



Mineral Exploration Research Centre

March 2014 - Newsletter

Message from the Director - Dr. Harold Gibson

MERC is off to a good start in 2014. With 6 short courses and workshops planned, and 20 research projects initiated and ongoing, 2014 promises to be another busy and successful year. MERC continues to benefit from a close working relationship with the Goodman School of Mines in the areas of new course and workshop development, and in the delivery and advertisement of our joint educational initiatives. For example, 84 participants registered for our joint workshop on Scientific and Technical writing held in January 2014, these included 32 geoscience students, 43 students from other departments, and 9 from industry. The Goodman School of Mines is now a MERC foundation member. This will further enhance our collaboration, and demonstrates Laurentian University's financial commitment to MERC and support of the Minerals sector.

MERC's research projects for 2014 will exceed \$2 M in expenditures, are conducted globally, cover multiple ore systems, and include 53 graduate students. We have initiated discussions with our industry partners in Sudbury to develop a third Sudbury Ni-Cu-PGE exploration research project, and through discussions with industry partners we are exploring a possible thematic Abitibi gold project. In addition, MERC is host to the 5-year, \$13M CMIC Footprints project, which is the largest mineral exploration research and NSERC CRD project ever conducted in Canada. The research involves 42 researchers from 24 Canadian universities and 45 industry collaborators from 27 mining and exploration service companies (www.cmic-ccim.org/).

We have also created a new website with a members-only page (www.merc.laurentian.ca). The members page contains PDF copies of recent MERC journal publications, reports, posters and presentations organized by ore deposit types and themes. It also contains undergraduate and graduate student CVs and links to recent graduate theses.

On the organizational front, the MERC Advisory Board has requested that MERC develop a 5-year business plan and business case to guide our growth, and to provide measures of success. The MERC website is now being adapted for access by smart phones, allowing our members, industry partners, sponsors and potential students to more readily access our site.

MERC hired Dr. John Ayer as a part-time Associate Director in February 2013. John worked for 7 years in the exploration industry and for 28 years with the Ontario Geological Survey. MERC is very fortunate to have John join our team and he continues to move our initiatives forward and to provide a closer liaison with our industry members and sponsors.

Our graduate modular course curriculum continues to educate students from across Canada and globally, and the courses, in whole or in part, are used for professional accreditation by industry. Upcoming MERC modular courses within the next 6 months include:

Exploration for Magmatic Ore Deposits (April 2014)

Exploration in Volcanic Terrains (Field Mapping Course; August 2014)

Visit our website at:
www.merc.laurentian.ca

Educational Initiatives

1. **Workshop: Scientific and Technical Writing** – January 18th with 84 registered participants, taught by experts from Government, Industry and University
2. **April 17th Workshop** Associated with the Timmins Northeastern Ontario Mines and Minerals Symposium (April 15&16).

Highlights of new Abitibi Research that improve the understanding of, and exploration methods for, gold & base metals presented by experts from Universities, Government and graduate students

3. **May 7 to 11th Field Trip: Abitibi-Huronian Shield Metallogenic Transect** – 5 day field transect focused on the Metallogeny, Stratigraphy and Tectonics of the Abitibi greenstone belt and the Huronian Supergroup

Includes visits to new deposits and traditional gold and base mining camps.

Specifically designed for geoscientists in gold and base metal exploration and those who have recently entered the exploration sector, led by experts from MERC, Government and Industry



Field Lunch overlooking Lac Dufault, Noranda during the Greenstone Gold and base metal exploration mapping course

4. **Workshop: First Nation Concerns and Exploration, Fall of 2014**

Constitutes a module within the Goodman School of Mines certificate program

5. **Workshop: The Economic of Exploration in Challenging Times, Fall 2014**

Constitutes a module within the Goodman School of Mines certificate program

6. **Workshop: Advances in Surficial Exploration Methods December 2014**

Two days workshop with a Canadian Shield Focus presented by experts from government and industry

Research Initiatives

MERC is the ore deposit research arm of the Department of Earth Sciences (DES). MERC research focuses on, but is not restricted to, Precambrian ore systems and is directed at solving fundamental and applied problems related to the genesis of ore deposits, their metallogeny (location), and their discovery. Our research is subdivided into 6 broad themes below, which also contains a list of current research areas and the principal faculty and collaborative researchers within each theme. Research funding comes from NSERC, NSERC-Industry collaborative research grants (CRDs) and Governments.



BGR Index 2013 Leg II research team on board the RV Sonne to explore the Southern Central Indian ridge

MERC researchers include 13 faculty from the Department of Earth Sciences (listed below), 22 industry and government Adjunct Professors, and 53 graduate students (21 PhD, 19MSc, and 13 applied MSc) as well as 14 undergraduate students. Graduate and undergraduate students and their research topics are listed on the final pages of this newsletter.

1. Mafic and Ultramafic Environments

Ni-Cu-PGE: Sudbury, Ontario; (P. Jugo, D. Tinkham, D. Kontak, B. Lafrance, M. Leshner, A. McDonald); Jinchuan, China; (M. Leshner, P. Lightfoot, Jian-Gang Jaio)

Cr deposits: Ring of Fire, Northern Ontario; (M. Leshner, M. Houlié, R. Metsaranta, D. Shinkle)

2. Felsic Intrusive Environments

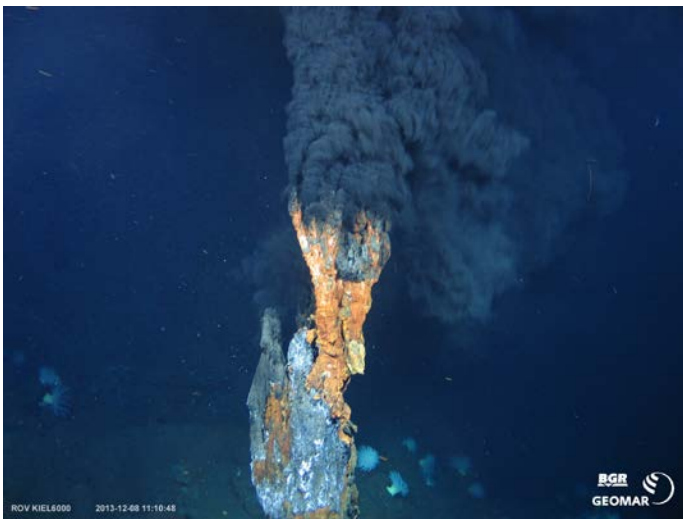
Rare-metal pegmatites: NWT, NS, NB, Alaska; (D. Kontak, A. McDonald, J. Hanley, L. Groat)

3. Volcanic Environments

VMS and gold-enriched VMS: (Flin Flon & Snow Lake, Manitoba; H. Gibson, B. Lafrance, D. Tinkham, M.; Noranda, Québec; (H. Gibson, H. Poulsen, J. Franklin, T. Monecke); Reg de Plata, Mexico; (H. Gibson, B. Lafrance)

Metamorphism of VMS deposits and alteration zones: Sherridon, Manitoba and Noranda, Québec; (D. Tinkham, H. Gibson)

Sea floor Massive Sulfide deposits: Tonga Arc, Lau back-arc, Central Indian Ridge (H. Gibson, U. Schwarz-Schampera, T. Monecke, S. Petersen, M. Leybourne, M. Hannington, M. DeWolfe, M. Engelbert)



Black smoker chimney at the Edmond Site, Southern Central Indian Ridge (418°C fluid temperature)

4. Sedimentary Environments

Zinc-lead deposits: Polaris, Nanisivik and MacKensie Mountains Districts; (E. Turner)

Fe deposits: (Rapitan Fe; E. Turner)

Unconformity uranium: Thelon Basin: B. (Lafrance, D. Thomas)

5. Precambrian Gold Environments

Gold mineralized Iron Formations: Meadowbank, Meliadine, Musselwhite, Beardmore Geraldton; (P. Thurston, B. Lafrance, D. Kontak, B. Dube)

Vein-hosted gold: New Britannia Mine; (B. Lafrance, H. Gibson)

Intrusion-related gold: Cote Lake; (D. Kontak, B. Lafrance, B. Dube)

6. Geophysical Mapping and Discovery (R. Smith)

Integrated Studies: 3-D integration of geology-geophysics at Sudbury, Radio Imaging

Physical properties: resistivity, magnetic susceptibility and geology

Data Acquisition and Processing: three component transmitter for detection of perfect conductors

New Modeling, Inversion and interpretation: laterally varying conductance in mine tailings

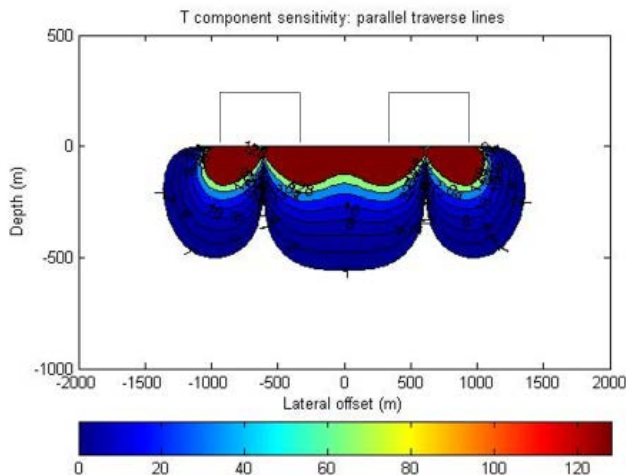
Dr. Smith is a Geophysics co-leader for CMIC's Footprint project on orogenic gold, unconformity uranium, and porphyry copper deposits.

Targeting Initiatives

Research conducted by Professor Richard Smith, NSERC Industrial Research Chair in Exploration geophysics, and his graduate (9) and undergraduate (4) students has significantly enhanced and expanded MERC's research initiatives in ore systems and targeting. Some of the tangible results of his research include: 1) filing for patents in Australia, Canada and the United States, and 2) Laurentian University has signed a license agreement with CGG, an integrated geoscience company that provides geological and geophysical capabilities to industry to develop a multiple three-component transmitter system and graduate student, Michal Kolaj is working part time at CGG to develop this technology.

Research conducted by Jacques Desmarais is an example of the high quality of geophysical research that is being conducted at the undergraduate level. Jacques is undertaking a study to help answer the question: "How deep can an electromagnetic system see an ore-body?" For the case of a body with a radius of 50 m, the ability of the system to detect the body is shown on the cross-

section on the figure below. The electromagnetic system is the InfiniTEM system, which has two 600 m wide loops, one on the left one on the right (grey lines). When the body is in different positions in the subsurface, the ability of the system to detect the body is indicated by the colours. When the body is at a red location, the body is extremely easy to see as it is shallow and the fields strong. When the colour is darkest blue, the body can just be seen; where it is white, the response from the body is too small to see. In this case, the currents flow in a vertical plane (vertical conductor), so there are no currents induced in the body right below the transmitter where the transmitter fields null couple to the body (white cusp in the section).



Other sections were generated for different system parameters. In this way, the effect of loop size, loop separation, pulse width, base frequency, duty cycle etc have been studied. A paper describing these results has been submitted to a scientific journal.

DES/MERC Faculty

- Randy Dirszowsky: Earth System Science, geomorphology
- Harold L. Gibson, Professor and MERC Director: Economic Geology, Volcanology
- Bruce Jago, Professor and Executive Director, Goodman School of Mines, Economic Geology
- Pedro J. Jugo, Associate Professor: Igneous Petrology, Economic Geology
- Daniel J. Kontak, Professor: Economic Geology
- Bruno Lafrance, Professor and DES Chair: Structural Geology, Economic Geology
- C. Michael Lesher, Professor: Economic Geology, Igneous Geochemistry
- Darrel G.F. Long, Professor: Sedimentology, Stratigraphy
- Andrew M. McDonald, Professor: Mineralogy

- David A.B. Pearson, Professor: Environmental Earth Science
- Michael Schindler, Associate Professor: Environmental Mineralogy, Hydrology
- Graeme A. Spiers, Associate Professor: Environmental Geochemistry
- Richard S. Smith, Professor: NSERC IRC in Exploration Geophysics
- Phillips C. Thurston, Adjunct Professor: Precambrian Geology
- Douglas K. Tinkham, Associate Professor: Metamorphic Petrology
- Elizabeth C. Turner, Associate Professor: Carbonate Sedimentology, Invert. Paleontology
- Interviews underway for a Professor of Geochemistry



Examining outcrops on the Mexican Silver Belt tour

Graduate and Undergraduate Student Thesis/Project Topics

PhD	Thesis
Baldwin, Geoffrey	Stratigraphy and geochemistry of the Rapitan Iron Formation, NWT & YT
Burns, Michael	Role of fluids in the evolution of a rare metal LCT pegmatite
Cafagna, Fabio	Experimental study on the role of Bi and Te on the mobility of Pt and Pd
Carson, Heather	Stratigraphy, geochemistry, and petrogenesis of the Black Thor Mafic-Ultramafic Complex and associated Cr and Ni-Cu-PGE mineralization, McFaulds Greenstone Belt, Ontario
Engelbert, Meg	Volcanological and structural reconstruction of the Upper Chsiel Succession, host to the gold-enriched Lalor and Photo Lake VMS deposits, Snow Lake, MB
Gourcerol, Blandine	The role of iron formation geochemistry in BIF-associated gold mineralization.
Hahn, Katherine	Origin of rift-related deep-water carbonate mounds in the Mesoproterozoic Borden Basin, Nunavut
Haring, Monika	Crystal chemistry of borosilicate mineral focussing on tadhikite group
Hechler, Johannes	Geochemistry and mineralogy of sulphide tailings
Hunter, Rebecca	Geological investigation of uranium mineralization along the Qavvik-Tatiggaq Trend, northeast Thelon Basin, Nunavut
Joergensen, Taus	Evolution of the Sudbury Igneous Complex contact metamorphic aureole and contact anatexis
Katz, Laura	Origin of the Archean Cote Gold Au-(Cu) intrusion-related gold deposit, northern Ontario
Kolaj, Michal	Mapping laterally varying conductance
Li, Yongxing	Modelling the response of the Radio Imaging method
Mahmoodi, Omid	Using physical properties to determine lithological information
Mealin, Caroline	Geology, geochemistry, and metallogenesis of the Booth River Complex, Northwest Territories
Olaniyan, Oladele	3-D structural reconstruction of the Sudbury Basin
Petrus, Joseph	Mineralogical, chemical, and isotopic evolution in bombarded rocks and minerals
Rubingh, Kate	Origin of, and controls on, gold mineralisation at the New Britannia Mine, Snow Lake, MB
Stewart, Craig	Alteration in the footwall and granophyre of the Sudbury Igneous Complex
Toth, Zsuzsanna	BIF-hosted Au deposits - Beardmore-Geraldton district area: structural setting, footprint and exploration implications

MSc	Thesis
Adibpour, Mojgan	Trace element distribution in sulfide assemblages from the Levack-Morrison ore system, Sudbury, Ontario: Looking for chemical fingerprints of ore processes using Laser Ablation ICP-MS methods
Deng, Deng	A comparative study of magnetic susceptibility instruments
Durocher, Jennifer	A synchrotron study on the speciation of U in secondary minerals of the Athabasca basin
Farhangi, Naghmeh	Mineralogy, geochemistry, and petrogenesis of Ni-Cu-PGE mineralization in the Black Thor Mafic-Ultramafic Complex, McFaulds Greenstone Belt, Ontario

Franchuk, Anatoliy	High tenor NI-PGE sulfide mineralization of the South Manasan Ultramafic Intrusion, Thompson Nickel Belt
Lam, Judy	Metamorphic reaction history and metal mobility at the gold-enriched Lalor VMS deposit, Snow Lake, MB
MacInnis, Linette	Nature of the Grey Gabbro and the alteration related to Cu-PGE footwall mineralization in the Podolsky deposit, Sudbury
Mathieu, Jordan	Diagenetic history and economic potential of Proterozoic and Paleozoic dolostones on Victoria Island, Arctic Canada
Mehrmanesh, Kaveh	Stratigraphy, geochemistry, and petrogenesis of the Black Label Chromite Zone of the Black Label Mafic-Ultramafic Complex, McFaulds Greenstone Belt, Ontario
Moll, Marilyn	Hangingwall alteration at the Wolverine VMS Deposit, Yukon
Monter, AHIRAM	Structural and stratigraphic analysis of the gold- and silver-enriched, Rey de Plata VMS Deposit, Mexico
Naprstek, Tomas	Studies in modeling the response measured with the Radio Imaging Method
O'Hare, Sean	Neoproterozoic black shale in the Mackenzie Mountains NWT
Poulin, Remy	Scheelite chemistry as an Indicator of Intrusion-related W-Mo-(Au) Mineralization
Schaub, Christoph	Testing the feasibility of using electrical and magnetic measurements to monitor stress underground
Slater, Evan	A mineralogical and chemical study of the Minas Pirquitas Sn-Zn-Ag deposit, Jujuy, northern Argentina
Smith, Jocelyn	Role of structure in the formation of the Cote Gold Au-(Cu) Deposit, Northern Ontario
Spath, Charles	Geology and genesis of mobilized chromitite in the Black Label Zone of the Black Thor Mafic-Ultramafic Complex, McFaulds Greenstone Belt, Ontario
Tokaryk, Scott	Nature and origin of Proterozoic (?) Au Mineralization on the Pistol Bay Trend, Nunavut

Applied MSc in Mineral Exploration	Research Project
Anders, Carlson	Geochemistry of komatiites in the Winnipegosis Greenstone Belt, Manitoba
Andrzejewski, Anna	The application of statistical analysis to geochemical data at the ZNT exploration project, West Central BC, Canada
Bewcyk, Jamie	New Student, research topic to be determined
Flank, Steven	New Student, research topic to be determined
Guest, Nicolas	Exploration geochemistry of felsic metavolcanic rocks in the Musslewhite area, Ontario
Halverson, Andrew	Geophysical fingerprinting of the Overman deposit, Guyana Shield, Suriname
Joyette, Michelle	New Student, research topic to be determined
Kirwan, Ashley	Lithological controls on gold mineralization of the Loma Larga high-sulfidation epithermal deposit, Azuay province, Ecuador
Lapointe, Matthieu	New Student, research topic to be determined
Samiei, Ahoora	New Student, research topic to be determined
Tomczuk, Brian	New Student, research topic to be determined
Tuck, Loughlin	New Student, research topic to be determined
Verma, Ramona	New Student, research topic to be determined

BSc	Thesis
Caplette, Jaime	Using black rock coatings as a vector for historical atmospheric depositional processes
Desmarais, Jacques	Estimating the volume of investigation of the InfiniTEM system using the sphere model
Hall, Marshall	Sub-layer textured Quartz Diorite, a result of Fractionation across the Hess Offset or Injection of Sub-layer into the Hess
Humphries, Ryan	Petrography and Geochemistry of Moose Mountain Banded-Iron Formation, Ontario
Legrand, Christine	Interfacial processes on silicates and Fe-hydroxides in a uranium mine tailings
Long, Samuel	An overview geophysical methods for estimating resistivity with an analysis of the ability of the ground resistivity method to detect alteration at the Midwest Uranium Deposit, northern Saskatchewan, Canada
Malcolm, Kelly	Spectral analysis and mapping of black rock coatings from Canada, Russia, and Southwestern USA
Pavan, Katharin	Isotope stratigraphy of the Mesoproterozoic Iqqittuq, Angmaat and Nanisivik Formations, Nunavut
Pecman, Melissa-Jane	The geological significance of rock property measurements taken on core samples at the KGHM Victoria Property, Sudbury, Ontario
Sullivan, Neal	Paragenesis and partitioning of highly siderophile elements (HSE) and metalloids in compositionally segregated sulfide droplets from Noril'sk, Russia
Valvasori, Anthony	Origin and evolution of titanite in the Sherridon structure, Sherridon MB
Walker, Joseph	The Black Norite orthopyroxene-(sulfide)-rich layer, South Range Norite
Whymark, Wesley	Paragenesis of gold bearing mineralization in diverse conglomerates of the Mississagi Formation, Southern Cobalt Embayment, Ontario, Canada.
Wray, Nicholas	Timing and emplacement processes of ultramafic intrusions in sedimentary strata, Halliday Township. Abitibi Greenstone Belt

Going underground at the Francisco I. Madera mine, Mexico



MERC Corporate Members

Foundation Members

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Teck

Ontario Geological Survey, Ontario
Ministry of Northern Development and
Mines



Tier 1 Members

Gold Fields Exploration Inc.



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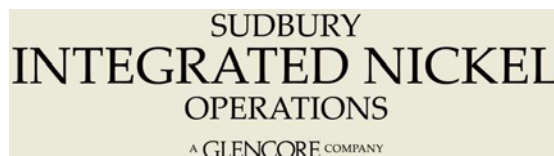
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