

Reservoir complexity in the Mid Jurassic J28-J30 Succession, North Carnarvon Basin, Northwest Shelf, Australia

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Abstract

The Mid-Jurassic late J20 regional play interval is located within the North Carnarvon Basin, North West Shelf, Australia, and comprises syn-rift shallow marine reservoirs in a number of producing fields. Due to both the shallow marine systems' depositional complexities and the influence of tectonically driven variation in accommodation space, the structure of the late J20 reservoirs is complex and there are many uncertainties in the models for this syn-rift succession.

The aim of this research is to interpret 'well' data in order to evaluate and interpret the complexity of the late J20 reservoir in the immediate area of the Perseus-2, Capella-1 and Persephone-1 wells. This complexity includes uncertainty of the depositional environments and the dominant depositional processes, the influence from syn-rift tectonics and the impact of these on static and dynamic reservoir properties, and exploration prospectively.

Three cores were described and interpreted (Perseus-2, Capella-1 and Persephone-1). These were then reviewed using the WAVE Descriptive Framework, and the resulting data were used to discuss the complexity of the reservoir.

The results show that waves and a fluvial interval were the dominant depositional processes influencing the reservoirs, and the interpreted depositional sequence boundaries correlate strongly with the pressure data in the late J20 reservoir, which show five sub-divisions. This suggests that the sedimentary sequences resulted in layering and vertical permeability barriers. Later tectonics further complicated these layers and their connectivity. This complexity has influenced the reservoirs properties and behaviour, as well as exploration prospectively and production.

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