# Geochronology and geochemistry of Late Archaean granites from the Narryer Terrane, Yilgarn Craton

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The transition from the Archaean to the Proterozoic Eon is marked by the amalgamation of Archaean cratons from continental nuclei and the stabilisation of Earth's lithosphere. This global event is associated with a widespread pulse of granitic magmatism during the Neoarchaean (ca. 3000 – 2500 Ma) and represents a fundamental stage in the evolution of the planetary system. However, it is undetermined how Archaean lithosphere was cratonised, what tectonic setting was associated with magmatism, or the identity of the sources that generated widespread potassic granites.

The Narryer Terrane of the Archaean Yilgarn Craton in Western Australia preserves a distinctive assemblage of Eoarchaean-Neoarchaean lithotypes exposed at mid-lower crustal levels. Here, Late Archaean granitic rocks comprise a wide compositional gamut, ranging from tonalite to leucogranite, in contrast to the wide-spread minimum melt monzogranites that are exposed at upper crustal levels in the eastern Yilgarn and other Archaean cratons. Furthermore, the Narryer Terrane's mid-lower crustal exposure places these granites closer to the magma source, aiding efforts to understand their petrogenesis.

We report zircon U-Pb ages and whole-rock geochemistry of Neoarchaean granites from a regional traverse of the Narryer Terrane and Murchison Domain of the Northwestern Yilgarn Craton. We identify three discrete magmatic events at ca. 2740 Ma, 2680 Ma, and between 2655 – 2619 Ma, reflecting cratonisation and stabilisation of the crustal lithosphere. Mantle-derived magmas, and addition of new crust, are associated with terrane wide magmatic events after ca. 2740 Ma. Late Archaean granites exhibit high $K_2O$-$SiO_2$-$Al_2O_3$-$FeO_t$ and low CaO-$Na_2O$-MgO compositions relative to other Neoarchaean granites in the Yilgarn Craton, interpreted as evidence for distinctive lower-crustal sources and magmatic evolution.