



**Delamerian Reactivation of the Curnamona Province, Australia: age constraints and implications for the tectonothermal evolution from the retrograde shear zones**

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**Abstract**

Palaeoproterozoic to early Mesoproterozoic metamorphic rocks in the Curnamona Province are cross cut by a complex system of regional-scale retrograde shear zones that locally dominate the terrain. Combined metamorphic and geochronological data from localities across the southern Curnamona Province indicate that the peak metamorphic shear zone assemblages formed during the Cambrian Delamerian Orogeny, and not during the waning stages of ~1600Ma Olarian Orogeny as has been previously asserted. A combination of monazite chemical U-Th-Pb and garnet Sm-Nd geochronology indicates that shear zone fabrics formed between ~485 and 517Ma. Peak metamorphic conditions obtained from prograde garnet-staurolite-biotite-muscovite-chlorite-quartz assemblages are between 530 and 600°C at pressures of around 5 kbars. The absence of significant up-pressure prograde paths recorded by the mineral assemblages together with the modest (10-20%) degree of Delamerian shortening, suggests that attainment of burial to depths of around 15 km was largely a function of sedimentation associated with the development of the Adelaide Rift Complex between ~700-530 Ma. Metamorphic pressures within the shear zones in the central southern Curnamona Province suggest that Adelaidean sequence thicknesses there were in excess of 12 km prior to the Delamerian Orogeny. This estimate compares with previous estimates of <4 km for the thickness of Adelaidean cover in that part of the Curnamona Province and highlights the existence of unrecognised Adelaidean Rift Complex depocentres. The association between patterns of basement metamorphism and reactivation during the Delamerian Orogeny therefore reflects in part the distribution of pre-Delamerian sedimentation, and highlights the importance of pre-orogenic processes in controlling the style and pattern of terrain reactivation and reworking.

**Key words:** age constraints; Curnamona Province; Delamerian Orogeny; P-T conditions; shear zones; tectonothermal evolution.