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Early Archean granitoid gneisses and supracrustal enclaves of the southern Inukjuak domain, Québec (Canada)

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The Inukjuak domain in northern Québec is part of the Archean Minto Block in the northwestern Superior Province of Canada, and hosts numerous km-scale supracrustal enclaves within variably-deformed granitoid gneisses. The Eoarchean (ca. 3750-3780 Ma) Nuvvuagittuq supracrustal belt (NSB) is the best known of approximately ten variably metamorphosed and deformed volcano-sedimentary (supracrustal) enclaves in the region. In general, the supracrustals that comprise the Innucsuac Complex are dominantly amphibolitic, and are surrounded and intruded by several generations of tonalitic-trondhjemite-granodiorite (TTG) gneisses. Few detailed geochronology studies for the assorted Inukjuak domain gneisses and the associated enclaves have been performed, beyond the Nuvvuagittuq locality. A tonalitic gneiss at the margin of the NSB fold belt was previously assigned a ca. 3650 Ma age, and granitoid gneisses of the surrounding Boizard suite were considered to have formed at about 2700 Ma. We report new major-, minor-, and trace-element geochemistry coupled with U-Pb zircon geochronological data for these gneisses as well as from the little-studied, but volumetrically significant Voizel suite gneisses. Results show that tonalitic gneisses at the center of the NSB fold belt (Central Tonalitic Gneiss; CTG) preserve mainly ca. 3650 Ma zircons. Outside the NSB, previously undated Voizel suite rocks – considered contemporaneous with the CTG – are instead about 100 Myr younger (3550 Ma). The Boizard suite also contains inherited zircon cores up to ca. 3700 Ma with ca. 2700 Ma overgrowths. A tonalitic gneiss that transects a highly deformed supracrustal belt dubbed the Ukaliq Supracrustal Belt (USB), northeast of the NSB and within the Voizel gneisses, yielded maximum concordant zircon ages of 3653 ± 8 Ma (1σ). Therefore, the USB has a minimum age of ca. 3770, and is thus contemporaneous with the NSB. Another granitoid gneiss west of the NSB fold belt yielded zircons with ages of ca. 3760 Ma. The discovery of pre-3.7 Ga rocks beyond Nuvvuagittuq calls attention to the widespread occurrence of hitherto undocumented Eoarchean rocks in the southern Inukjuak domain.