REGIONAL JURASSIC SEDIMENT DEPOSITIONAL ARCHITECTURE, BROWSE BASIN: IMPLICATIONS FOR PETROLEUM SYSTEMS

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The Browse Basin hosts considerable gas and condensate resources, including the liquefied natural gas (LNG) developments at Ichthys/Prelude and Concerto fields. However, oil discoveries have been sub-economic and confined to the Caswell Sub-basin and Yampi Shelf. This multi-disciplinary study has mapped the hydrocarbon sources and areas of increased liquids prospectivity within the gas-prone basin.

Isochore maps and depositional models suggest multiple Jurassic and Cretaceous source rock units in compartmentalised pods, resulting in four geochemically distinct petroleum systems.

Organic-rich shales of the Upper Jurassic–Lower Cretaceous J40–K10 supersequences (Vulcan Formation) are believed to have sourced the gas in the encasing K10 sandstone reservoir (Brewster Member) in the Ichthys/Prelude and Burnside accumulations, and potentially other similar plays in the southern Caswell and Oobagooma sub-basins.

The gas sourced by the Lower–Middle Jurassic J10–J20 supersequences (Plover Formation) has assisted migration toward the basin margin, and is reservoired within the J10–J20 supersequences on Scott Reef Trend, the K10 supersequence in the Ichthys/Prelude field, and the shallow Lower Cretaceous K40 supersequence on the Yampi Shelf.

The Jurassic J10–J50 supersequences (Plover and lower Vulcan formations) in the Heywood Graben have generated fluids with a unique composition within the basin, and resemble a petroleum system in the Bonaparte Basin. These data integrated into a pseudo-3D petroleum systems model identified liquid-prone plays in the southern and northern Caswell Sub-basin, on the basin margins and in the Heywood Graben.