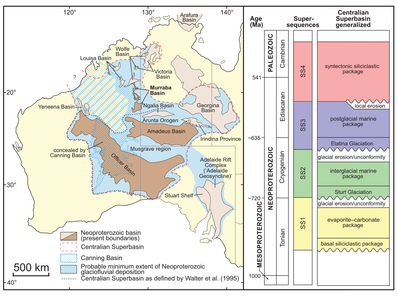
CENTRALIAN SUPERBASIN
Amadeus, Murraba and Officer Basins

CENTRALIAN SUPERBASIN

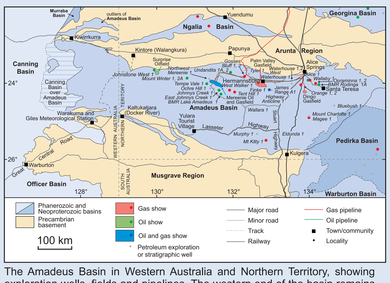
The Centralian Superbasin was a large intracratonic sedimentary system that developed during the Neoproterozoic. It was linked to the continent margin preserved in the Adelaide Rift Complex (Geosyncline) in South Australia. The superbasin was sequentially fragmented by tectonic events during the late Neoproterozoic (Petermann/Paterson Orogenies) and Paleozoic (Alice Springs Orogeny) to create separate basins. These basins preserve a similar depositional history during the Neoproterozoic, but the Paleozoic remnants display more divergent histories. Significant components in Western Australia include the Officer, Amadeus, Murraba, Louisa, Wolfe, Victoria and Yeneena (metamorphosed) Basins. Recent dating indicated that tectonised remnants of the Centralian Superbasin are also present beneath the Canning Basin. Hydrocarbon exploration has been undertaken in the Amadeus, Officer, Georgina and Ngalia Basins, with the eastern Amadeus Basin being a producing province from both Paleozoic and Neoproterozoic sources. Exploration in Western Australia has been limited to the central Officer Basin.



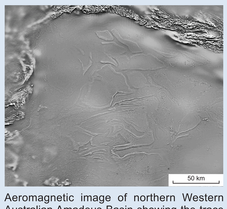
Components of the Centralian Superbasin, with Murraba, Amadeus and Officer Basins highlighted. Generalised Centralian Superbasin Neoproterozoic stratigraphy at right. Stippled area is concealed by the younger Canning Basin

AMADEUS BASIN

About a quarter of the Amadeus Basin lies in Western Australia. Although preservation of Paleozoic strata is limited, the thick Neoproterozoic section has a similar stratigraphic history to that of the much better studied eastern end of the basin. Thus the Neoproterozoic hydrocarbon systems identified in the Northern Territory potentially extend into unexplored Western Australia. There is good evidence from the salt-tectonic style of deformation in the west that an early Neoproterozoic salt unit (potential seal over the oldest source) is widespread in Western Australia. This source-seal couplet is associated with high-helium gas flows in the Northern Territory.



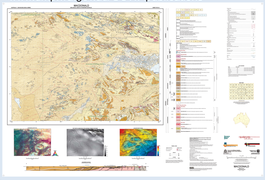
The Amadeus Basin in Western Australia and Northern Territory, showing exploration wells, fields and pipelines. The western end of the basin remains essentially unexplored for hydrocarbon resources



Aeromagnetic image of northern Western Australian Amadeus Basin showing the trace of irregular fold structures related to the interference of salt tectonics and compression

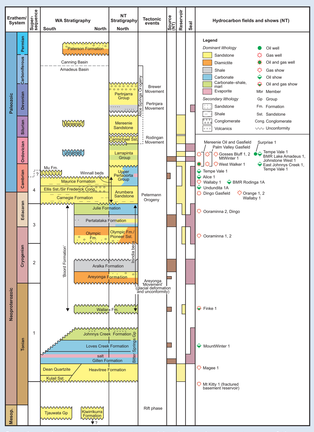
Well-preserved columnar stromatolites, Neoproterozoic Loves Creek Formation of Bitter Springs Group

New Macdonald 1:250 000 geological map (2018) covers much of the northern half of the Western Australian Amadeus Basin, available online at <www.dmp.wa.gov.au/GSWApublications>



Amadeus Basin publications are available online at <www.dmp.wa.gov.au/GSWApublications>

Available from Northern Territory Geological survey, GSWA co-authors

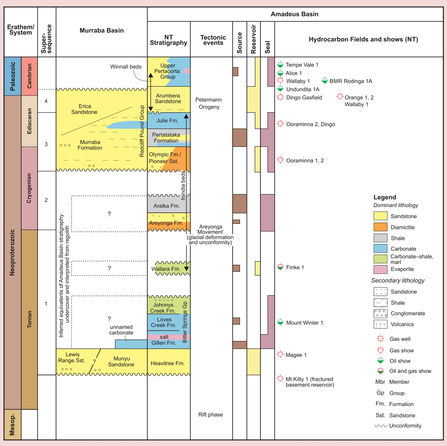


Stratigraphy, tectonic event, and hydrocarbon systems of the Amadeus Basin. Western Australian stratigraphy is compared with the northern Amadeus Basin stratigraphy of the Northern Territory. Source-rock data and exploration drilling is restricted to the Northern Territory

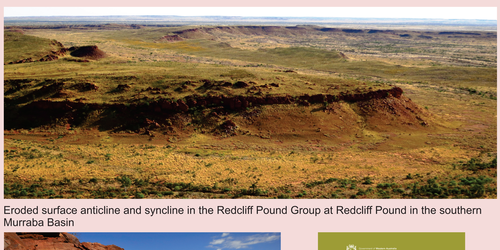
MURRABA BASIN

The poorly known Murraba Basin straddles the Western Australia – Northern Territory border. The stratigraphy is incompletely exposed due to extensive cover and there is a lack of deep drilling or seismic data. The basin can be inferred to have had a similar Neoproterozoic depositional and structural history to the western Amadeus Basin. It may thus harbour similar Neoproterozoic source rocks to that basin and potentially a lower salt seal (there is a suggestion of salt tectonics). No hydrocarbon exploration has been undertaken in the basin, and it thus remains a very high risk for explorers.

The Western Australian component of the Murraba Basin and adjacent basins and basement domains



Stratigraphy of the Murraba Basin compared to Neoproterozoic–Cambrian stratigraphy, tectonic events, and hydrocarbon systems of the Amadeus Basin



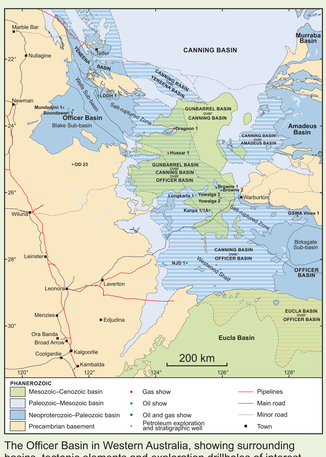
Eroded surface anticline and syncline in the Redcliff Pound Group at Redcliff Pound in the southern Murraba Basin

Outcrop of the Lewis Range Sandstone, basal unit of the northern Murraba Basin

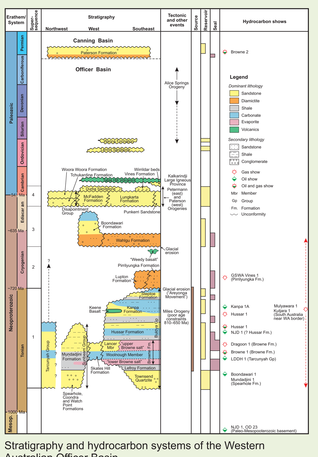
Murraba Basin record is available online at <www.dmp.wa.gov.au/GSWApublications>

OFFICER BASIN

Over half of the Officer Basin lies in Western Australia but it is very poorly exposed with much being covered by thin extensions of the Canning Basin, the Mesozoic Gunbarrel Basin and Cenozoic dune fields. The Western Australian part of the basin is mainly of Neoproterozoic age. There has been some historic hydrocarbon exploration in the central part of the Western Australian Officer Basin. A sparse seismic grid in this area shows numerous salt structures related to an equivalent salt interval to that found in the Amadeus Basin. Minor oil and gas shows in hydrocarbon exploration wells and mineral exploration holes indicate some source potential in the basin.

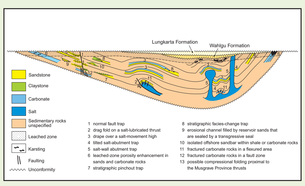


The Officer Basin in Western Australia, showing surrounding basins, tectonic elements and exploration drillholes of interest

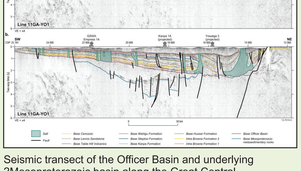


Stratigraphy and hydrocarbon systems of the Western Australian Officer Basin

Stratigraphic drilling in the Western Australian Officer Basin; GSWA Lancer 1 drilled 2003



Hypothetical hydrocarbon traps in the Western Australian Officer Basin; these may be equally applied to other components of the Centralian Superbasin



Seismic transect of the Officer Basin and underlying ?Mesoproterozoic basin along the Great Central Road (from Geoscience Australia Record 2013/28)

Black shales and carbonates in the Hussar Formation; GSWA Lancer 1

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