

## **MSc Earth Sciences opportunity at Carleton University, Ottawa, ON, Canada**

*Characterizing pyrite in gold-bearing paleoplacers of the Huronian Supergroup, Cobalt Basin, Ontario*

Applications are sought for a Master of Science study in the department of Earth Sciences of Carleton University. The successful applicant will receive Carleton graduate student support (stipend + possible departmental scholarship based on GPA), a student teaching assistantship and a ca. \$17,000/yr. bursary from the Geological Survey of Canada (GSC). The expected start date for the project is January 2022; however, an earlier start date of September 2021 is possible.

### Qualifications

The successful candidate will have a BSc. in Earth Sciences, preferably with research experience, and a minimum B+ (9.5 GPA) average. An interest in Precambrian Earth history along with experience using *in-situ* analytical techniques such as LA-ICP-MS (laser ablation inductively coupled mass-spectrometry), SEM (scanning electron microscopy) and/or EPMA (electron probe microanalysis) is considered an asset.

### Project Description & Goals

Economic concentrations of placer gold have been discovered recently in fluvial conglomeratic rocks of the early Paleoproterozoic Huronian Supergroup, northeast of Sudbury, Ontario (Inventus Mining, Pardo project). These ancient placer deposits are the first of their type in Canada, hence understanding their depositional setting, genesis and possible broader occurrence presents an important exploration opportunity for Canada's mining industry. Gold potential, in the lower part of the Huronian Supergroup, is indicated by the presence of detrital pyrite, derived from a Au-enriched Archean hinterland. The provenance of pyrite, detrital gold and other heavy minerals needs to be established to answer the question as to whether the gold is locally or distally derived. Potential sources include the underlying and adjacent Temagami greenstone belt, or a more distal source, like the well-known gold deposits and pyrite-bearing metasedimentary rocks of the Abitibi Sub-Province. A parallel study seeks to investigate the depositional setting and stratigraphic architecture of these deposits to better understand the mechanisms of original gold endowment and determine if any recognizable facies are more favourable for gold exploration.

### Approach/Methodology

The MSc. project will focus on the provenance and significance of detrital, diagenetic and/or hydrothermal pyrite in relation to gold endowment. Sophisticated petrographic imaging (SEM-EDS-BSE) will be employed to identify different pyrite types for subsequent trace element and isotopic fingerprinting (e.g. *in situ* Pb and S isotopes to trace gold remobilization and Re-Os geochemistry/dating to determine the genesis/age of pyritization). These data can then be compared with similar data from the potential source regions. The project can also employ tools recently developed at the GSC for assessing gold diffusion using trace element and electron backscatter diffraction (EBSD) mapping. Pyrite fingerprinting studies will be conducted in parallel with detrital zircon U-Pb geochronology provenance



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analysis and detailed sedimentological (e.g. paleocurrent analysis), and petrographic studies to elucidate the approximate source region for these deposits. Ultimately the study will make comparisons with the world-class Witwatersrand deposits to assess genetic similarities and inform the ongoing discussion on the detrital versus hydrothermal origin for paleoplacer gold enrichment.

#### How to Apply

Interested applicants should send a CV, unofficial transcript, a statement of research interests, along with the names and contact information of two referees to Dr. Robert Rainbird ([rob.rainbird@canada.ca](mailto:rob.rainbird@canada.ca)), senior research scientist at the Geological Survey of Canada (Ottawa) and Adjunct Professor in the Dept. of Earth Sciences at Carleton University.