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External Granitoids of the Mesoarchean North Caribou Terrane

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The North Caribou Terrane (NCT), located in northwestern Ontario and eastern Manitoba, is in the core of the Archean Superior Province. Like many Archean terranes, the North Caribou is characterized by central greenstone belts of strongly deformed metavolcanics and metasediments surrounded by variably deformed granitoids. The focus of this study is the granitoids surrounding the North Caribou greenstone belt in the NCT. The plutonic suite exhibits diverse compositions from hornblende tonalite to garnetiferous two-mica granites. Previous geochronology from the region suggests a prolonged history of magmatic activity associated with 2.7 Ga tectonism, with U-Pb and Sm-Nd ages ranging from 2.86 Ga to 2.69 Ga plutons and 3.98 Ga zircon in the volcanic rocks of the greenstone belt (Klipfel 2001, Wyman et al. 2010). Epidote and quartz veins are indicative of post-magmatic metasomatism, which may be related to deformation evidenced by undulose extinction and bulging in quartz and alignment of biotite and hornblende. Broadly, there are two distinct groups of granitoids: large tonalite, trondhjemite, granodiorite (TTG) batholiths and younger, localized more evolved pegmatitic to aplitic K-feldspar-rich granites. Migmatitic fabrics in parts of the batholiths confirm that the TTG batholiths were reheated post-crystallization, and indicate that partial-melting of older batholiths could be a source for the younger granites. Al-in-hornblende barometry from several batholiths spanning granitic, granodioritic and tonalitic compositions indicated that they were emplaced at different depths, with pressures of 4 kbar (13 km) to the southeast (tonalite) and 7 kbar (20 km, granodiorite) to the north of the belt. This range of emplacement depths suggests that these rocks were either intruded during various phases of the orogenic cycle or at distinctly different times, both of which are consistent with the reported range of U-Pb ages. Continued U-Pb dating of zircon and titanite from these locations will further constrain the evolution of the magmatic activity through time.