

PROVENANCE OF LATE PALAEOPROTEROZOIC COVER SEQUENCES IN THE CENTRAL EASTERN GAWLER CRATON: EXPLORING STRATIGRAPHIC CORRELATIONS WITH CURNAMONA AND MT ISA USING DETRITAL ZIRCON, ZIRCON HF AND ND ISOTOPIC DATA

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New provenance data from Palaeoproterozoic and possible Archaean sedimentary units in the central eastern Gawler Craton forms part of a growing dataset suggesting that the Gawler Craton shares important basin formation and tectonic time lines with the adjacent Curnamona Province and the Isan Inlier in northern Australia.

U-Pb dating of detrital zircons from the Eba Formation (previously mapped as Tarcoola Formation), yield exclusively Archaean ages (~2530-3300 Ma). This is consistent with whole rock Nd and zircon Hf isotopic data for the Eba Formation which have evolved compositions. Elsewhere in the eastern Gawler Craton, cover sequences historically considered to be Palaeoproterozoic in age also contain exclusively Neo and Meso Archaean aged detrital zircons (Reid et al, 2009 *Econ. Geol.*; Szpunar et al, 2007, SGTSG). The absence of Palaeoproterozoic detrital grains in several differently mapped sequences (including the Eba Formation) despite the proximity of voluminous Palaeoproterozoic rock units, suggests that the Eba Formation may be part of a Neo-Archaean or early Palaeoproterozoic cover sequence derived from erosion of a complex Archaean aged source region.

The Labyrinth Formation unconformably overlies the Eba Quartzite, and contains rhyolitic units that constrain deposition to 1715 ± 9 Ma (Fanning et al., 2007; PIRSA Bulletin 55). This

age is identical to the timing of deposition of the lower Willyama Supergroup in the adjacent Curnamona Province. Detrital zircon ages in the Labyrinth Formation range from NeoArchaean to Palaeoproterozoic, and are consistent with derivation from > 1715 Ma components of the Gawler Craton. Isotopic zircon Hf data and whole rock Nd data also suggest a source region with a mixed crustal evolution (ϵ_{Nd} -4.5 to -6), consistent with what is known about the Gawler Craton. Compared to the Lower Willyama Supergroup, the Labyrinth Formation has a source more obviously reconcilable with the Gawler Craton.

Stratigraphically overlying the Eba and Labyrinth Formations is the Tarcoola Formation, which was deposited at ca 1656 Ma (Fanning, 1990, PRISE 89-020). Isotopic zircon Hf and whole rock Nd data indicate that the Tarcoola was sourced from predominantly juvenile rocks (ϵ_{Nd} +1 to -2.5). The timing of Tarcoola Formation deposition is similar to the juvenile upper Willyama Supergroup (Barovich & Hand, 2008; *Precam. Res.*) further strengthening the stratigraphic links between the Gawler and Curnamona domains. Additionally the Tarcoola Formation is similar in age to packages in the Mt Isa region, including juvenile units in the eastern Isan succession. These juvenile compositions contrast with the evolved underlying sequences and hint at the existence of a large-scale c. 1650 Ma juvenile basin system in eastern Proterozoic Australia.