

## The Detrital, Geochemical and Metamorphic History of the Sedimentary Rocks in the Eastern Part of the North Caribou Greenstone Belt

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This study characterizes the sedimentary rocks in the eastern portion of the North Caribou Greenstone Belt, which hosts the Musselwhite Au deposit. The center of the belt is comprised of siliciclastic rocks of the Eyapamikama Lake Assemblage (ELS) and Zeemal Heaton Lake Assemblage (ZHL). The ZHL is close to the terrane boundary with the Island Lake Domain and the Totogon shear zone. Quartz-rich wackes of the ZHL contain detrital zircon grains of igneous origin (Th/U ~ 0.6). They display fine oscillatory zoning, a wide range of morphologies and contain three age populations; 2698-2750, 2844-2903 and 2970-2985 Ma. These rocks show elevated MgO (>1%), Ni (>104 ppm), Cr (>180 ppm) and low REE (>88 ppm) and a relatively undifferentiated signature (Th/Sc: 0.67-0.83, [Ce]<sub>N</sub>/[Yb]<sub>N</sub>: 8.1-19, Cr/Zr: 1.3-2.1). They display  $\epsilon$ Nd (2.7 Ga) of -0.97 to +0.50 and DM model ages of ~2.88 Ga. These values indicate a provenance of surrounding batholiths as well as mafic and 2.7 Ga igneous rocks. These sediments contain  $X_{sp}$  (0.246-0.414) and  $X_{alm}$  (0.378-0.548) garnet indicating prograding metamorphism at peak lower amphibolite facies.

The arkosic sediments in the central portion of the belt show one age population of detrital zircon between 2800-2850 Ma. Zircons display similar morphology and lower Th/U (~0.44). Bulk rocks contain low ferromagnesian elements (Mg <1%; Ni: 17-24 ppm, Cr: 9-50ppm), relatively high REE (104-166 ppm) and an evolved signature (Th/Sc: 0.8-2.1, [Ce]<sub>N</sub>/[Yb]<sub>N</sub>: 14-21, Cr/Zr: 0.07-0.27). They show  $\epsilon$ Nd (2.85Ga) of -0.14 to +0.77 and DM model ages of 2.92-2.95 Ga, suggesting a provenance primarily derived from the surrounding batholiths. These amphibolite facies sediments show varied compositional zoning ( $X_{grs}$  0.136-0.196,  $X_{alm}$  0.606-0.678,  $X_{pyr}$  0.038-0.053) displaying a protracted history of metamorphism.