

Paleozoic Petroleum Systems of the Canning Basin, Western Australia: A Review

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The productivity of Paleozoic petroleum systems depends on timing (Paleozoic–Cenozoic) and preservation (sub–suprasalt) of charge, as exemplified by super-giant, giant and small oil and gas fields within the Paleozoic basins of North America, North Africa, North Caspian, and the Canning Basin.

Within the Canning Basin, subsalt Ordovician sourced oil has been recovered in Cudalgarra 1, Dodonea 1, Edgar Range 1, Great Sandy 1, Leo 1, Percival 1, Pictor 1 and 2, and Solanum 1. Suprasalt Upper Devonian sourced oil is produced from the Blina field, and oil shows are present in Boronia 1, Ellendale 1, and Janpam 1. Suprasalt Lower Carboniferous sourced oil is produced at the Boundary, Lloyd, Sundown, West Kora, and West Terrace fields and a gas accumulation is present at Point Torment 1. These petroleum systems are part of the Australia-wide Larapintine 2 (Ordovician), 3 (Devonian), and 4 (Early Carboniferous) and Larapintine–Gondwanan Transition petroleum supersystems.

A review of published and unpublished open-file data supplemented by new analyses, including 73 total organic carbon content, 26 Rock-Eval pyrolysis, 8 extract analyses for source rock potential, 30 organic petrological analyses for source maturity, 14 apatite fusion track analysis to understand generation history, and 100 Quantitative Grain and Extract Fluorescence for presence of paleo and present hydrocarbon in reservoirs, indicate generation and migration of hydrocarbons within the basin. The basin is underexplored with only 4 wells/10000 km² as compared to North America with 500 wells/10000 km². There is need for further exploration studies on source, reservoir and seal distribution, timing of trap formation and generation– accumulation, and its preservation within diverse tectonic units.