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Western Inter-University Geosciences Conference Abstract

Volcanic, sedimentary, and deformation history of Winter Lake greenstone belt, Slave craton, Northwest Territories: preliminary results from the 2019 field season

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The Archean Winter Lake greenstone belt (WGB) in the Slave craton, located ~250 km northeast of Yellowknife in the Northwest Territories, has been underexplored relative to other supracrustal belts in the Slave craton, but shows potential for base-metal mineralization. It consists of lower greenschist to upper amphibolite grade mafic to felsic volcanic rocks and sedimentary rocks that are surrounded by ca. 3.3 to 2.9 Ga granitoids of the Central Slave Basement Complex (CSBC). The overall objective of this study is to better understand the origin and geodynamic evolution of the WGB and to evaluate its economic potential. The project will examine the tectonic setting of volcanic and sedimentary rocks of the WGB and their relationships to the CSBC granitoids.

In 2019, three weeks were spent bedrock mapping near Newbigging Lake and one week near Big Bear Lake (at 1:5,000 and 1:10,000 scales, respectively) to generate a lithostratigraphic scheme for the southern WGB. This mapping evaluated the nature of contacts, previously interpreted as unconformities, between the CSBC, the ca. 2734-2924 Ma Central Slave Cover Group (CSCG) volcanic and sedimentary rocks, and post-volcanic sedimentary and granitoid rocks (Hrabi et al., 1995). Mapping near Big Bear Lake also allowed the examination of a previously mapped ~ 1.3-1.7 km wide rhyolite interpreted to be part of the ca. 3.3 Ga Newbigging Formation (Hrabi et al., 1995). Based on field observations, the formation does not include a rhyolite *sensu stricto* but rather a succession of weathered mafic to intermediate volcanic and intrusive rocks. This field season, the first of three, also led to the discovery of several semi-massive to massive sulfide showings within the mafic volcanic sequence, and the identification of sulfides (interpreted as remobilised) and multiple younging indicators within the younger conglomerate unit that are necessary for our lithostratigraphy study.

Future U-Pb geochronological analysis of detrital zircon and Sm-Nd isotope geochemistry of metasedimentary rocks will enable us to determine their sources and age. Together with absolute timing of thermotectonic events, an Archean oceanic and continental crust geodynamic evolution model will be produced. An additional goal of this study is to identify the ore-forming environment for the sulfide mineralization and to generate an ore-deposit model for the mineralisation observed in the WGB.

References:

Hrabi, H.B., Nelson, M.D., and Helmstaedt, H., 1995: Diverse metavolcanic sequences and late polymictic conglomerate-associated metasedimentary rocks in the Winter Lake supracrustal belt, Slave Province, Northwest Territories; in Current research 1995-E; Geological Survey of Canada, p. 137-148.

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