Permian to Cretaceous Palaeogeographic Evolution and Petroleum Systems of the Northern Margins of the Australian Plate

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In northern Australia, the southern margin of Tethys evolved by successive shedding of microcontinents, which subsequently drifted and accreted to SE Asia. Uplift of central Australia in the Middle Carboniferous was followed by initiation of the Westralian Superbasin during Late Carboniferous-earliest Permian extension. The Sibumasu micro-continent then broke away in the Sakmarian. Simultaneously, the Greater Bird's Head rotated clockwise, opening the proto-Banda Sea. A Middle Triassic magmatic arc formed along northeastern Australia from NSW to the Greater Bird's Head. Large deltas formed on northwestern Australian margins from the Middle Triassic to Middle Jurassic.

Outboard of these deltas, carbonate build-ups developed from the Wombat Plateau to PNG, while deepwater marls accumulated between them. Argoland/West Burma broke up in the Oxfordian after widespread basaltic magmatism. Breakup was followed by a long period of localised extension in northwestern Australia, forming discontinuous grabens from the Exmouth Subbasin to the Aru Trough. The Berriasian Barrow and Toro deltas were followed by Valanginian breakup between Greater India and Australia. The northwestern graben system was then abandoned and the whole plate margin subsided into deep water until after the Aptian. Prolific petroleum source systems include wet gas-prone deltaic source rocks in the Upper Triassic-Lower Jurassic (North West Shelf) and Upper Permian (Bird's Head, Bonaparte), and oil-prone source rocks in the Upper Jurassic marine rifts (Carnarvon, Bonaparte, PNG). However, another source system occurs in Upper Triassic marine carbonates, responsible for high-sulphur oils in Seram, which may be represented in other areas of the former outer continental margin.