The Geochronology and Structural Evolution of the Warren Inlier and Springfield Sequence, Mt. Lofty Ranges: Implications for Proterozoic Paleogeographic Reconstructions.

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ABSTRACT

The Warren Inlier is one of five Paleoproterozoic inliers in the Mt. Lofty ranges and represents the easternmost exposure of the Gawler Craton. This inlier is dominated by a Mesoproterozoic S_2 fabric which was later deformed in a dominantly E-W to NE-SW stress regime during the Delamerian Orogeny. Regional scale fold orientations indicate that this fabric was near horizontal prior to the Delamerian deformation. Metamorphic monazite and zircon from early pegmatites suggest that this fabric formed at approximately 1570 – 1560 Ma. A metamorphic event is also recorded in the Springfield Sequence at ~ 1580 Ma, which is consistent with previous studies in the Barossa Complex, and is coincident with the Olarian Orogeny in the Curnamona Province to the east. The younger ~1560 Ma ages are consistent with a retrograde metamorphic event also documented in the Curnamona Province, and it is likely that these regions share this tectonic history.

The Springfield Sequence to the immediate east of the Warren Inlier has been shown to be an allochthonous basement unit, as opposed to sheared Adelaidean metasediments as they were originally mapped. Detrital zircons from this sequence indicate that deposition of this part of the basement occurred between 1744 Ma and 1625 Ma. This indicates that the Barossa Complex was deposited after the Wallaroo Group to the west, and prior or synchronous to the lower Willyama supergroup. This may be representing a westen extension of the Willyama Supergroup, or potentially a progressive eastward stepping series of basins was developing on the eastern margin of the Gawler Craton between 1800 ma and 1600 Ma, which may in turn be an indication of a retreating subduction margin.

KEYWORDS

Structural geology, Geochronology, Zircon, Monazite, Gawler Craton, Paleoproterozoic, Mesoproterozoic, Nuna

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