The 67th Annual Atlantic Universities Geoscience Conference 2017

26th-28th October 2017

Memorial University of Newfoundland

St. John's, Newfoundland and Labrador

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Letter from the Head of Earth Sciences, Memorial University

MEMORIAL UNIVERSITY

Faculty of Science

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Welcome to the 2017 Atlantic Universities Geoscience Conference at Memorial University. The Department of Earth Sciences is pleased to be hosting the AUGC this year, which is completely student organized and is one of the oldest geologic Conferences in Canada.

Congratulations to the Alexander Murray Club and the organizing committee for coordinating such a great selection of field trips, speakers, and fun activities. Please take this time to meet and network with other students, faculty, and professionals which could lead to opportunities for future study and employment in the future.

Newfoundland and Labrador is home to some of the oldest rocks and fossils on the planet, and what a great opportunity to see "The Rock" first hand. I hope you enjoy your stay in St. John's and at Memorial University. See you at the conference!

John Hanchar
Professor and Head, Department of Earth Sciences
Memorial University of Newfoundland

Letter from the AUGC Organizing Committee Chair

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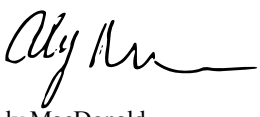
On behalf of the AUGC 2017 Committee and the Alexander Murray Geological Club, I would like to welcome you all for the 67th annual Atlantic Universities Geoscience Conference! We have worked very hard this past year to provide everyone with a conference full of great experiences, learning opportunities, and most of all, fun!

For the next three days you will get the opportunity to experience St. John's by taking part in the activities we have planned, as well as taking some time to explore this beautiful city. I hope you also have time to network with the other students and geoscience professionals that will be in attendance.

I would like to thank all of our sponsors for providing us with the financial stability to ensure this conference is a success. A special thank you is also extended to all of the field trip leaders, guest speakers, and judges, who are volunteering their time to help with this conference.



Aly MacDonald
Chair
AUGC 2017 Organizing Committee

Conference Schedule

Thursday October 26th 2017

2:00pm – 7:00pm	Arrive at Courtyard Marriott
5:00pm – 7:00pm	Registration at Courtyard Marriott
9:00pm – 1:00am	George Street Pub Crawl (Meet: Rob Roy - on George Street)

Friday October 27th 2017

7:45am – 5:30pm	Field Trips (Meet at Earth Science Building lobby) *7:30am Mistaken Point* *8:00am Epithermal Gold Deposits in Holyrood* *8:30am Your Career and Public Reporting* *9:00am C-NLOPB Core Logging Course*
5:30pm – 6:00pm	Club presidents/executives meeting in University Centre
6:00pm – 8:00pm	Challenge Bowl at the Breezeway (University Centre)
5:30pm – 11:00pm	Pizza and screech-ins at the Breezeway (University Centre)

Saturday October 28th 2017

9:00am– 4:30pm	Student Presentations at the Bruneau Centre for Innovation and Research (ICC 2001)
4:30pm – 5:00pm	Science Atlantic Earth Science Committee meeting (Earth Science Board Room)
6:30pm – 9:30pm	Banquet with dinner, awards presentations, and guest speaker at the St. John's Convention Centre
9:30pm – 1:00am	Social Event at The Republic

Sunday October 29th 2017

11:00am	Hotel Checkout

AUGC 2017 Organizing Committee

Aly MacDonald	Organizing Chair
Laura Sinclair	Fundraising Chair, Head of Budgets and Finance
Anika Bursey	Registration Secretary, Field Trip Organizer
Jack Bishop and Hilary Keats	Conference Bag Coordinators
Victoria Hollohan	Social Events Coordinator
Lauren Hayes	Conference Program Coordinator
Chris Williams and Aaron Connolly	Technical Talks and Guest Speaker Coordinators

Judges

Adrian Smith	Lucy Newton
Chelsea Squires	Greg Godek

Special Thanks

Dr. Duncan McIlroy	Frank Blackwood
Dr. Graham Layne	Phil Saunders
Dr. Greg Sparkes	Dr. Allison Leitch
Jeff O'Keefe	Dr. John Hanchar
Kelly Hender	Dr. Chuck Hurich
Michelle Miskell	Jane O'Neil
Diane Guzzwell	Lois Whitehead
Nadia Duman	Dr. Rob Raeside

Guest Speaker

Dr. John Jamieson

Dr. Jamieson holds a B.Sc. in Geology from the University of Alberta, an M.Sc. in Geology from the University of Maryland, and a Ph.D. in Geology from the University of Ottawa.

He worked in the industry for three years after completing his masters, performing gold exploration in British Columbia and the Arctic, and as the mineral resources project leader at the Alberta Geological Survey.

After completing his doctorate he worked as a Research Scientist at GEOMAR Helmholtz Centre for Ocean Research, in Kiel Germany until relocating to Memorial as the Canada Research Chair in Marine Geology in 2016.

His research focuses on hydrothermal systems (black smoker vent sites) on the modern ocean floor and the formation of volcanogenic massive sulfide (VMS) deposits. Dr. Jamieson combines seafloor exploration and mapping with petrography, trace element geochemistry, and stable and radiogenic isotope techniques to investigate aspects of seafloor massive sulfide (SMS) formation.

Student Presentation Schedule

9:00 am to 9:20 am	Regan Worden, UNB
9:20 am to 9:40 am	Kirklyn Davidson, Acadia
9:40 am to 10:00 am	Heather McGuire, Acadia
10:00 am to 10:20 am	Kirsten Costello, MUN
10:20 am to 10:40 am	***Coffee Break 20 minutes***
10:40 am to 11:20 am	***Morning Poster Session***
11:20 am to 11:40 am	Kelsey Koerner, UNB
11:40 am to 12:00 pm	Max Chipman, Acadia
12:00 pm to 12:20 pm	Sander Manley, UNB
12:20 pm to 1:00 pm	***Lunch in Atrium 40 Minutes***
1:00 pm to 1:20 pm	Graham Bolt, MUN
1:20 pm to 1:40 pm	Lauren Walker, StFX
1:40 pm to 2:00 pm	Gabriel Sindol, MUN
2:00 pm to 2:20 pm	Maya Soukup, DAL
2:20 pm to 2:40 pm	***Coffee Break 20 minutes***
2:40 pm to 3:00 pm	Ariel Greenbalt, DAL
3:00 pm to 3:20 pm	Kate Woods, DAL
3:20 pm to 3:40 pm	Colin Ross, StFX
3:40 pm to 4:00 pm	Joey Pittman, MUN
4:00 pm to 4:30 pm	***Afternoon Poster Session***

Student Abstract Index

Oral Presentations

Poster Presentations

Student Abstracts

A Characterization of Properties of the Eutectic Mixture of Zirconium Tetrafluoride and Potassium Fluoride for a Molten Salt Nuclear Reactor

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Transitioning to a non-carbon emitting energy source is one of the major challenges that the world currently faces as the impacts of a changing climate becomes more imminent. One of the main suggested sources during our transition to a new energy future will come from nuclear energy. In past decades, the use of uranium fuel rods have been used to generate heat to drive a turbine but in modern society, safer alternatives that have higher efficiency and electrical output are being proposed. Terrestrial Energy is a company based out of Ontario that is developing a pilot plan that uses a eutectic ZrF_4-KF mixture to be used in a molten salt nuclear reactor. The physical-chemical properties of a eutectic mix of potassium fluoride and zirconium tetrafluoride have been previously untested in a laboratory, but will be the integral mix that will be used in the cooling system in the second loop of the proposed molten salt nuclear reactor. The predictable behavior of the eutectic mix is crucial for the stability and efficiency of such a proposed project. As such, the homogeneity of the mixture, as well as the viscosity, melting and boiling point, solubility, purity, trace impurities of transition metals, and water moisture content within the crystal lattice will be measured. This will be accomplished by examination through laser ablation ionically coupled plasma mass spectrometry (LA ICP-MS), x-ray fluorescence (XRF), and a scanning electron microscope (SEM). The data that will be collected will be submitted to the Nuclear Energy Board of Canada for future projects that will involve these compounds.

Spatiotemporal assessment of metal concentrations of pre-effluent estuarine sediments in a freshwater kraft pulp mill taillings pond using paleolimnological methods

Kirklyn Davidson, Baillie Holmes, Ian Spooner, Craig Lake, Tony Walker & D. Dunnington

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Paleolimnological research at a former estuary in Pictou County, NS that has been contaminated by effluent from a kraft pulp mill and other inputs over the past 50 years has focussed on understanding the spatiotemporal distribution of metals within pre- and post-disturbance sediments. The site was dammed in 1967, effectively converting it into a shallow freshwater lake (140 ha, 4 m max. depth). The lake bottom sediments within Boat Harbour reflect both estuarine and fresh water environments, and can be broadly characterised as grey marine clay (~ 50% water content) which is overlain by black, organic-rich sediment (~ 90% water content). The contact between these two units is sharp and is present through the basin. To inform post remediation management decisions the marine sediment was analysed for the spatiotemporal distribution of As, Cd, Cr, Cu, Pb, Ti, Zn, Mo, and Ni, which were identified as uniquely representative of impact at the site. The samples were collected using a gravity corer, were analysed for metal concentrations using pXRF and ICP-MS techniques and distribution was modelled using QGIS.

Preliminary results indicate that As, Cr, Cu Zn and Pb concentrations at reference sites meet or exceed ISQG's. Metal loads within the grey marine clay at the impacted site are similar to or higher than those at the reference sites. Metals in the marine sediment at the impacted site and the reference sites show little stratigraphic variability, indicating that overprinting of contaminants from the overlying organic sediment at the impacted site is not likely. Spatial distribution maps of metals are being completed; preliminary results indicate that there is substantial variability in metal concentrations spatially. These data must be taken into consideration in both the remediation and compliance stages of environmental assessment at the site.

A paleolimnological approach to understanding metal retention and mobility associated with salt-water inundation at Laytons Lake, Nova Scotia

Heather McGuire, Amanda L. Loder, Mark L. Mallory, Ian S. Spooner, Dewy W. Dunnington, Nic R. McLellan

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Sediments in constructed wetlands and lakes have the potential to retain metals mobilized by natural and anthropogenic disturbance. The Cumberland Marsh Region on the Nova Scotia New Brunswick border is an important waterfowl refuge where arsenic (As) and lead (Pb) that exceed sediment quality guidelines (SQG's) are widespread. The role of variable water column chemistry and nutrient load on metal retention and mobility in wetland sediments is not well understood. Laytons Lake, in the Amherst Marsh, NS, was documented in the 1970's as becoming a density stratified, incompletely mixed (meromictic) lake by a sudden marine inundation which resulted in a saline bottom layer and a fresh top layer. New water column chemistry data indicate that the lake is no longer saline and has since mixed. A detailed paleolimnological assessment has been undertaken to investigate how these water column chemistry changes have influenced metal retention. Limnology and geochemical analysis of lake sediments using pXRF, total C, total N and stable isotopes ($\delta^{15}N$, and $\delta^{13}C$) will be used to determine how salinity changes influence nutrient availability and the retention of As and Pb in aquatic sediments.

Preliminary results indicate Layton's Lake is now dimictic with the former dense saline layer no longer present and average conductivity of 503 µs/cm at the surface and 1012 µs/cm at 11 metres. When the lake was meromictic the average conductivity was 538 µs/cm at the surface and 26,000 µs/cm at 11 metres. It is nutrient rich (high TP) averaging 0.09 mg/L at the surface and 0.42 mg/L at 10 metres depth. A depth-time profile of 100 years was established for the core based on the Pb curve. The Pb curve indicates atmospheric deposition is considerable and correlates with lead curves from other lakes in the region. Arsenic indicates a slight increase associated with the salt-water inundation. Distinct sediment stratigraphy compares with chemical changes seen in the pXRF data.

Investigating the metamorphism of the low-P metapelites in the Escoumins Supracrustal Belt, southern central Grenville Province, Quebec

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It has been proposed that the Grenville Province is a hot long-duration orogen which took place in the late Mesoproterozoic to early Neoproterozoic from 1090–980 Ma. This complex, continental collision between Laurentia and possibly Amazonia, consisted of multiple thrusting events and was later modified by extension. The two primary tectonic zones which make up the Grenville Province are referred to as the Parautochthonous belt and the Hinterland. The Parautochthonous belt shows barrovian sequence metamorphism from mid- to high-Pressure (P) conditions, whereas the Hinterland consists of various belts which underwent different grades of Ottawan (1090–1020Ma) and Rigolet (1000–980Ma) metamorphism. The allochthonous High Pressure belt (aHP) and the Mid Pressure belt (aMP) experienced HP-granulite to eclogite and mid-P granulite facies conditions, respectively. In contrast, the allochthonous Low-Pressure (aLP) experienced amphibolite facies conditions, and the orogenic lid has avoided Ottawan metamorphism altogether.

This project focuses on the metapelites of the Escoumins Supracrustal Belt, which is part of the aLP belt in the southern central Grenville Province, Quebec. Nine samples of metapelites from four different areas in the ESB were collected mainly during 8 days of field work completed this summer. Methods such as petrography aided by SEM-MLA maps, imaging and microprobe analyses have been used to determine the mineralogy and composition of these samples. In the near future, phase equilibria modelling will be done to determine the depth and temperature of metamorphism. In addition, if time permits, monazite compositional maps in select samples will be produced by electron microprobe, and specific zones will be dated using LA-ICP-MS, in order to constrain the age of metamorphism. The final results of this honours thesis will illustrate the overall relationship between the low-P metapelites in the ESB.

Changes in primary production and sedimentation in the North Water (NOW) polynya during the past ca. 3500 years

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Polynyas are areas of open water located in a region that is otherwise covered by sea ice in the polar sections of the globe. Because light is not limiting and the mechanisms involved in their formation can enhance the nutrient supply to the surface waters, polynyas are regions of high primary production that sustain large and diverse food webs.

The North Water (NOW) polynya is located off the coast of northwestern Greenland and Ellesmere Island, Canada. It is the largest polynya in the polar Arctic region. The purpose of this project is to investigate changes in the sedimentary tracers from a long sediment core collected from this region to better understand the response of the system to the climatic variability of the last ca. 3500 years. We further would like to understand how and why the polynya formed.

Here, we will present preliminary results on changes in the microfossil assemblages (e.g. dinoflagellate cysts) from a core drilled off the coast of Northwestern Greenland. The core was collected at 77°17.097'N-74° 23.214W at a depth of 700 m. Variations in the dinocyst abundance and species composition will be used to infer temporal changes in the sea-surface properties such as temperature, salinity, etc.

By understanding how climate has changed in the past, it allows us to better understand how it may evolve in the future. During a time where anthropogenic factors are contributing to a changing climate, it is necessary to understand and study areas with a major impact on ocean circulation. This study aims to better understand these factors and help predict the impacts of future climate fluctuations on the productivity and oceanic circulation of the NOW polynya.

The bountiful coprolites of the Joggins Formation

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The fossil cliffs at Joggins (Nova Scotia) hold a wealth of fossils, both terrestrial and aquatic, from the Late Carboniferous Period. Fossils from the aquatic realm have historically been understudied and the ecosystem they represent is poorly understood. This research broadens our understanding of the aquatic ecosystem, specifically the food web, by examining fish coprolites that are abundant in the limestones of the Joggins Formation. Coprolites preserve undigested material that give us a window into the diets of these fish and a better idea of species interactions within the ecosystem. The coprolites have been studied in thin section and hand sample, as well as cathodoluminescence and computed tomography to determine the contents. We found that specimens could be divided into six categories based on size and shape: cigar/cylindrical shaped; cone shaped; small/equant; spiral; irregular; and massive (samples greater than 5 cm in length). The small coprolites are the most abundant and the massive coprolites are the rarest. They range in size from <1 cm to >10 cm and are 2-3 centimetres on average. The mineralogy of the coprolites is high calcium phosphate, similar to the composition of bone. This suggests that the fish producing these coprolites were carnivorous and that there is a lack of herbivores present, supporting Carpenter et al.'s (2015) faunal study findings. Bone fragments have been found in almost all samples, however specific species identification has thus far been impossible. This research provides both a foundation for further studies on coprolites and similar fossils and a deeper understanding of aquatic ecosystems as fish diversified further into fresh water in the Palaeozoic.

Mid-to Late Holocene changes in the hydrographic conditions of the Baltic sea, as inferred from dinoflagellate cyst assemblages

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Dinoflagellate cyst assemblages from marine sediments in the south-central Baltic Sea provide a record of major changes in the Baltic Sea hydrographic system. Beginning just before 8000 BP, dinocyst assemblages show a sharp increase in salinity and decrease in dinocyst abundance and diversity associated with a growing reconnection with the Atlantic Ocean via the Kattegat north of Denmark. The appearance of marine dinoflagellate cysts, cross-referenced with C-14 dates for the sediment core, indicates the times of transgression. Morphological characteristics such as increased process length for *Lingulodinium machaeorophorum* as well as relative abundances of the dinocyst assemblage correlate with the increase in salinity.

This transgression continued the trend of increasing salinity and temperature for at least 1000 years, before dinocyst diversity and abundance decline or remain relatively constant. Recent brackish water conditions in the last 4000 years are lower in both diversity and abundance than pre-transgression, with assemblages dominated by *Operculodinium centrocarpum.*

Effects of annealing and HF etching on U-Pb geochronology and Lu-Hf radiogenic isotopes on Sri Lankan zircon crystals

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The aim of this thesis is to study the effects of annealing and HF acid etching on the U-Pb geochronology and Lu-Hf radiogenic isotopes of Sri Lankan crystals. This is done to improve our understanding of how zircon crystals that have accumulated significant amounts of radiation damage respond to these treatments. The main objective of this study is to determine if the annealing and HF acid will reduce the amount of discordance and dispersion in the U-Pb age and if the Lu-Hf isotopic systematics will be disturbed. The hypothesis to be tested is that areas of the zircon crystal extensively damaged (i.e., the breakdown of zircon to amorphous SiO_2 and crystalline baddeleyite [ZrO_2]) during the decay of U and Th to Pb will recrystallize during the annealing process forming newly crystallized zircon nanocrystals. By placing the annealed zircon in concentrated HF, the nanocrystals, and any pre-existing radiation damaged zircon, will dissolve leaving behind only the undamaged regions of the original zircon crystals. We postulate that the annealing process will not affect the age or Lu-Hf of the zircon in the non-radiation damaged regions of the crystals; the HF etching of the zircon will dissolve these newly formed zircon crystals leaving behind only undamaged regions. When plotted on a Concordia diagram this zircon should give a more precise and accurate age of crystallization with less dispersion and discordance in the data.

Thallium isotopic analysis of microcline by laser ablation- inductively mass spectrometry with application to granite pegmatite petrogenesis

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Rare element granitic pegmatites are divided into two groups: Lithium, Cesium, Tantalum (LCT) type and Niobium, Yttrium, Fluorine (NYF) type based on their enrichment in these elements. In general, NYF pegmatites are related to anorogenic magmatism where as LCT pegmatites are related to peraluminous granites in orogenic settings. Previously, trace element geochemistry of various minerals has been used to identify LCT and NYF pegmatites, however the source of the magma is still uncertain. In an attempt to characterize the specific sources of these pegmatite types the thallium isotopic ratios of primary microcline from fourteen major pegmatites located around the world were determined by laser ablation inductively coupled mass spectrometry. Thallium was selected to be analyzed for because it is very enriched in highly fractionated granites and because its isotopic signature in crustal rocks show a small, but measurable, range which has been attributed to specific sources in the mantle or crust. The structural state of all microcline samples was determined by powder X-ray diffraction and the major as well as trace element content was measured by electron microprobe analysis and laser ablation inductively coupled mass spectrometry, respectively. The relative abundance of Ga, Rb and Pb found in the microcline clearly separates LCT and NYF type pegmatites as previous work has suggested. The $^{205}Tl/^{203}$ Tl ratios of microcline samples, which contain between 20 and 300 ppm Tl, was measured for the first time by Laser Ablation Inductively Coupled Mass Spectrometry. All the $^{205}Tl/^{203}$ Tl ratios were around 2.395 except for a rare alkali-enriched microcline from the core of the Tanco pegmatite. In conclusion, the $^{205}Tl/^{203}$ Tl ratios obtained by laser ablation inductively coupled mass spectrometry do not discriminate the different sources for NYF and LCT pegmatites, however, the results do indicate significant fractionation of thallium isotopes within the highly evolved Tanco pegmatite in Manitoba.

Corestone-saprolite interfaces as tracers of the Paleoproterozoic surface environment

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The ca. 1.85 Ga Flin Flon paleosol that developed on dolerite intrusions situated along the Manitoba-Saskatchewan border, is one of the earliest explicit evidence for subaerial weathering under oxic conditions, which postdates the ca. 2.45 Ga Great Oxidation Event (GOE). Inferences from marine deposits around 1.85 Ga imply a decline in atmospheric oxygen levels. On the contrary, constraints from continental deposits, such as paleosols, remain sparse. This study aims to analyze corestone-saprolite interfaces, which are small-scale chemical weathering fronts, to study the changes occurring in the dolerite intrusions during early weathering reactions. Initial work using both petrographic analysis and scanning electron microscope and mineral liberation analyzer (SEM-MLA) has revealed albite-dominated cores surrounded by rinds primarily composed of clinochlore, chamosite, and illite. Hematite and magnetite are preferentially preserved in the cores, whereas muscovite progressively increased outwards from the cores. Solution-based geochemistry using a quadrupole inductively coupled plasma mass spectrometer (Q ICP-MS) will be used to obtain high precision major to ultra-trace element data across the corestone-saprolite interface. Once completed, this study will provide a full elemental and mineralogical data set that can provide new insights into the poorly understood surficial conditions of the Paleoproterozoic. By combining the different data obtained from corestone-saprolite interfaces, the study will attempt to shed light on the processes that occurred during the incipient stages of oxidative weathering, which reflect the composition of the ancient atmosphere and have further implications for seawater composition and metal cycling in the Paleoproterozoic.

Determining the early incision history of the Colorado Plateau using an innovative dating method

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The early incision history of the Colorado Plateau remains highly debated. Multiple stages of uplift and erosion appear to exist and attempts to constrain these events have resulted in conflicting conceptual models. Over a century of thermochronologic, geodynamic, stratigraphic, and geomorphologic studies have not resolved the timing, mechanisms, and history of the plateau's incision, including the Grand Canyon. A new approach is necessary to help reconcile their differences. High energy cosmic ray particles produce secondary particles when they interact with nuclei of atoms in the atmosphere or exposed minerals. Secondary muons are 209 times the mass of an electron, and because of their small mass they interact weakly with matter. Thus, muons can penetrate deeply into the subsurface, and cause further interactions to produce rare terrestrial cosmogenic nuclides (TCN). While TCN techniques have previously been limited to depths of 130 m below the valley bottom along a mine stope that runs laterally across the valley. The concentration of muogenic 10Be produced from oxygen and silicon in the quartz, will be proportionate to the flux of cosmic radiation received over the past 8 Ma. The spatial pattern of the concentrations will reflect the cosmic ray shielding by the overlying crust. If the incision occurred recently, the 10Be concentrations will be greatest under the deepest portion of the valley. Older or slower incision histories will generate other spatial distributions. Currently eight 10BeO targets are being prepared at Dalhousie University and will be tested at Lawrence Livermore National Laboratory. With this project, we hope to first and foremost determine the viability of detecting muogenic isotopes for future applications of the dating method, and to accurately determine the incision history of the Colorado Plateau.

A High Resolution Record of Sediment Deposition in the Gulf of Aqaba during the last ~1000 years

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The Gulf of Aqaba is a narrow and deep basin at the northeastern tip of the Red Sea. Sedimentation is dominated by biogenic and eolian material, as well as by material delivered by the Wadi Mubarak. Here we present paleoenvironmental proxy records from a 108 cm gravity core, recovered at 720 m water depth at the northern end of the Gulf. These records are compared to sediment flux directly sampled by co-located sediment traps deployed since 2014, which show that sedimentation is dominated by sporadic, short-lived flux events on the order of days. An event deposit in the sediment core at 96- 87 cm, with coarse sediment at the bottom and a fining upward sequence is tentatively, and in analogy to previous studies, ascribed to a turbidite triggered by the historical earthquake at 1068 AD. This age assignment would imply overall sedimentation rates on the order of 1 mm/yr at our sampling site, in general agreement with bulk flux estimates from the sediment traps as well as previously published sediment core records from the Gulf of Aqaba. Records of basic sediment geochemistry, foraminiferal abundances, and nitrogen isotopes will be discussed in the context of regional climate, hydrographic variability, and nitrogen cycling during the last 1,000 years.

An experimental study of the effect of water on chromite saturation in komatiites

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Chromite is an oxide mineral and the only chromium ore. Economically important deposits of chromite (massive chromitites) are associated with ancient ultramafic magmas known as komatiites. One such deposit has recently been discovered in the Ring of Fire area of the James Bay Lowlands, Ontario. Despite their economic value, the conditions of formation of massive chromitites are poorly constrained. The purpose of this investigation is to characterize the impact of magmatic water on the mineral phase relationships in komatiitic magmas. Orthopyroxene, an important constituent in komatiites, readily incorporates chromium into its crystal lattice. The early crystallization of orthopyroxene therefore inhibits the precipitation of chromite by depleting chromium in the melt. Studies of more felsic systems have shown that magmatic water significantly decreases the crystallization temperature of most silicate phases, but that it has a relatively lesser effect on oxides. Phase equilibrium experiments allow us to test the hypothesis that, by depressing the liquidus of orthopyroxene relative to that of chromite, magmatic water can facilitate the early crystallization and subsequent accumulation of chromite in a komatiitic melt. To accommodate water, experimental charges are sealed in graphite-lined platinum capsules and pressurized to 1 GPa in a piston-cylinder apparatus. This results in fixed pressure and redox state, allowing phase equilibria to be determined as functions of 1. temperature and 2. composition. Preliminary data from this study suggest that water does affect the chromite liquidus, and that olivine may be a heretofore overlooked competitor for chromium. In addition to phase characterization by electron microprobe analysis, we will analyse for chromium and trace element partitioning between mineral phases and melt using laser-ablation inductively coupled plasma mass spectrometry. If trace element partitioning is sensitive to water content, and water content affects the chromite formation capacity of a melt, then such a fingerprint may have applications in characterization of natural komatiites. Komatiites are some of the oldest lavas and best-preserved relics of the Archean Earth. Expanding our understanding of komatiites and their crystallization behaviour could provide important constraints on early Earth processes, including those associated with highly valued ores.

Structural Evolution and Tectonic History of the Glenelg Area, Nova Scotia and Relationship to Correlative Rocks of the South Portuguese Zone, Spain

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The Peri-Gondwanan Meguma Terrane is the most outboard terrane of the Canadian Appalachian Orogen and encompasses an area of 200,000 km^2 extending from the Gulf of Maine to the Grand Banks of Newfoundland. The terrane consists of mainly greenschist to amphibolite facies turbiditic metapelite sedimentary sequences that were intruded by Devonian plutonic rocks during the Neoacadian orogeny, a tectonic event that stitched the Meguma Terrane to the Avalon Terrane (ca. 380-370 Ma). Surface exposure of the Meguma Terrane is believed to be restricted to Nova Scotia. However, U-Pb detrital zircon and isotopic data indicate that the South Portuguese Zone (Iberian Peninsula) may be underlain by Meguma basement. This interpretation is consistent with paleogeographic reconstructions that place Maritime Canada adjacent to autochthonous Iberia in the Late Paleozoic. In Iberia, the oldest exposed rocks are relatively weakly deformed Late Devonian phyllite and quarzite; however, the recent discovery of exposed polydeformed alternating beds of phyllite and quartzite could represent an older sequence. These rocks were intruded by felsic-intermediate plutonic rocks and are discomformably overlain by Carboniferous (ca. 343 Ma) volcanic rocks of the Iberian pyrite belt. To test potential linkages between Iberia and Meguma, a sequence of folded and metamorphosed quartz-rich metasandstone and siltstones, in the northeastern Meguma terrane near Glenelg, Nova Scotia, was studied. The region is of economic interest as it hosts an anomalous galena deposit, and outcrops along strike of the Cochrane Hill gold occurrence. Preliminary field and petrographic studies in the Meguma Terrane indicate a NE-SW trending fold system and amphibolite grade metamorphism. Results show that metamorphic grade increases towards the center of the fold and has resulted in large staurolite and garnet porphyroblasts. U-Pb detrital zircon geochronology from both localities will test possible genetic linkages between the Meguma and South Portuguese Zone. Sample assays were also taken to target and assess economic mineralization potential.

A geophysical characterization of a Bog in Gullbridge, Newfoundland

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Characterization of a bog near Gullbridge in west-central Newfoundland, was performed with the use of a ground penetrating radar (GPR) and coring. X and Y lines were taken of the bog on snowmobile in two different trips in February 2017 using the Earth Science Department's Sensors and Software GPR with 100 and 250 MHz antennas. The antennas were set up in a sled towed by the snowmobile one person in the back operating the GPR one person operating the snowmobile. The soft and deep snow was troublesome but gave interesting information. Different snowfalls are noted as layering and could possibly be detected in GPR profiles. Processing of the GPR data is done using EKKO Project software by applying many different techniques by observing the Nyquist frequency and applying appropriate filters (highpass, lowpass and bandpass) where applicable. With processing being done in terms of the GPS locations and gain to create the best possible cross sectional view of the area. The aims are to map snow thickness and bog bathymetry and if possible to image structures in both layers. Bog core samples for analysis with the Multi-scanner core logger (MSCL). The data from the MSCL will be analyzed and also compared to data collected with the GPR. A bog corer has been borrowed from the geography department. It is planned to test this corer on local bogs, and if the tests are successful, to take core samples of the bog in a final field trip to Gullbridge in November.

Discriminating multiple mineralization events of the diatreme-associated Cu-Mo-W-Au occurrences at the Revenue Deposit, Dawson Range, Yukon Territory, Canada

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The west-central area of the Tintina Gold Belt, Yukon Territory, Canada, is a perspective area for gold as it hosts large, high-grade deposits such as the Coffee Creek and Casino deposits. The Freegold Mountain Project located in the Dawson Range of the Tintina Gold Belt hosts multiple gold showings, including the Revenue Deposit: a poorly characterized diatreme-associated Cu-Mo-W-Au occurrence. This thesis project will characterize alteration and ore mineral assemblages at Revenue, and investigate the composition (major, minor, and trace element), and sulfur isotope signatures of ore minerals in order to discriminate different mineralizing events, fingerprint their chemical signatures, and elucidate the processes that led to their formation. Recent field work and sampling of exploratory drill-core confirmed at least two distinct styles of mineralization: early, vein-hosted and disseminated chalcopyrite-pyrite-pyrrhotite associated with potassic alteration in the Revenue Granite, and later breccia-hosted molybdenite-scheelite-pyrite-chalcopyrite with phyllic alteration likely associated with the emplacement of the pyroclastic diatreme and quartz-feldspar-porphyry dykes. Detailed petrographic work using optical microscopy and scanning electron microscopy, in conjunction with short-wave infrared spectroscopy (Terraspec), will i) identify and characterize ore minerals and associated alteration, ii) examine microscopic textures, and iii) quantify the major and minor element composition of the mineral phases. By characterizing the mineral assemblages, we aim to classify the mineralization styles using existing models to be applicable in an exploratory setting. *In situ* laser ablation inductively-coupled plasma mass spectrometry will be used to determine the trace element compositions of ore minerals, in order to identify unique chemical signatures. Using secondary-ion-mass-spectrometry the sulfur isotope composition of sulfides from different assemblages will be determined. Together with trace element data, this information will provide constraints on the source of sulfur (i.e. mantle or sedimentary derived) and allow for the discrimination of different mineralizing fluids. The results of this study will be used to assign the different mineralization styles at Revenue to existing ore deposit models to benefit exploration programs (e.g., intrusion-related, skarn) in the region.

The hydrothermal system of the Miocene volcanic rocks of Western Lesbos, Greece

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The Sigri Pyroclastic Formation in the western side of the island of Lesbos consists primarily of pumice flows, mudflows and stream conglomerate. Most of the pyroclastic rocks appear to be derived from a caldera near Vatoussa and shows extensive alteration and mineralization. The purpose of this study is to understand the hydrothermal fluid(s) altering the volcanic rocks and to determine a model for the hydrothermal system. Samples were collected from the Jithra ignimbrite, layered fine-grained sediments underlying the ignimbrite, a zoned nodule at a fault zone, and a wood sample from the Sigri Petrified Forest. Rock mineralogy and chemistry were investigated using a petrographic microscope, scanning electron microscope, electron microprobe, and Laser Raman spectroscopy. Hydrothermal alteration minerals and assemblages identified from the altered ignimbrite were: *(1) K-feldspar +silica +illite +minor apatite, zircon TiO minerals*; *(2) Jarosite +hematite +amorphous silica* and; *(3) Mn-oxides*. Three different horizons from the underlying sediments shows identical mineral assemblage of *Smectite +silica +TiO2 minerals ±monazite, hematite*. The presence of hydrothermal quartz, K-feldspar, kaolinite and smectite are closely similar to the alteration assemblages found in the epithermal system of the Taupo volcanic zone which are created by different types of circulating groundwater. Hydrothermal veins and the zoned nodule were predominantly made up *silica-iron-manganese* mineralization. The availability of manganese may be related to the decay of organic matter as the study area used to be forested with multiple tree horizons. While the amorphous silica-iron mineralization is mineralogically and chemically comparable to jaspers found in exhalative marine systems. This observation is intriguing because there is no evidence for a nearby marine condition in Western Lesbos.

Petrographic and Geochemical Characteristics of Ultramafic-Hosted Hydrothermal Sulfide Deposits on the Mid-Atlantic Ridge

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Seafloor hydrothermal systems involve the circulation of hydrothermal fluids through oceanic crust and are present along spreading ridges and near subduction zones. Superheated fluids scavenge metals from the surrounding rock and, upon contact with cool seawater, precipitate sulfide minerals. Seafloor hydrothermal systems are modern analogues of ancient volcanogenic massive sulfide deposits. As such, they have raised many questions on the potential for mining these systems directly off the seafloor.

Faulting associated with slow-spreading ridges, such as the Mid-Atlantic Ridge, can expose deep oceanic lithosphere in the form of dome-like structures along the spreading axis. These features are termed oceanic core complexes and are of interest due to their strong correlation with hydrothermal activity. Ultramafic-hosted hydrothermal sulfide deposits are less common and have not been studied as extensively as the more common mafic-hosted deposits.

The purpose of the proposed study is to examine sulfide-rich samples from four ultramafic-hosted hydrothermal vent fields along the Mid-Atlantic Ridge between 12°N-15°N and: (1) characterize the samples in terms of their composition and their genesis; (2) evaluate whether these samples contain a distinct mafic or ultramafic signature; and (3) evaluate whether the metal content of the samples show suitable grade for potential future deep-sea mining efforts.

The hydrothermal vent fields visited during a six-week research cruise (M126 BIGMAR) in 2016 were Ashadze-2, Irinovskoe, Semyenov-2, and Logatchev-1. Samples and footage were collected by remotely operated vehicle and will be used to complete detailed vent field descriptions, hand sample descriptions, and petrographic descriptions using both transmitted and reflected light. Whole rock multi-element geochemical data will be compared to previous studies to determine whether these vent fields show a characteristic mafic or ultramafic signature.

Depositional environment and provenance of sedimentary rocks at MacIsaac's Point, Nova Scotia

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The Appalachian-Caledonide orogen was formed by the accretion of peri-Gondwanan terranes to Laurentia-Baltica at various times during the Ordovician–Devonian, followed by collision with Gondwana and the formation of Pangea in the Carboniferous–Permian. The two most outboard peri-Gondwanan terranes in Atlantic Canada are the Neoproterozoic Avalon Terrane and the Cambrian-Early Devonian Meguma Terrane. As the Rheic Ocean closed and Gondwana collided with the Laurussian Avalon and Meguma Terranes, a large system of strike-slip faults developed. These regional-scale strike-slip faults resulted in the formation of syn-collisional basins, and as a result, their sedimentary rocks preserve a record of the orogenic events that marked the formation of the supercontinent Pangea. One such basin, the Antigonish Basin, contains late Devonian marine, coastal, and lacustrine sedimentary rocks such as sandstone, conglomerate, limestone and shale. These rocks are well-exposed at MacIsaac's Point approximately 17km north of Antigonish. This project aims to better understand the relationship of the basin evolution to the regional tectonic development during the formation of Pangea. Previous work mapped this area as the 'Undivided Devonian-Carboniferous rocks', consisting of mainly conglomerate and sandstone. To better constrain the relationship between these sedimentary rocks and the regional tectonics; (i) a detailed stratigraphic succession was created, (ii) a detailed geologic map and cross section were created, and (iii) detrital zircon data were collected from the section, in addition to granite clasts from the major conglomerate bed. The detailed stratigraphic log allows for depositional environment analysis and preliminary results indicate this area was likely a braided stream system. The sandstone units were further subdivided by sedimentary features such as plant fossils, cross bedding, and grain size changes, and indicated a lacustrine depositional environment. The conglomerate layers were distinguished based on clast compositions and clast sizes and are interpreted as the remnants of stream channels. Furthermore, the ability to subdivide this area based on the sedimentary rocks observed will increase the overall geologic understanding of the Antigonish Basin.

Investigating the relationship between the Bras d'Or and Aspy Terranes in Cape Breton Island: Insights from Devonian plutonic rocks

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Located on the eastern margin of North America, Cape Breton Island records a complex geological history that formed during the Palaeozoic Appalachian Orogen. The Appalachian Orogen records the accretion of a series of peri-Gondwanan terranes to the composite Laurentian margin. The four major terranes in Cape Breton Island are the peri-Laurentian Blair River Inlier, and the peri-Gondwanan Aspy, Bras D'Or, and Mira terranes. The Bras d'Or Terrane is comprised of Neoproterozoic gneissic and metasedimentary units with associated metavolcanic rocks. The Aspy Terrane is dominated by younger Silurian-Devonian back arc sedimentary and volcanic rocks that were intruded by post-depositional plutonic rocks. The boundary between the Aspy and Bras D'Or terranes is defined as a regional, east over west, sinistral shear zone named the Eastern Highlands Shear Zone (EHSZ). Devonian plutons of the Black Brook Granite Suite (BBGS) that intruded into the EHSZ form the focus of this study. The BBGS is a peraluminous, muscovite biotite granitoid plutonic suite which was interpreted to have formed from partial melting of metasedimentary rocks. The purpose of this study is to characterize the petrogenesis of the BBGS and other spatially-associated "stitching" granitoid plutons namely the White Point and Parks Spur plutons that are also located along the EHSZ. The study will further constrain the timing of the emplacement of the BBGS: preliminary zircon U-Pb data yielded an age of ca. 375 Ma. Geochemical and zircon hafnium isotopic signatures will be analyzed to determine whether the petrological protolith can be linked to either the Bras D'or Terrane or the Aspy Terrane as well as to better understand the tectonic setting at the time of pluton emplacement. Results will be used to correlate Devonian magmatism within the peri-Gondwanan terranes of northeastern Cape Breton Island that are associated with the EHSZ with coeval magmatic rocks in Newfoundland and New Brunswick that have correlative ages, lithologies and geological histories.

Assessment of Methods for Measuring Glacier Mass Balance of the Taku and Lemon Creek Glaciers, Southeast Alaska

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The Juneau Icefield Research Program (JIRP) has collected annual glaciological mass balances for the Lemon Creek Glacier (10 km^2) since 1953 and Taku Glacier (730 km^2) since 1946. End-of-season glacier-wide mass balances are derived annually from mid-summer snow depth measurements in pits and short-duration mass balance modeling. We continue this glaciological record during the 2017 JIRP season by compiling snow thickness and density measurements from more than 30 snow pits. Deploying a high frequency ground penetrating radar (GPR), we measure the variability of the snow depth around selected pits. We use these data to assess whether individual field sites are representative of the entire glacier. To evaluate the glaciers' health, we compare the 2017 mass balance both at pit sites and glacier-wide to corresponding measurements from previous years. We further compare the glacier-wide mass balances of the Taku and Lemon Creek glaciers (period 2004-2015) to mass changes detected by the Gravity Recovery and Climate Experiment (GRACE) satellites (mascons 1352 and 1353). The goal is to investigate whether regional GRACE-detected mass changes reflect the mass changes of the two glaciers. Lemon Creek Glacier is a challenging candidate for this comparison because it is small compared to the ~12,100 km^2 GRACE mascon solutions. Taku Glacier is equally challenging because its mass balance is stable compared to the negative balances dominating its neighboring glaciers. Challenges notwithstanding, a high correlation between the glaciological and GRACE-derived balances for Lemon Creek and Taku glaciers would encourage future use of GRACE data to estimate glacier-specific mass balance.

Epithermal-style Gold Mineralization in the Eastern Cobequid Highlands, Nova Scotia: Towards a First Model

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Within the northeastern Cobequid Highlands, Nova Scotia, recent bedrock mapping, bulk rock geochemistry, and prospecting has identified a potential low-sulphidation epithermal Au system in Late Devonian to Early Carboniferous bi-modal volcanics. In this area of the Highlands, two distinct volcanic formations are present, the Byers Brook Formation consisting of felsic and volcaniclastic rocks and the overlying Diamond Brook Formation comprised of vesicular basalts with minor felsic volcaniclastic rocks. To the southwest these volcanic formations overly the Hart Lake-Byers Lake granite pluton, while to the north, the volcanics are unconformably overlain by Late Carboniferous sedimentary rocks of the Cumberland Basin. These magmatic events are synchronous with onset of siliclastic sedimentation in the Maritimes Basin and combined with bimodal volcanic package and the within-plate characteristics of the volcanics, this would suggest emplacement in a continental-rift-type environment. Continental-rift, bi-modal volcanic environments are known to host epithermal gold systems (e.g., Great Basin, Nevada). The Warwick Mountain area located in the northwest portion of the Diamond Brook Formation shows the most potential for gold mineralization, with two zones of intense silicified and sulphidized basalt present. In these zones the basalt has been altered to quartz + sericite + carbonate + pyrite ± chlorite ± epidote. Assays from the first narrower zone returned anomalous Au concentrations, up to ~660 ppb. Anomalous concentrations of As, Sb, Cd, and W were also detected. These trace elements are typical of the bi-modal volcanic hosted low-sulphidation deposits in Nevada. To date, there has been no detailed study conducted on this potential low-sulphidation Au system leaving many questions unanswered. This preliminary study aims to answer: 1) What is the mineralogy and paragenesis of alteration and mineralization and 2) What generation of pyrite (i.e., early vs. late) is gold mineralization associated with. In order to address the above questions, regular microscopy and SEM-EDS will be conducted to determine the alteration and mineralization mineralogy and paragenesis; therefore, aiding in determining the relative age of Au precipitation. This research will contribute new data to a poorly studied area and will help put constraints on the mineralization history and economic potential.

Characteristics of epithermal-style gold occurrences at the Goldy and Irene showings, Dawson Range, Yukon Territory, Canada: towards a first model

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The objective of this study is to characterize and compare epithermal quartz-Au-sulfide vein mineralization that occurs on Triumph Gold Corporation's Goldy and Irene showings in the Dawson Range, Yukon Territory. Specific goals of the study will be to (i) determine if the two showings constitute part of a single hydrothermal system that had several mineralizing centers along common structures or in relation to a common heat source, (ii) to determine the fluid characteristics and crustal depth of the gold mineralizing process(es), and (iii) to characterize the mineralogy expressed at the showings leading to a classification of the P-T regime of the mineralization.

Both mineral showings contain economically significant concentrations of gold in quartz-sulfide veins that are focused along fault-modified contacts between the metamorphic rocks of the Yukon Tanana Terrane and the intrusive bodies that are Jurassic to Cretaceous in age. The Goldy showing comprises a roughly 160 x 160 metre elliptical area of dense quartz-stockwork veining at a contact between biotite schist/gneiss and Jurassic syenite. The Irene showing, located 9.5 km NW of Goldy, comprises a greater than 3 metre thick quartz-sulfide vein exposed over 150 metre strike- length at a contact between biotite schist/gneiss and biotite-hornblende granodiorite to granite of probable mid- to late- Cretaceous age. At both showings, roughly fault/contact-parallel quartz- feldspar-porphyry dykes are present, and are interpreted to occur along segments or splays associated with the regionally important Big Creek Fault.

Using petrographic microscopy, a paragenetic investigation of the mineralization (ore and accessory minerals) and associated alteration assemblages will be conducted to better characterize these two showings. This will be complemented by stable isotope (O and S) and fluid inclusion analyses (petrography and microthermometry) of the vein-hosted minerals, in order to constrain fluid composition and origin, as well as the crustal depth and temperature of the mineralizing event(s). The value of this study will be to ultimately establish robust geochemical criteria to aid in mineral exploration within this under-characterized region.

Initial field and petrographic investigations of the geology, paragenesis & gold deportment at the Hopper Prospect, Yukon

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The Hopper prospect covers an area of 7,400 hectares. It is owned wholly by Strategic Metals Limited. The Hopper prospect is located east of Aishihik Lake, in the Kluane Plateau of southwestern Yukon. Underlying the Hopper prospect is the 5 by 7 km Late Cretaceous aged Hopper pluton. The Hopper pluton is part of a larger plutonic suite termed the "Casino Suite". The Casino Suite is comprised of Late Cretaceous intrusive rocks which form a belt in Yukon extending from the Dawson Range to the northeast of Haines Junction. The Casino Suite represents a suite of rocks with metallogenic significance. The Casino Suite hosts the Casino porphyry deposit and several MINFILE occurrences of porphyry and epithermal style mineralization.

Geological mapping and sampling of the Hopper prospect was performed in August 2017. 24 polished thin sections are currently being reviewed to determine a paragenetic sequence for skarn mineralization observed at the Hopper prospect. Determination of specific ore and gangue mineralogy will be determined through the use of the Scanning Electron Microscope.

Factors controlling the gold deportment observed in gold rich intervals of drill core from the Hopper prospect are of particular interest. These controls (if observed) will be compared to gold enriched skarn samples from the past producing Arctic Chief mine of the Whitehorse Copper Belt, which has a similar protolith composition to that of the Hopper prospect.

Ni-Cu-PGE Potential of the Labrador Trough

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The purpose of this project is to evaluate the Ni-Cu-PGE potential of gabbro sills within the Labrador Trough. The mineral potential of the Labrador Trough was first recognized in the 1930's when exploration programs were focused on its base and precious metals, however, it was not until recent exploration in Quebec by Northern Shield that mineralized gabbro were identified as potential targets for Ni-Cu-PGE mineralization. This project will examine the gabbro sills of the Howse Lake area and compare the results with the Northern Shield prospect 100 km north along strike in Quebec. Fieldwork for this project consisted of grab sampling from known occurrences and prospecting the areas in the immediate vicinity. It was conducted during the summer of 2017 through a student position with the Geologic Survey of Newfoundland and Labrador (GSNL).

This project will attempt to determine the Sulphur source within the mineralized gabbro, classify the deposit type(s), and generate a genetic model for exploration. Bulk rock geochemistry was conducted at the GSNL's laboratory in St. John's, with PGE and Au assays conducted at external commercial facilities. Petrographic analysis of the polished thin sections will be done to determine a paragenetic sequence for the sulphide mineralization, and selected samples will be chosen for SEM-MLA analysis to determine detailed petrographic relationships and host minerals for PGE mineralization. The sulphur isotopes of pyrrhotite and chalcopyrite from the mineralized gabbro will be analyzed in situ using secondary ion mass spectrometry (SIMS) to determine the source of the reduced sulphur within the melt, and to relate the different types of mineralization. These will be compared to results obtained from sulphide rich shales in contact with the gabbro sills. Whole rock geochemistry from both mineralized and non-mineralized gabbro samples will be used to determine regional geochemical trends within the intrusions, and to identify which factors contributed to the localized mineralization.

Polygonal ridges in the Medusae Fossae and analogous features on Earth

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Polygonal ridges found on Mars are morphologically similar to desiccation cracks found in periglacial and other ephemeral sedimentary environments on Earth. Such ridges, with up to 50 metres of relief, have been observed in areas of the Medusae Fossae nearest the Tharsis region, the largest volcanic region on mars. These ridges have been interpreted to have formed as a result of lava extruding into pre-existing cracks in surficial rock. However, the origin of the cracks themselves is thought to be related to thermal stress, much like the thermal stress that creates the "patterned ground" common in polar regions on Earth. This paper comprises a selective review of literature that will form the basis of a team project by junior undergraduate students.

Shortening of the Southern Tibet

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The geological studies of the Himalayan orogen have been focusing on three aspects: the initial collision in Early Eocene, the Miocene tectonics, and the recent seismotectonics. However little is known about first half of the Himalayan orogeny, during Eocene and Oligocene. The Tethyan Himalaya, located between the crest of the Himalaya and the India-Eurasia suture (the Indus-Tsangpo suture Zone) in the southern Tibet are a fold-and-thrust belt that developed during this period. There are two principal objectives of this project. First one is to determine the geometry of the basal detachment of the Tethyan Himalaya. The current hypothesis is that the basalt detachment of this fold-and-thrust belt was a south vergent thrust which was reactivated as a low angle normal fault geometry shear zone. This structure crops out in the northern Himalaya as the South Tibetan Detachment. Second aim is to calculate the shortening amounts of the Tethyan Himalaya. Only one such study was performed until now by Ratschbacher et al. (1994). The objectives of this project will be implemented through construction of a series of balanced, retrodeformable cross sections using MOVE ® software. The cross sections will be constructed based on published geological maps and field observations. This study is part of a larger project aimed to constrain the structure of the southern Tibet and the Himalaya.

Atlantic Universities Geoscience Conference (AUGC) – Awards

Science Atlantic Best Paper Award

The Science Atlantic Presentation and Communication Award is given for the best overall student paper on any geoscience topic presented orally at the annual AUGC (Atlantic Universities Geoscience Conference).

Judging

The award is judged primarily on the basis of the scientific quality of the topic, the amount of original work done by the student, and his/her understanding of the subject. Evaluation criteria include: Abstract – Clear statement of problem, objectives, principal findings Presentation – Clarity, visual aids, organization Scientific merit – Experimental design, innovative approach, and interpretation of data Understanding - Overall knowledge and response to questions.

The award will be judged by a panel of at least 3 qualified judges with diverse geoscience expertise as described under judging above.

The Award

The award consists of a monetary prize and letter of commendation for the presenter, as well as a plaque which resides at the winner's university for one year, after which the winner's university is responsible for bringing the plaque to the next annual conference. The award is usually presented by a representative of the Science Atlantic Earth Science Committee at the annual banquet of the AUGC.

Sponsor Information

This award (previously known from 2004-2012 as the APICS-NSERC Award) is the AUGC version of the Science Atlantic Undergraduate Research Award and Communication Award offered at all Science Atlantic-sponsored conferences. The Communication part of the award is sponsored by Canadian Science Publishing. A separate Communication Award is not offered at AUGC.

Imperial Oil Best Poster Award

The Imperial Oil Best Poster Award is given to the student presenting the best overall student poster on any topic at the annual AUGC.

Judging

The award is judged primarily on the basis of the scientific quality of the topic, the amount of original work done by the student, and his/her understanding of the subject. Evaluation criteria include: Abstract – Clear statement of problem, objectives, principal findings Poster design – Clarity, organization, visual appeal Scientific merit – Experimental design, innovative approach, and interpretation of data Understanding - Overall knowledge and response to questions

The award will be judged by a panel of at least 3 qualified judges with diverse geoscience expertise as described under judging above. When a representative of Imperial Oil is present, he/she will take the lead in judging this award.

The Award

The award consists of a monetary prize for the student presenter.

Sponsor Information

This award has been sponsored by Imperial Oil since 2007. Imperial Oil recognizes that business success depends on the economic, social and environmental health of the communities where they operate and views community investment not simply as a responsibility but as an essential component in building a strong society. Imperial Oil gives back to local communities through financial contributions, in-kind donations and volunteer efforts and supports scientific research with a number of awards and sponsorship.

Canadian Society of Petroleum Geologists (CSPG) Award

The Canadian Society of Petroleum Geologists Award is awarded annually for the best presentation of a petroleum geology-related paper at the annual AUGC. If the winner of the Science Atlantic Best Paper Award gave a petroleum geology-based presentation, then the CSPG award will go to the petroleum geology-based paper judged to be next best.

Judging

The award will be judged by a panel of at least 3 qualified judges with diverse geoscience expertise as described under judging above. When a CSPG representative is present, he/she will take the lead in judging for the award. A plaque is presented to the winner at the AUGC banquet as well as a monetary prize, preferably by a CSPG member or representative. The plaque will reside at the winner's university until the next AUGC, when the winner's university is responsible for bringing the plaque to the next conference.

Sponsor Information

This award is sponsored by the Canadian Society of Petroleum Geologists. Founded in 1927, the mission of the Society is to advance the professions of the energy geosciences – as it applies to geology; foster the scientific, technical learning and professional development of its members; and promote the awareness of the profession to industry and the public.

Canadian Society of Exploration Geophysicists (CSEG) Award

Canadian Society of Exploration Geophysicists (CSEG) Award Established in 2008, the CSEG award is given to the student who presents the best overall geophysics paper at the AUGC conference (typically awarded for an oral presentation; however, poster presentations are also

eligible). Geophysics is a diverse discipline with many different areas of study, and this award could be awarded to any student whose work falls under this broad category.

Judging

Students will be evaluated on the scientific merit of their work, their general understanding of the material covered and their ability to effectively communicate this to the judges. This award will be judged by the panel of judges chosen by the conference organizers. Ideally one of these judges should have a geophysics background. The CSEG will typically send representatives to attend the conference so if a geophysics judge cannot be found locally then one of these representatives may be asked to judge. The award may not be presented if the judges and the CSEG representatives determine that no presentation fulfills the spirt of the award.

The Award

The award consists of a monetary prize for the student presenter, as well as a plaque which resides at the winner's university for one year, after which the winner's university is responsible for bringing the plaque to the next annual conference. The award is usually presented by Imperial Oil's representative at the annual banquet of the AUGC. The monetary prize comes from the funds, the IOL commits to the conference. It is a responsibility of the school that hosts the conference to prepare and distribute a cheque for the winning presenter.

Sponsor Information

The Canadian Society of Exploration Geophysicists began in 1949 at around the time of the petroleum production boom of the Leduc and Redwater discoveries. As a result of these 4 significant discoveries, there was a need for increased knowledge, skill and professional attributes in the field of geophysics. Today, the CSEG is a thriving organization. CSEG's mandate is to promote the science of geophysics among its members, especially as it applies to exploration, and to promote fellowship and co-operation among those persons interested in geophysical prospecting.

Frank S. Shea Memorial Award in Economic Geology

The Frank S. Shea Memorial Award honours the student making the best presentation regarding an aspect of or with implications for economic geology. If the winner of the Science Atlantic Best Paper Award gives an economic geology presentation, then the Shea Award will go to the economic geology judged to be next best.

The award was established by the Mining Society of Nova Scotia at its annual meeting in June 1981 to honour Frank Shea, a long-time member and former president.

About Frank Shea

During some 27 years, Frank Shea was engaged in mineral resources exploration and development activities in the Atlantic region. For more than 10 years he served as Chief Geologist and division

director of the Mineral Resources and Geological Services Division in the former Nova Scotia Department of Mines. Frank graduated from St. Francis Xavier University in 1954 with a BSc in geology. He continued his studies at Dalhousie University, receiving his Master's degree in 1958. Frank had a great love for his native province and promoted its welfare by assisting mineral exploration and research projects whenever and wherever he could. He was a strong supporter of educational programs in geology such as the geology field school at Crystal Cliffs near Antigonish and prospector training.

Judging

Student papers are reviewed and judged for content in economic geology or implications for economic geology by a panel of practicing geologists. For practical purposes, this will be done the same panel of judges as evaluates the other awards. If there are no papers on economic geology or none deemed worthy during the annual AUGC, the award may not be given.

The Award

The award consists of a cheque for the winning student and a cheque for the geoscience club that the student represents.

Sponsor Information

The Frank Shea Memorial Award is sponsored by the Mining Society of Nova Scotia. Organized in the 1890s to promote the mineral industry, to share technical knowledge and to encourage fellowship, this Society was one of the founding members of the Canadian Institute of Mining and Metallurgy (CIM), the premier mining organization in Canada. The Society is pleased to support this award honouring a student, the contributions of Frank Shea, and the economic impact of geology on the Canadian economy.

Atlantic Geoscience Society (AGS) Environmental Geoscience Award

The Atlantic Geoscience Society Award was established in 2015 by the Atlantic Geoscience Society to recognize the best project (talk or poster) at the annual AUGC involving a significant component of environmental geoscience.

Judging

Student papers are reviewed and judged for content in environmental geoscience or implications for environmental geoscience by the same panel of judges as evaluates the other awards.

The Award

The award consists of a monetary prize to the winning student and a plaque that will reside at that student's university until the next AUGC.

Sponsor Information

The Atlantic Geoscience Society exists to promote a better and wider understanding of the geology of Atlantic Canada, both to its members and to the public. An entirely volunteer association, the AGS brings together earth scientists from universities, government institutions, the environmental, mining, and petroleum industries, and consultants in the Atlantic provinces.