

Gold mineralisation and tectonomagmatic evolution of the Yalgoo-Singleton Greenstone Belt, Western Australia

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Project description

The Murchison Province in the Archaean Yilgarn Craton is comprised of greenstone belts surrounded by several generations of granitoid intrusions. The 190 km-long Yalgoo-Singleton greenstone belt (YSGB), extends in a NNW direction from Mount Gibson in the south, to north of Yalgootown (Fig. 1) and hosts significant gold deposits. The project partner, Minjar Gold, owns the mineral rights to much of the belt, which can be divided into a lower ~10 km thick, 3.0 Ga Group (Luke Creek) and an overlying ~5 km thick, 2.8 Ga Group (Mount Farmer) (Watkins & Hickman, 1990). Both successions contain mostly mafic volcanic and intrusive rocks, with minor ultramafic and felsic rocks and the belt is characterised by heterogeneous deformation, with narrow high-strain zones separating more weakly deformed zones.

The YSGB hosts world-class Volcanogenic Massive Sulphide (VMS) deposits, including the Cu-Pb-Zn-Ag-Au Golden Grove mine. The belt also contains extensive gold mineralisation, thought to post-date the VMS mineralising event. The Minjar Project tenements, which host 1.1 million ounces of gold resource, cover ~70% of the YSGB. The source(s) and timing of the mineralising fluids are still poorly understood in the YSGB and initial SEM-work indicates multiple overprinting mineralisation events.

Using detailed structural mapping, along with petrography, SEM, XRD, ICP-MS and fluid inclusion work, the project will study the paragenesis of the various mineral assemblages associated with Au mineralisation and will assess the composition and origin (deep vs. shallow) of the mineralising fluids along the main shear zones within the YSGB. Radiometric dating of the mineralisation events will also shed more light on their origin and formation.

Little is known about the geochemistry of the meta-igneous rocks in this belt and the project will also involve the systematic collection and (elemental and isotopic) analysis of a suite of samples in order to determine the petrogenesis, tectonomagmatic evolution and more-precise age of these rocks. This part of the project will also inform our understanding of the province's mineralisation events. The working hypothesis is that the Luke Creek and Mount Farmer groups represent the remnants of several Large Igneous Provinces (LIPs). The geochemical framework produced for these postulated LIPs will be compared with geochemistry of similar age LIP magmatism elsewhere in the Yilgarn Craton and on other cratons.

In short, this project represents an exciting opportunity to study both the nature of the gold mineralisation in, and the tectonomagmatic evolution of, a relatively unknown greenstone belt.

Further reading

Van Kranendonk, M.J., et al. 2013. Long-lived, autochthonous development of the Archean Murchison Domain, and implications for Yilgarn Craton tectonics. *Precambrian Research*, 229, 49-92.

Watkins, K.P. & Hickman, A.H. 1990. Geological Evolution and Mineralisation of the Murchison Province: Western Australia. Geological Survey of Western Australia: Bulletin, 137.

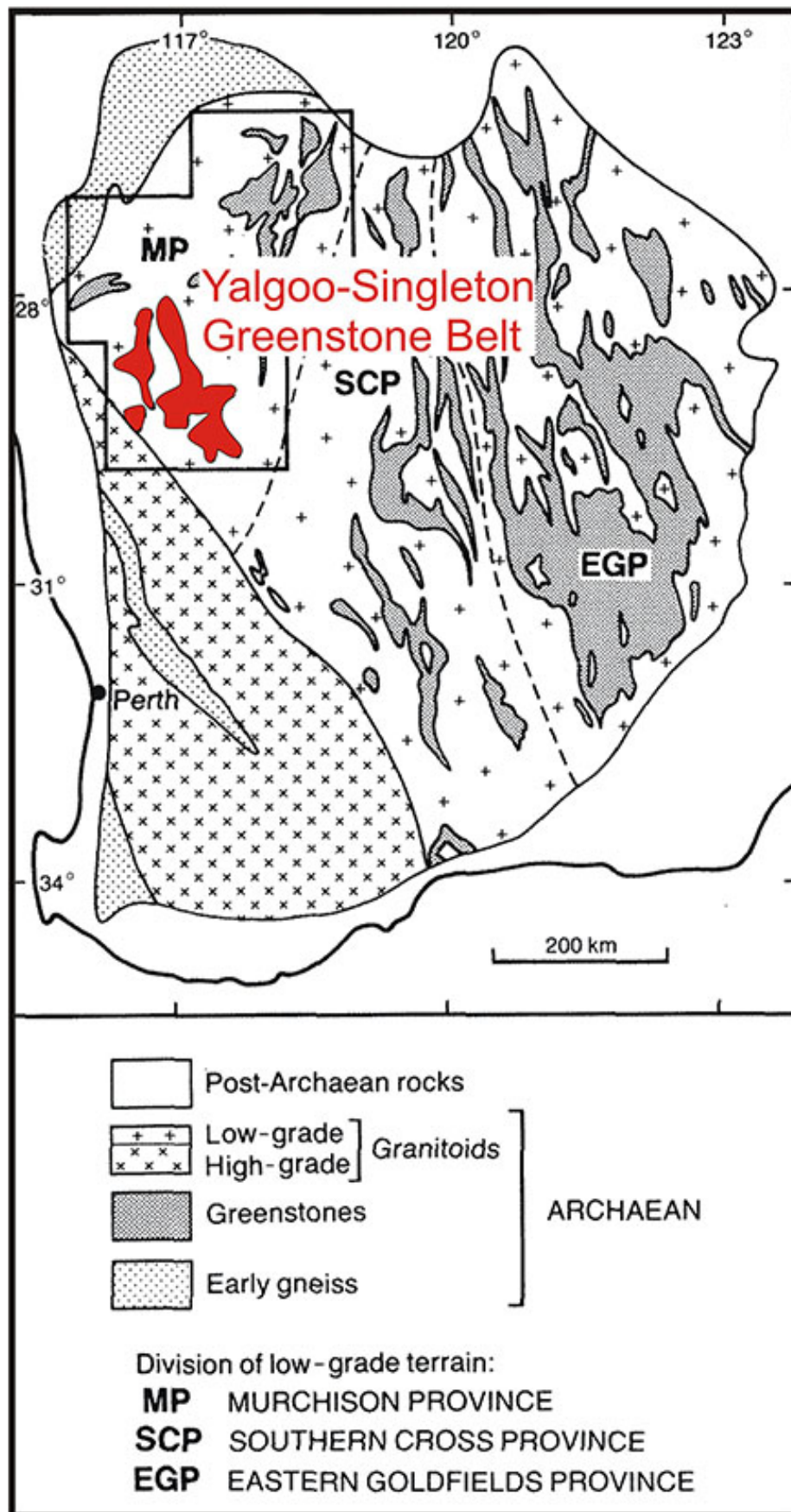


Fig. 1. Regional geology of the Yilgarn craton and the location of the YSGB. After Watkins & Hickman (1990).