

Petrographic and chemical analysis of metasedimentary rocks and iron formations to investigate gold mineralization in the New Quebec orogen, Canada

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The Labrador Trough is an early Proterozoic fold and thrust belt system that extends from Schefferville to the Kuujuaq area of northern Quebec. It is part of the New Quebec orogen and represents the foreland of this Paleoproterozoic orogenic belt. The Labrador Trough (or Kaniapiskau Supergroup) consists primarily of metasedimentary rocks. It has been heavily deformed, and preserves tight fold structures that exhibit a range of dilatant structures that are suitable for hydrothermal gold deposition. This project addresses the possible sources for gold in the Labrador Trough, and will relate mineralization styles to the structural evolution of the area. Quantitative contents of gold and other metals in the metasedimentary rocks and iron formations will be determined through a series of analytical methods. The goal is to assess the potential of these units as sources or hosts for gold and other precious metals. This analysis will be based on whole rock geochemical analysis using Instrumental Neutron Activation Analysis (INAA). Mineral and textural data from both microscopy and micro X-Ray Fluorescence (μ -XRF) will include sulphide maps and mosaics that will add data regarding the spatial distribution of metals to the mineralogical data. The Scanning Electron Microscope (SEM) analyses will be used for identifying micro-textures and inclusions within the sulphide minerals. At present, geochemical analysis, μ -XRF mapping and SEM analysis are in progress. Detailed microscopy determined that gold is present in varying abundances in samples of greenschist-facies metasedimentary rocks, siliceous-carbonate iron formations, and greenstone-hosted carbonate vein systems. Polished thin section examination of the metasedimentary samples showed a variability in concentrations of pyrite (4–7%), galena (up to 5%), sphalerite (2–3%), arsenopyrite (up to 10%) and gold (<2%). Gold found in the metasedimentary samples was typically replacing, or in contact with, arsenopyrite grains near carbonate vein structures. The iron formation samples had an abundance of sulphides present; however less gold was found, due to either a lower concentration within the sample and/or gold grains not being visible using microscopy methods. Further work will include completion of Laser Ablation Ion Coupled Plasma Mass Spectrometry (LA-ICP-MS) analysis to determine quantitative precious metals and trace element abundances. It is anticipated that this research will be of interest to exploration companies operating in the area because while the occurrence of gold has been documented in the Kuujuaq area, there has been little work completed on the sources and sinks for metals in the region.