TIMING OF TERRANE ACCRETION, OROGENY AND GOLD IN THE LATE ARCHEAN KALGOORLIE TERRANE

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The Kalgoorlie Terrane is one of the most intensely mineralised Late Archaean (2.8 to 2.6 Ga) granite-greenstone terranes. It contains several world-class lode gold deposits that although dated at 2640 to 2630 Ma are similar in style to Phanerozoic gold deposits that form in convergent-margin orogens. Phanerozoic orogenic gold deposits are derived from metamorphic (± magmatic) fluids generated either by plate subduction below or terrane collision onto continental crust. They represent focused fluid-flow that is an inherent consequence of terrane accretion and orogenesis. Although Barley et al. (1989) considered that gold mineralisation in the Kalgoorlie Terrane was related to convergent-margin orogenic processes, most subsequent tectonic syntheses indicate that gold mineralisation followed a 50 million year period of magmatism, metamorphism and deformation with little evidence for orogeny at the time of mineralisation. However, combination of the results of a recent tectonostratigraphic study and new dating from gold deposits links basin evolution in the Kalgoorlie Terrane to magmatism, terrane accretion, orogeny and gold mineralisation. Rather than spanning 50 million years, there is mounting evidence that the main period of regional deformation and metamorphism (orogeny) followed terrane accretion, with peak metamorphism at <2650 and >2630 Ma linked directly to gold mineralisation.