critical metal endowment in the SMB. The current study is investigating Late Devonian satellite plutons in the Port Joli area, Nova Scotia, which contain evidence of mafic end-member magmas that were coeval with the SMB. Extensive field photography, sampling, bulk rock geochemistry, and detailed petrography were conducted, followed by analysis with SEM, microprobe, and zircon-hosted melt inclusion analysis. The data acquired thus far are being used to constrain the depth and temperature conditions of the source magmas, diagnose the heat sources present in the source region, definitively characterize the extent of mixing with coeval magmas, and to enable comparisons of the source regions of these magmas. Research is focused on these lesser-studied plutons containing mafic lithologies to evaluate their impact on the magmatic history of the much larger SMB. [*Oral presentation*]

Mercury in soil horizons from southwestern Nova Scotia, Canada: relationships with vegetative bioindicators and mineralogy*

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Mercury (Hg) is a highly toxic mobile element which has organic forms (e.g., methyl mercury - MeHg) which bioaccumulate and biomagnify in food webs. Southwestern Nova Scotia is a known hotspot for Hg bioaccumulation. There is extensive research on mercury in birds, fish, invertebrates, and water; however, there is less data on Hg in soils and plants. This study examines total mercury (THg) and mineralogy of soils as well as previously obtained THg in lichens. Samples were taken from 16 sites along a transect through southwestern Nova Scotia to examine relationships between THg in soils, soil mineralogy, and THg in lichens. Soil samples from the O, A, B, and E (if present) horizons were dried, sieved to a silt/clay fraction and analyzed for THg and loss on ignition (LOI) using thermal pyrolysis atomic absorption spectroscopy. Soil mineralogy of the A, B, and E horizons from seven sites with different bedrock were analyzed using scanning electron microscopy. The soil THg data will be examined using statistical analyses to test for significant differences between horizons and for correlations with soil mineralogy, and lichen THg. Preliminary results show that THg in soil ranges between 2.234 and 323.890 ppb and appears to be broadly correlative with THg in lichen. This work will help to clarify the relationship between soil mineralogy and THg soil and lichen, and relationships with bioindicators in SW Nova Scotia. [*Oral presentation*]

***Winner of the Atlantic Geoscience Society Environmental Geoscience Award for the best Environmental Science-related presentation**

Age and petrogenesis of the Top Pond pluton, southern Newfoundland, and its tectonic significance

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The eastern edge of the Appalachian–Caledonian orogenic belt is characterized by peri-Gondwanan domains,

including Ganderia, Avalonia, and Meguma. These domains accreted to composite Laurentia during the closure of the Iapetus and Rheic oceans from the Ordovician to the Carboniferous. Many plutons were emplaced into peri-Gondwanan metasedimentary and metavolcanic rocks in a collisional orogenic to post-orogenic tectonic setting during several Paleozoic accretionary orogenies. Southern Newfoundland hosts many of these Palaeozoic plutons. The Top Pond pluton is a diorite intrusion emplaced along the Bay d'Est Fault Zone (BDFZ) into the metasedimentary and metavolcanic Dolman Cove Formation, which is part of the Hermitage Flexure terrane in Ganderia. The Top Pond pluton is located proximal to critical element mineralization in lithium-cesium-tantalum (LCT) pegmatites that also intruded the Dolman Cove Formation; however, the Top Pond pluton has received no academic study. Understanding the age and origin of the Top Pond pluton will establish its significance to the regional tectonic history and help elucidate possible relationships with nearby critical element mineralization. This research aims to determine the origin, age, and tectonic setting of the Top Pond pluton using petrography, whole rock and mineral chemistry, and precise U–Pb zircon dating to correlate the pluton with magmatic and tectonic events within Ganderia, particularly the activity along the BDFZ. In addition, the BDFZ is considered equivalent to the Eastern Highlands Shear Zone in the Cape Breton Highlands, Nova Scotia, and the Dolman Cove Formation is correlated with Ganderian rocks in Cape Breton Island. This research will also test these connections by comparing the Top Pond pluton with potentially coeval dioritic rocks in the Cape Breton Highlands. [*Oral presentation*]

Depths of mystery; stratigraphic analysis of Cambrian metasedimentary rocks on Liscomb Island, Nova Scotia, Canada

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The Meguma terrane comprises most of southern mainland Nova Scotia and is mostly Cambrian to lower Ordovician metasedimentary rocks that are interpreted to have been deposited along the passive margin of Gondwana; however, the depositional environment and water depth remain unresolved. The objective of this project is to add stratigraphic, petrogenetic, and geochemical data to established depositional models to better understand the depositional history of the Cambrian to Ordovician rocks in the Meguma terrane. The oldest unit, the Goldenville Group, is metasandstone-dominated with thickness estimates between 4800 to 8500 m that represent between 20–50 Ma years of deposition. The Halifax Group is a black metamudstone-dominated unit that overlies the Goldenville Group. This work focuses on the Goldenville–Halifax transition zone (GHT) and its unique minerology within the stratigraphy that includes elevated concentrations of critical elements such as manganese, copper, nickel, and zinc. The GHT is well exposed on Liscomb Island on the eastern shore of Nova Scotia. A section covering 686 m of stratigraphy was logged at the metre-scale, and 69 samples were collected at 9–15 m intervals for geochemical and petrographic analysis. The logged section consists of grey, thick-bedded, fine-grained metasandstone beds and thin-bedded grey metamudstone turbidites. The mud to sand ratio generally increases with stratigraphic height, with an abrupt transition to exclusively metamudstone turbidites with rare thin carbonate beds in the upper 200 m. Rhodochrosite nodules are also present in several metre-thick intervals throughout the upper section. The succession at Liscomb Island is interpreted to represent deep-sea sand lobes transitioning to a slope channel-levee environment. Additional petrographic and geochemical analyses will be used to determine the source and concentration mechanisms of critical minerals. This work will broaden our understanding of deep ocean geochemistry of the Cambrian to Ordovician metasedimentary rocks in the Meguma terrane and the depositional processes that concentrate critical elements (e.g., Mn, Co, Ni) in deep-marine environments. [*Oral presentation*]

Ore mineralogy and precious metal deportment of Late Neoproterozoic epithermal gold prospects in the eastern Avalon Zone, Newfoundland, Canada

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The Grog Pond, Steep Nap, and Berg's prospects are Late Neoproterozoic occurrences of low sulphidation epithermal gold and silver mineralization within the Avalon tectonostratigraphic zone of the Newfoundland Appalachians. These prospects are situated within the Eastern Avalon High-Alumina Belt (EAHAB), located in the eastern region of the Avalon Zone. These prospects of interest are hosted within the Manuels Volcanic Suite [580 Ma], composed of rhyolite and rhyolitic ash-flow tuffs, and display varying degrees of epithermal-style hydrothermal alteration. Multiple generations of veins are associated with the precious metal mineralization. These veins consist of banded quartz-adularia-hematite with crustiform-colloform and comb textures, and contain chalcedonic silica, as well as carbonate replacement textures. These prospects also feature highly hematitized cockade-breccias, with crustiform-colloform textures throughout. Using samples with known higher gold

contents (>~2g/T), petrographic analysis of polished thin sections and pucks will be used to examine the relationships between gold mineralization and specific generations of veins and alteration. Scanning electron microscopy will then be employed, combining X-ray spectroscopy with back-scattered electron imaging, to identify the fine-grained ore assemblages occurring in these samples. These techniques should assist in better understanding their origins and the processes, such as boiling, that led to their deposition. [*Poster presentation*]

Carboniferous Sarcopterygian fish fossils and the marine paleoenvironment at Joggins Fossils Cliffs, Nova Scotia, Canada*

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Joggins Fossil Cliffs, a UNESCO World Heritage Site in Nova Scotia, Canada, is known for its Pennsylvanian coal seams and remarkably preserved ecosystems that represent terrestrial tropical Pangea. Of the five formations present, the most significant is the Joggins Formation which is divided into approximately 15 sedimentary cycles based on the flooding plains, coals, and channel bodies. Although the site records cyclic terrestrial and marine deposits, the marine influence on the Joggins Formation has rarely been studied. As a result, many fish fossils in the Joggins Fossil Cliffs collection remain unidentified, and debates are ongoing about the source of the marine influence. We aim to (1) identify a selection of unidentified sarcopterygian fish fossils from the Joggins Formation and (2) determine their habitat and depositional environment. We have selected sarcopterygian fish scales and bones that have previously been misidentified and will identify them to the family level using the literature. To learn more about the marine habitat, a carbonaceous limestone from the Joggins Formation was chosen as a representative for the marine depositional environment based on its thickness and history of producing determinate fish fossils. A sedimentary log and thin sections are currently being made for the representative limestone, as well as a larger sedimentary log for the encompassing open water facies association for a greater marine influence context. This work will contribute to our understanding of the environment of this important site and the animals that lived within it. [*Oral presentation*]

***Winner of the Science Atlantic Presentation and Communication Award for best overall presentation**

The Late–Early Cambrian Hawke Bay Event of the eastern Laurentian margin in western Newfoundland, Canada

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The Laurentian passive margin formed from extension and break-up of the supercontinent Rodina during the Neoproterozoic. Several rifting events define the opening of the Taconic Seaway from the Tonian to Ediacaran with the development of the Laurentian passive margin by the early Paleozoic. Strata deposited during late rifting to the onset of passive margin sedimentation along the Taconic Seaway are represented by the Labrador group of the Laurentian autochthon in Newfoundland's tectonostratigraphic Humber domain. The Hawke Bay Event (HBE) high-lights a late-early Cambrian regional regressive event in the early history of the Laurentian passive margin. The HBE is expressed as late–early Cambrian quartz arenite to sub-feldspathic arenite formed on the eastern margin of Laurentia in the Hawke Bay Formation and correlative units across the Appalachian region. On the west coast of Newfoundland, it is preserved as the youngest unit in the autochthonous Labrador Group and forms a conformable contact with the underlying older, predominantly transgressive, middle part of the lower Cambrian Forteau Formation, recording outer-shelf-facies carbonate and siliciclastic sedimentation. The significance of the HBE along the eastern Laurentian margin is debated with some workers suggesting that the event represents a eustatic sea-level fall, recognized globally; In contrast, other workers suggest it instead represents a relatively local high-stand systems tract on the eastern Laurentian Margin. In this study, we address exposures of the Hawke Bay Formation present at the type locality in the Hawke's Bay area, and outcrops along the East Arm of Bonne Bay, Newfoundland. The sedimentological and stratigraphic analysis of its northern type sections along with petrographic analysis, U–Pb dating, Hf isotope geochemistry, and trace element data in zircon are used to identify sediment provenance of the sandstone units in the Hawke Bay Formation to understand the implications of the late–lower Cambrian clastic wedge on the paleogeography of the eastern Laurentian Margin. Early facies interpretations indicate a shallowing upwards succession that transitions from subtidal muds and fine sands to subaerially exposed inversely graded aeolian dunes. [*Oral presentation*]

"Where's my lawn gone?": coastal erosion in Hantsport, Nova Scotia, Canada*

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Coastal erosion is a natural process that can become an issue when there is no room to accommodate the retreat of a coastline, as is the case in many coastal communities in Nova Scotia. Addressing issues such as erosional processes has become a priority as environmental disturbances are increasing in both magnitude and frequency; an increase in these disturbances can threaten lives and infrastructure. Hantsport, Nova Scotia is a community located along the coast of the Avon River estuary which empties into the Minas Basin. Studies on the Avon River have explored the changes in bathymetry and sedimentation over time; however, erosional studies in this area have not been done. This site is unique for two reasons: (1) it is part of a macrotidal environment (tidal range approximately 15 m) and (2) it has a long history of anthropogenic influence. This study uses quantitative methods of observation, photography, and ground penetrating radar to better understand the sedimentology of the cliffs and to quantify the impact of erosional processes taking place. The properties along Avon Street are the most seaward locations in Hantsport and are at the highest risk of being impacted by coastal erosion. Quantifying erosional processes in Hantsport will increase the level of understanding of erosion sites along the Avon River coastline and will help inform remediation and mitigation efforts. [*Oral presentation*]

***Winner of the Canadian Society of Exploration Geophysics Award for best presentation of a geophysics-related paper**

Timing of mafic magmatism and nature of metasomatism at Clarke Head, Nova Scotia, Canada*

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The main objective of this project is to constrain the timing of mafic magmatism at Clarke Head, Nova Scotia, and to interpret its relationship to metasomatism along the Cobequid - Chedabucto Fault Zone (CCFZ). Clarke Head is located within the CCFZ, a 300 km long, E-W striking, terrane-bounding fault system that hosts numerous metasomatic iron ± copper, gold, and cobalt occurrences. The mineralization occurs within breccias with sodic and potassic alteration, suggesting that an Iron Oxide Copper Gold (IOCG) mineralization model is relevant. The source of metasomatism along the CCFZ is is speculated to be from the melting of the Visean Windsor Group salts initiated by magmatism. Field evidence and radiometric dates from mafic rocks north of the CCFZ indicate that syn- to post-Visean magmatism occurred. Undated mafic blocks at Clarke Head may be related to this magmatic pulse. Clarke Head exposes a mélange, bounded to the north by an E-W- striking fault splay of the CCFZ, that incorporates blocks of varying size, lithology, age, and deformation history. Field observations show that Na-rich scapolite veins with alteration haloes are constrained within mafic blocks in the mélange. Drone imagery was collected to create three-dimensional models of the mineralization relationships observed in these mafic blocks and to reach inaccessible outcrop in the cliff face. Future work will include micro-X-Ray Fluorescence (μXRF) mapping of host block lithologies and later mineralization to characterize alteration styles and build a paragenesis. Petrography of mafic blocks and scapolite veins will also be done to identify mineral geochronometers (e.g., apatite or rutile) to date magmatism and metasomatism using in-situ U–Pb Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). These results will be compared to similar mineralization and alteration styles along the CCFZ to evaluate the timing of mafic magmatism in the area and its relationship to metasomatic deposits. [*Poster presenta-tion*]

***Winner of the Imperial Oil Best Poster Award for best overall poster presentation**

Understanding elemental distributions in variably altered limestones of the Pleistocene Ironshore Formation, Grand Cayman, British West Indies

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The objective of the current project is to map the elemental distribution of the altered and unaltered units of the Pleistocene (500–80 ka) Ironshore Formation on Grand Cayman, Cayman Islands, British West Indies, north Caribbean Sea. Addressing this objective will provide a better understanding of how pore fluids modify an isolated carbonate platform that has undergone varying degrees of meteoric diagenesis. This goal will be met using two methods: petrographic/microfacies analysis and micro-X-ray Fluorescence (μXRF) analysis. The first stage of study will involve a comprehensive petrographic analysis of ~32 thin sections from each of the six units of the Ironshore Formation. In this stage representative thin sections will be chosen for detailed microfacies analysis where lithology, allochem abundance, porosity, and diagenetic features will be identified. The microfacies analysis will act as a guide for μXRF analysis. μXRF will be utilized to map major and trace element distribution to help determine the relationship between diagenesis

and the elemental distribution of the allochems and their associated matrix material. Preliminary results show that the current understanding for diagenetic alteration and allochem identification in the study area are consistent with samples examined in this project in terms of microfacies characteristics. Units E-F are visually pristine and chemically unaltered, whereas units A, C, and D are minimally altered with cementation, but chemically altered, and unit B is visually and chemically altered. Ongoing work will characterize chemical alteration within the units of the Ironshore Formation to study pore fluid movement throughout this isolated carbonate platform, a process which may have significant applications for petroleum reservoirs. [*Poster presentation*]