

# **Basement reactivation and control of Neogene structures in the Outer Browse Basin, North West Shelf**

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## Abstract

Basement control on reactivation along the North West Shelf has been broadly postulated, but direct links with Neogene events have yet to be substantiated. One reason for this is that styles of Neogene reactivation and inversion vary around the North West Shelf, and have been found to be tightly geographically constrained to certain areas, such as the Barcoo Sub-basin.

In the Barcoo Sub-basin of the Browse Basin structures initiated during Late Permian to Early Triassic extension ("Bedout Movement") have strongly influenced the patterns of subsequent Neogene deformation. Recent structural and stratigraphic analyses of Cenozoic and Mesozoic horizons in the Barcoo Sub-basin have revealed the strong influence of deep structures upon the location and nature of structures within the Miocene section. In particular NE-SW extensional faults have been reactivated at several times since the early Triassic, with the subsequent formation of inversion structures such as open folds developed in Triassic half graben growth sequences. Reactivation of these Early Triassic extensional faults continued during the Cretaceous and Cenozoic. Minor fault movement is recorded in the Cenomanian-Turonian, whilst more pronounced faulting occurred in the Middle Oligocene and Middle to Late Miocene. The latter was associated with pure strike-slip and transpressional reactivation of NE-SW faults and formation of extensive inversion structures such as the Barcoo and Lombardina-Lynher structures. Other effects of continued motion on these faults can be seen from the location of drape anticlines in the Cretaceous section and the preferential location of shallow marine reefs in the Miocene section directly over the edge of Triassic horsts and crests of footwall blocks.

Key Words: reactivation, inversion, seismic, structural geology, Browse Basin