

## Metal Earth Research Opportunities (Summer 2020)

With CAD \$104 million in funding provided by the Canada First Research Excellence Fund (CFREF) and through strategic partnerships with 5 Canadian universities, 6 government geological surveys and 3 international research centres, the Mineral Exploration Research Centre (MERC) at Laurentian University has initiated Metal Earth - the largest ever mineral exploration research project undertaken in Canada. Metal Earth seeks to identify and understand the processes responsible for Earth's differential metal endowment during the Precambrian. This research initiative aims to transform our understanding of Earth's early evolution and how we explore for metals.

### Project ID 2020-03 **Westward extension of Larder Lake Cadillac Deformation Zone (LLCDZ) and the Porcupine Destor Deformation Zone (PDDZ) across the Kapuskasing uplift**

**Project Details:** The goal of the project is to determine the expression and the extent of major crustal breaks across different rock types and metamorphic facies, and to identify processes controlling the distribution of orogenic gold systems at the subprovince scale. These goals will be achieved through: (1) GIS compilation and airborne magnetic data interpretation, (2) Structural kinematic analysis, (3) Geochemistry and geochronology of intrusions/sedimentary successions, (5) Petrography of hydrothermal alteration and mineralization. Two complementary studies will trace the extent LLCDZ and PDDZ west of the Kenogamissi batholith, in the Swayze greenstone belt, across the Kapuskasing uplift, and in the Wawa terrane, characterize these deformation zones and associated sedimentary basins in the Wawa terrane and Swayze greenstone belt, and provide the required knowledge base for correlation with the well-studied LLCDZ and PDDZ of the Abitibi greenstone belt.

**Required:** Two field-based *Postdoctoral positions* in structural geology, economic geology, geochronology at Laurentian University, Sudbury, Ontario

### Project ID 2020-04 **Lithogeochemical characteristics of endowed vs unendowed greestone belts & Gold endowment of volcanic rocks**

**Project Details:** Through analysis of new and existing lithogeochemical data, the postdoctoral fellow will examine the data by volcanic assemblage and determine what igneous processes can be inferred in each assemblage and how this relates to the evolution of the greenstone belt. The project will utilize existing lithogeochemical data from the Metal Earth transect data and government and industry datasets to establish a representative dataset for each volcanic assemblage in the southern Abitibi and western Wabigoon subprovinces. Selective fieldwork will fill data gaps and update areas with modern lithogeochemistry where necessary.

**Required:** One *Postdoctoral position* in geochemistry at Laurentian University, Sudbury, Ontario

**Project ID: 2020-05      The Gold Fluid Window**

**Project Details:**

The proposed “Gold Fluid Window” thematic project aims to further constrain controls on orogenic gold metallogenesis across known endowed, less endowed and barren areas, from the craton-wide to the deposit scale. Gold enrichment in orogenic gold deposits is a function of several parameters: fertile reservoirs for metals, volatiles and water, a high fluid flux of metal-rich fluids, and efficient precipitation mechanisms in physical and/or chemical sinks. The proposed project will investigate specific Superior deposits, transects, districts and subprovinces as a complete “source-to-sink” system, providing unprecedented insight at deposit- to craton-scale fluid generation and circulation during one of the most important metallogenic periods in the history of the Earth. The main objectives are to constrain the volume, chemistry and timing of release of fluids involved in orogenic gold-style mineralization of endowed, less endowed and barren systems, as well as that of fluids, gold and sulfur released by important potential source rocks at the time of mineralization.

**Required:**

One **Postdoctoral position** in the fields of stable isotope geochemistry, metamorphic petrology, geochronology at Laurentian University, Sudbury Ontario

**Project ID: 2020-06      Testing the diapirism-sagduction vertical tectonic model**

**Project Details:**

The project proposes to address the emplacement mechanisms of batholiths in Archean greenstone belts. The main questions are: (1) Were batholiths emplaced as near-horizontal tabular sheet intrusions or laccoliths that were deformed during subprovince accretion?; (2) Were they emplaced as diapirs during sagduction of the denser greenstones and partial convective overturn of the crust? Or were they emplaced during regional extension, exhumation and gravitational collapse of greenstone belts?; (3) Are there differences in batholith emplacement mechanisms in Mesoarchean and Neoproterozoic greenstone belts?; and (4) If present, do these changes reflect parallel changes in the geodynamic evolution of these greenstone belts? To address these questions, detailed structural, petrological, and geophysical studies will be done on batholiths in the Wabigoon and Abitibi subprovinces of the Archean Superior Province.

**Required:**

Two field-based **PhD projects** in structural geology, igneous petrology, geochemistry, geochronology at Laurentian University, Sudbury, Ontario

**Project ID: 2020-07      Mineral Exploration Footprints of Crustal-Scale Deformation Zones in Neoproterozoic Greenstone Belts**

**Project Details:**

Orogenic gold deposits in Precambrian to Phanerozoic belts (e.g., Abitibi, >150 Moz Au, Ashanti, >200 Moz Au) are typically spatially associated with crustal-scale deformation zones. However, their frequency, grade and tonnage vary considerably between deformation zones. For example, the Larder Lake Cadillac Deformation Zone (LLCDZ) contrasts with the Wabigoon Deformation Zone (WDZ) or Mosher Bay Washeibemaga Deformation Zone (MBWDZ), in the western Wabigoon. The research approach will build upon the successes of the NSERC-CMIC Mineral Exploration Footprints program. From 2013 to 2018, this program developed a comprehensive model of the metasomatic halo of the world-class Canadian Malartic gold deposit (>18.6 Moz). A similar strategy will be applied to orogenic gold deposit vectoring in major deformation zones. Four different map areas across major breaks will be considered: two in the Abitibi subprovince, two in the Wabigoon subprovince.



Required: One **PhD project** in structural geology, lithogeochemistry, mineral chemistry at Laurentian University, Sudbury, Ontario

**Application Process:**

To apply, please forward your application and cover letter to [metalearth@laurentian.ca](mailto:metalearth@laurentian.ca) and reference the Job Identification Number and position assigned to the specific project you are applying. The application should include: a CV including a list of publications, academic transcripts, contact details and the names of three referees. Review of applications will begin immediately and will be accepted until March 31, 2020.

Metal Earth MSc projects are fully funded for two years and PhD projects are fully funded for four years with \$30K/year, which includes a Laurentian Graduate Assistantship.

PDF's will be provided a salary commensurate with experience and a competitive benefits package.

All analytical and field costs are covered as part of these projects.

*Laurentian University is a bilingual (French-English), tri-cultural institution. Laurentian University especially welcomes and encourages applications from members of visible minorities, women, Aboriginal persons, members of sexual minorities and persons with disabilities. Applicants may self-identify as a member of an employment equity group. All qualified candidates are encouraged to apply. However, Canadians and permanent residents will be considered first for these positions.*