

# The Muzidian Gneiss Complex: Long-lived Hadean Crustal Components in an Archean Continent

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The nature of Earth's earliest crust is still poorly known because of the limited exposures of > 3.7 Ga magmatic record. The oldest known rocks are only found in small areas of Archean cratons, such as the Acasta Gneiss Complex. Here we report the identification of a new Eoarchean terrane in the northern edge of the Yangtze craton of central China where rocks older than 3.8 Ga are exposed. We name this terrane the Muzidian Gneiss Complex (MGC).

The source of felsic rocks in the MGC was explored using zircon U-Pb dating, and combined zircon Hf and whole-rock <sup>142</sup>Nd isotopic compositions. The ~ 3.8 Ga tonalite samples yielded eHf(t) values around -3 and negative m<sup>142</sup>Nd values of ~ -7, which collectively suggests reworking from a >4.3 Ga incompatible element enriched source, likely Hadean mafic crust. In comparison to the zircon Hf and whole-rock <sup>142</sup>Nd isotopic compositions of global Eoarchean rock records, the data suggest two distinct lineages for the Eoarchean cratons, one type reworked from Hadean mafic crust with the isotopic signature of coupled negative eHf(t) and m<sup>142</sup>Nd, and the other type by melting of mantle sources depleted by the early extraction of Hadean mafic crust from a chondritic primitive mantle characterized by positive m<sup>142</sup>Nd and near chondritic to slightly positive eHf(t) values. The Eoarchean rocks in the newly identified MGC are isotopically similar to those of the Acasta Gneiss Complex, which combined implies a Hadean crustal source that may not be directly linked to the products of magma ocean crystallization.