THE DIVERSE ORIGINS OF CRATONIC NUCLEI—A PERSPECTIVE FROM THE SLAVE CRATON

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The Slave craton, located in the northwestern portion of the Canadian Shield, contains the oldest zircon-dated remnant of evolved crustal rocks on Earth along with extensive suites of basement gneisses with crystallization ages that span almost the entire Archean Eon. Portions of these basement gneisses form the Central Slave Basement Complex (CSBC), a belt of outcrops some 200 km-long that records magmatic/metamorphic events occurring approximately every 100–150 million years from 3.5–2.7 Ga. When considered with the 4.02 Ga Acasta Gneiss Complex, the good exposure and wide age range of basement gneisses of the Slave craton provide a unique record of the geological processes involved in early continent formation.

New whole-rock geochemistry and laser-ablation split stream U-Pb-Hf data on zircons extracted from intermediate to felsic composition rocks of the CSBC permit us to assess the relative roles of crustal reworking versus juvenile crustal addition. The main belt of the CSBC has an age range from 3.3 Ga to 2.85 Ga. CSBC rock compositions are broadly similar to Archean tonalite-trondhjemite-granodiorite suites globally. The CSBC rocks have a significantly different geochemical signature from the youngest suite of Acasta Gneiss Complex (AGC) granitoids. Additionally, rocks from the CSBC have initial Hf-isotope compositions that are consistent with derivation from a juvenile or chondritic source reservoir, while 3.3—2.9 Ga rocks from the Acasta Gneiss Complex have much more negative εHf values. Combined, these data suggest that the CSBC has a distinct history from the AGC. Crustal growth in the CSBC portion of the Slave craton was driven by juvenile additions more than by the reworking of ancient crust, as is apparent for the AGC. The distinct evolution of these two ancient building blocks of the Slave craton highlights the complex and often disparate evolution of cratonic nuclei prior to their amalgamation and stabilisation.