

Metallogeny of the Upper Beaver Cu-Au deposit

We are seeking highly motivated candidates to carry a series of integrated PhD and MSc projects to understand the formation of the Upper Beaver Cu-Au deposit (Larder Lake, Ontario). This Cu-Au deposit in the Abitibi subprovince displays unusual mineralogical (e.g., chalcopyrite-magnetite) and structural (veins and breccias) hosted in a strongly altered intrusive complex. Thus, understanding the genesis of the Upper Beaver Au-Cu deposit and using the controls for its localisation and formation to predictive targeting in the Archean terranes of the Superior Province will generate new opportunities for exploration by industry.

The PhD and MSc candidates will integrate a research program carried by a team of researchers from Université Laval (*Profs. G. Beaudoin, C. Dupuis, C. Guilmette, C. LaFlamme, B. Rottier*), Laurentian University (*Profs D. Kontak, B. Lafrance, R. Sherlock, R. Smith*) and Agnico-Eagle Mines (*Drs O. Coté-Mantha, O. Grondin, M. Simard*). The PhD and MSc candidates will work in close cooperation with the Agnico Eagle Mines exploration team at the Upper Beaver deposit.

PhD #1: Regional magmatic and tectonic evolution

The PhD candidate will investigate the regional magmatic and tectonic evolution of the Upper Beaver deposit area, with particular emphasis on the origin of the Upper Beaver intrusive suite origin, its magmatic evolution, and its geochronology. The study will apply a suite of advanced methods including lithogeochemistry, radiogenic isotopes, melt inclusions and in situ mineral chemical and isotope composition (e.g., zircon, apatite).

PhD #2: Source of fluids and metals at the Upper Beaver deposit

The PhD candidate will characterize the PTX conditions and constrain the origin of the mineralizing fluids using isotopic tracers (H, C, O, S), and date mineralizing events using gold-associated hydrothermal minerals (monazite, xenotime, rutile, molybdenite). This will enable identification of the source reservoirs of metals, fluids, and sulfur, and the fluid pathways and traps for Au-Cu mineralization.

MSc #1: Structure and breccias in the shallow portion of the Upper Beaver deposit

The MSc candidate will document the structural characteristics of breccias at the Upper Beaver deposit, their geometrical and rheological controls on the Cu-Au mineralization, and their relative timing with respect to hydrothermal alteration and regional deformation events.



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MSc #2: 3D distribution of mineralization assemblages at the Upper Beaver deposit

The MSc candidate will define the paragenetic sequence of events and its 3D distribution. The distribution of the mineral assemblages of various styles of mineralization and alteration will help to understand the evolution of the mineralizing system. Mineral chemistry of major and trace elements of sulfides and gold will provide information critical to understand the deportment of metals.

MSc #3: Petrophysical properties of the Upper Beaver deposits

The MSc candidate will use borehole logging equipment to acquire in-situ physical properties to help refine the geophysical models for the deposit. This dataset will be used to provide a first-order assessment of the lithologies based on the physical properties in order to explore at depth for the unusual Au-Cu mineralization of the Upper Beaver deposit.

The PhD projects are supported with research scholarships of 25 000\$ per year for up to 4 years. The MSc projects are supported with a research scholarship of 21 000\$ per year for 2 years. The PhD and MSc candidates will be enrolled at the university of their primary supervisor, with co-supervision by a team member of the other university. The candidates will be encouraged to conduct original research and to present it in national and international conferences.

Submit your cv, transcript and motivation letter, **BEFORE June 8 2020**, to:

NSERC-Agnico Eagle Industrial Research Chair in Mineral Exploration

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