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Geology and controls on mineralisation in the Eastern Goldfields region, Yilgarn Craton, Western Australia

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The Yilgarn Craton in Western Australia contains evidence of the oldest crust on Earth. Greenstone successions developed after c. 3000 Ma show a complex history of juvenile crust generation and crustal reworking. There are at least three periods of greenstone related magmatism in the Yilgarn Craton. The earliest recognised greenstone development consists of volcanic and sedimentary successions deposited between c. 3000–2900 Ma. A mantle plume at c. 2800 Ma produced large mafic–ultramafic igneous complexes and probably initiated rifting on the eastern side of the craton and incipient rifting in the NW. A second major plume, at c. 2700 Ma, was focussed along the rupture created by the c. 2800 Ma event and may have been associated with the re-accretion of lithospheric blocks created by the earlier event. Komatiites generated by the c. 2700 Ma plume contain world-class Ni deposits, and structures developed subsequent to the peak of plume activity host world-class Au deposits. Recent studies of Ni and Au deposits in the Eastern Goldfields Superterrane have shown how features ranging in scale from the lithosphere to regional structural and stratigraphic controls to local volcanological and sedimentological variations can affect the size and distribution of deposits. This understanding is now being applied in exploration targeting.