

Permian cyclothem development within the onshore Canning Basin, Western Australia

By

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This investigation tests for glacially-influenced cyclothem development during the mid-Permian. Historically, cyclothems have been associated with periods of widespread glaciation, such as the Plio-Pleistocene and Permo-Carboniferous. Although there is evidence of Gondwanan glaciation throughout the Permian, few studies exist on cyclothem development past the earliest stages of this era.

The mid-Permian Tuckfield Member (Poole Sandstone) is an excellent candidate for a sequence stratigraphic study. It crops out around the periphery of the St. George Ranges (onshore Canning Basin, Western Australia) as a 50 to 100 meter thick package of coarsening- and thickening-upward cycles. These cycles consist of siltstone, sandstone, and conglomerate with minor amounts of silty mudstone at the base of some cycles. Although the Poole Sandstone has been mentioned in several publications, no detailed sedimentological or stratigraphic analysis has been performed on this unit.

Nineteen outcrop sections were evaluated for lithology, fossils, sedimentary structures, including bed thickness variations, and vertical stacking of facies. Data analyses included documenting repeated variations in sediment facies that indicate a change in depositional environment, thereby providing evidence for a fluctuating sea level. Gamma-ray data were collected from the outcrops every 0.5 meters and were used as a proxy for grain size. Time-series spectral analyses were run on the gamma-ray data to detect cyclicity. Several orders of meter- to decameter-scale cycles were identified. These cycles correlate strongly with known Milankovitch periodicities. Well-logs are being used to map the Tuckfield in the subsurface. Preliminary results reveal that identified cycles can be traced laterally for more than 200 km.