Mineral Exploration Research Centre

March 2015 - Newsletter

Message from the Director
Dr. Harold Gibson

Notwithstanding the difficult economic times facing our industry, 2015 is shaping-up to be a busy and successful year for MERC. We continue to benefit from a close working relationship with Laurentian University's Goodman School of Mines in new course and workshop development. Seven workshops and field trips are planned for 2015. MERC's exploration research projects exceeded $2 M in expenditures in 2014, were conducted globally, covered multiple ore systems with a focus on the Precambrian, and included 66 graduate and 17 undergraduate students. Research expenditures for 2015 are expected to match those for 2014. As outlined in the newsletter, we successfully initiated three new gold projects during 2014 and we are continuing to develop a Thematic Abitibi Gold Exploration research program with new projects planned for 2015. We have also completed our initial discussions with our industry partners to develop a research project that will focus on developing an exploration model for low-sulfide, footwall PGE mineralization at Sudbury, which will be initiated this summer. In addition, Laurentian University, Ivanhoe Mines, and the University of Limpopo in South Africa have signed a memorandum of understanding in a five-year educational partnership.

On the organizational front, we have recently completed a 5-year business plan and business case to help guide MERC's growth, and to provide measures of success. The Business Plan reviews MERC's current operations, focussing on its achievements to-date and recommends six strategic initiatives, phased in over a five year period, to guide future research, broaden organization capacity, improve overall governance, and ensure that MERC remains firmly on a path of increased operational capacity and long term sustainability.
(see **http://merc.laurentian.ca/news/merc-5-year-business-plan**)

We welcome Ivanhoe Mines Ltd. as a new MERC corporate member in 2015

IVANHOE MINES
NEW HORIZONS

MERC Educational Initiatives

- Greenstone Gold and Base Metal Exploration Field Mapping Course (May 9-15, 2015) in the Kirkland Lake-Noranda Mining Districts (**http://merc.laurentian.ca/news/may-9-15-gold-and-base-metal-mapping-course**)
- Field Excursion for Mining Analysts (Summer 2015)
- Exploration workshop associated with OEGS symposium in Sudbury (November 2015)
- GSM/MERC collaborative workshops (fall & winter 2015)
    - Aboriginal Communities and Resource Development
    - Technical Writing, Resume & Interview skills
    - Portable XRF
    - Leapfrog

MERC Modular Courses

- Structure, Tectonics and Mineral Exploration (Aug 24-Sept. 7, 2015). 14-day field-based course in structural geology applied to gold deposits addresses the tectonic and structural controls on gold mineralization at Hemlo, the Beardmore-Geraldton Belt, and Kirkland Lake.
- Exploration Geophysics (Dec. 2015). 10-day intensive course in geophysical methods applied to mineral exploration.

MERC 5-Year Business Plan

The plan was completed in November 2014 with the key outcomes focusing on exploration research in order to:

- Expand research to other shields, increase number of "gold – related" projects, develop methodologies for exploration "under cover".
- Increase MERC membership
- Establish a 1 year Sustainability Fund
- Establish an Exploration Science Advisory Council
- Implement a Pre-Research investigation fund (test proof of concept)
- Increase research capacity through hiring Research Associates (starting in 2017)

DES/MERC Faculty

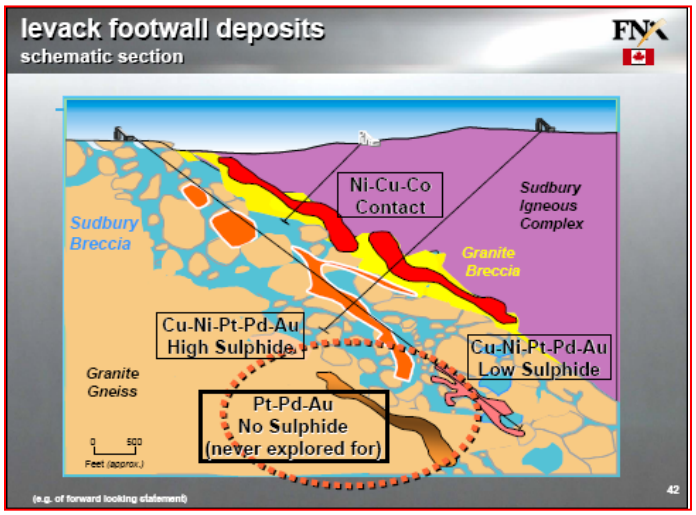
- Harold L. Gibson, Professor and MERC Director: Economic Geology, Volcanology
- Bruce Jago**,** Professor and Executive Director, Goodman School of Mines**,** Economic Geology
- Pedro J. Jugo, Associate Professor: Igneous Petrology, Economic Geology
- Daniel J. Kontak, Professor: Economic Geology
- Bruno Lafrance, Professor and DES Chair: Structural Geology, Economic Geology
- Matthew Leybourne, Associate Professor: Geochemistry
- C. Michael Lesher, Professor: Economic Geology, Igneous Geochemistry
- Andrew M. McDonald, Professor: Mineralogy
- 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, Professor: Carbonate Sedimentology, Invert. Paleontology
- **A search is currently underway for a Clastic Sedimentologist**

New MERC Exploration Research Initiatives

1) Low Sulfide, PGE-rich Footwall Mineralization at Sudbury

An integrated research project to characterize a new PGE-rich deposit type in the Sudbury Igneous Complex footwall is in the planning stage. The research will be undertaken in collaboration with Glencore - Sudbury Integrated Nickel Operations, KGHM International, Lonmin Investments Canada Inc., Wallbridge Mining Co. and the Ontario Geological Survey. The goal is to develop an integrated geological, geochemical and geophysical Exploration Model for Low Sulfide, PGE-rich mineralization within a 5-year Project time-frame. This will be achieved through **c**haracterization of the exploration-relevant aspects of this mineralization type, including:

- Structural and lithologic, controls
- Ore mineralogy, mineral chemistry, textures, and baseline geometallurgical characterization
- Alteration mineral assemblages, geochemical signature, and host rock characterization
- Physical properties of rock types and mineralization to map/detect mineralization
- Establish surficial geochemical characteristics of mineralization under cover



Schematic section through the Sudbury Igneous Complex and footwall showing mineralization types

Characterization will consider variations in mineralized environments, in mineralization tenor, and the spatial/temporal relationship to other types of footwall

and contact Ni-Cu-PGE mineralization. Emphasis will be on the identification of characteristics that show measurable spatial variations within, and with proximity to, low sulfide, PGE-rich mineralized zones. The data will be used to develop an integrated geological, geochemical and geophysical 3-D exploration model and will include:

- bedrock and surficial maps and reports
- geochemical, mineral chemical and geochronological data
- physical property data for mineralized, non-mineralized and altered samples
- the orientation and timing of structures and litho-facies controlling mineralization
- ore associated alteration assemblages and constraints on fluid chemistry
- the effects of subsequent orogenic events on mineralization
- geochemical and heavy mineral characteristics of till associated with buried mineralization
- structural and lithological characterization model for targeting mineralization**,**
- geochemical and heavy mineral characteristics in till to vector to buried near mineralization

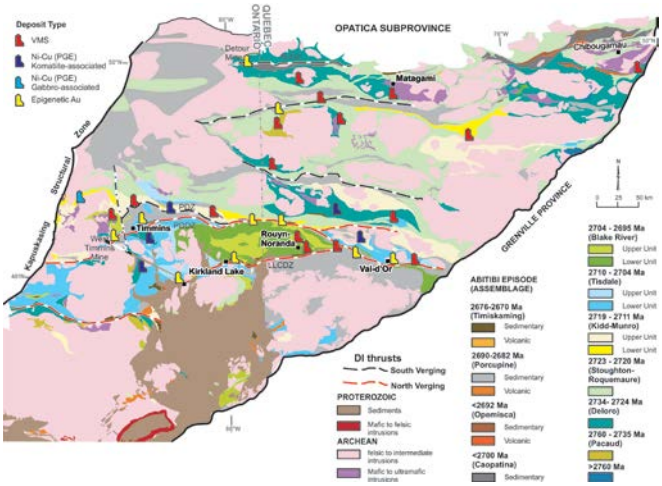
2) Abitibi Lode Gold Research

Three new graduate thesis projects were initiated in 2014 designed to improve understanding of, and the exploration criteria for, Abitibi lode gold deposits. These include: an MSc study at the Detour Mine in the northern Abitibi and two projects in collaboration with the Ontario Geological Survey; an MSc study focused on the Renabie Mine on the northeastern margin of Michipicoten greenstone belt, and a PhD study focused on gold metallogeny of the Swayze greenstone belt.

We will expand research on Abitibi gold deposits in 2015 through application to the Natural Sciences and Engineering Research Council, Collaborative Research and Development Grants program to match funding for ongoing projects at the Côté Gold deposit by Iamgold Corp. and by Detour Mines Ltd. In addition, Primero Ltd. and St Andrews Ltd. will provide funding for a new research project starting this year on the Grey Fox and 147 zones in the Matheson area. The matched funds will be used to expand the Abitibi Thematic Gold project with new research topics and sites chosen in collaboration with the sponsoring companies.

The primary goal of the thematic initiative is to aid exploration by developing new geochemical techniques to fingerprint gold deposit types from across the Abitibi integrating a variety of methods including:

- Lithogeochemistry of alteration zones as a basis for mass balance and geochemical characterization of the altering fluids
- Defining the mineralogy and mineral chemistry of alteration integrated with lithogeochemistry to identify the mineralogical origin of elemental signatures
- Characterization of sulfide textures related to barren versus mineralized zones
- Chemical characterization of sulfides with both point analysis and elemental mapping to fingerprint systems
- Chemical characterization of fluid inclusions to directly fingerprint different fluid generations.



Abitibi Subprovince Stratigraphy and Mine Locations

3) Åkulla Gold-Telurium Deposit, Sweden

The goal of this new project will be to develop an Exploration Model for a new low sulfide Au-Te deposit type.The project will be sponsored by Boliden in collaboration with the University of Stockholm and Lulea University, with a PhD project starting this summer.

Student Sponsorship Opportunity

The Laurentian University Student Economic Geology Chapter (SEG) is planning a 14-day fieldtrip to South Africa in April 2015. During this trip, they will visit diverse geological environments which will include active mines and key geological sites. Corporations or individuals willing to help with funding of this learning initiative should contact CX_Legrand@laurentian.ca.

MERC Members

Foundation Members

Ontario Geological Survey, Ontario Ministry of Northern Development and Mines

Université Laurentienne Laurentian University

GOODMAN ÉCOLE DES MINES SCHOOL OF MINES

Teck Resources Ltd.

Tier 1 Members

Detour Gold Corp.

Gold Fields Exploration Inc.

Ivanhoe Mines Ltd.

KGHM International

Tier 2 Members

Cliffs Natural Resources Inc.

Northern Superior Resources Inc.

Sudbury Integrated Nickel Operations
A Glencore Company

Wallbridge Mining Co. Ltd.