

Fluid Migration and Diagenetic Homogeneity in the Amadeus Basin, Australia

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The Amadeus Basin in central Australia is an intracontinental basin that covers 170,000 km² with only one well per 5,200 km². Several tectonic events have shaped the basin. The latest was the Alice Springs Orogeny during the Devonian, which buried Ordovician sediments up to 3 km depth and created more than 50 identified traps sites (of which two are producing fields).

This study investigates the diagenetic homogeneity of the Ordovician Pacoota and Stairway sandstone reservoir rocks throughout the basin. By analysing in what way diagenesis is controlled by depositional environment (e.g. grain size, sorting), by varying burial depth and by varying fluid migration pathways this study aims at predicting cementation pattern in frontier basin with limited existing data.

Pacoota and Stairway sandstone samples of 4 wells have been studied using image analysis, SEM, CL, XRD and fluid inclusion thermometry. Preliminary data indicate extensive quartz cementation (10-15% cement) occurring at ca. 90°C in a highly saline NaCl-CaCl₂ fluid system. The saline brines are likely to be originating from evaporites of the underlying Bitter Springs Formation. Hydrocarbons were encountered along microfractures and stylolites but not found in fluid inclusions. It indicates that oil and gas migration may have occurred subsequent to extensive quartz cementation.

Further studies are currently in progress and more data (well and outcrop) will be collected, in order to find controls on cementation pattern in underexplored frontier basins and assess potential for hydrocarbon exploration in those areas.