A Geochemical Provenance Study of Timiskaming-Type Sedimentary Rocks of the North Caribou Greenstone Belt

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Abstract

The North Caribou Greenstone Belt (NCGB) is located in the North Caribou Terrane, which is considered to be the nucleus of the Western Superior Province. The NCGB is also host to the Musselwhite orogenic Au deposit. The central part of the belt is comprised of siliciclastic sedimentary rocks of the Eyapamikama Lake Assemblage, which includes the Heaton Lake metasedimentary assemblage. Relatively young (<2680 Ga) sedimentary rocks were discovered by Jason Duff et al (2013) along the northeastern margin of the NCGB. Eight sediment samples have been identified as arkosic sandstone and wacke, which shows minor recrystallization of quartz/feldspar and deformation parallel to the margin of the belt. The location of these sediments, relative to the deformation zone is similar to that of the Timiskaming-type rocks in other greenstone belts. These immature, unmetamorphosed sediments show elevated MgO (>1%), Ni (27.5-104 ppm), Cr (42-180 ppm) and low REE (48-88 ppm in total) and a relatively undifferentiated source (Th/Sc: 0.67-0.83, $[Ce]_N/[Yb]_N$: 8.1-19, Cr/Zr: 1.3-2.1, $[Eu]_N/[Eu^*]_N$: 0.88-1.1). Based on this geochemical data, the mafic igneous rocks appear to be a significant contributor, along with granitoid and felsic volcanics These relatively young sediments (~ 2680 Ma; Duff et al., 2013) have been compared to six newly sampled arkosic sandstones which occur along the Markhop Lake deformation zone which runs from the northeastern margin of the NCGB to the centre of the belt. These sedimentary rocks are metamorphosed under lower greenschist facies and are commonly carbonatized with calcite, contain low ferromagnesian elements (Mg <1%; Ni: 17-24 ppm, Cr: 9-50ppm), relatively high REE (104-166 ppm in total) and geochemical signatures of slightly evolved source (Th/Sc: 0.8-2.1, $[Ce]_N/[Yb]_N$: 14-21, Cr/Zr: 0.07-0.27, $[Eu]_N/[Eu^*]_N$: 0.63-1.1). The data suggests they sourced mostly from grantic and felsic volcanic rocks.