

THE RELATIONSHIP BETWEEN THE THOMSON SYNCLINE  
AND UNDERLYING BARCOO TROUGH

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BIOGRAPHY

Kevin Wake-Dyster obtained his B.Sc (Hons.) degree in Geophysics from the University of Adelaide in 1974. He joined Exploration Logging of Australia and worked on well-site surveys, mainly on the Northwest Shelf before joining the Geophysical Branch of the Bureau of Mineral Resources in 1976. He worked in the Antarctic Observatory Group first as Observer at Mawson, Antarctica in 1977 then at Macquarie Island in 1979. In 1980 he joined the seismic group where he has been working on the Central Eromanga Basin Project.

SUMMARY

Seismic surveys have generally been made over the margins of the Thomson Syncline and over basement highs such as the Galway, Chandos and Thunda structures. These anticlinal trends were the main targets for petroleum exploration in the Eromanga and Cooper Basin Sequences. Deep seismic reflections recorded in the central region were interpreted to indicate a very thick Permian sequence. However some doubts were cast on the identification of the age of the sediments in the lower part of the section since reconnaissance gravity data indicate that a major low over the Thomson Syncline is similar to that over the Warrabin Trough which is known to contain Devonian sediments.

Seismic traverses recorded over the syncline by the Bureau of Mineral Resources in 1980 (Wake-Dyster & Pinchin, 1981) and in 1981 (Sexton & Taylor, in prep.) clearly show the major unconformity which has been associated with the top of the Devonian sequence elsewhere in the area. The presence of Devonian sediments was confirmed from the drilling of XL Barcoo Junction 1 well. This trough of Devonian sediments was named the Barcoo Trough by Pinchin & Senior (1981).

The Barcoo Trough is a structural remnant of the formerly widespread Adavale Basin sequence. It was formed by the structural uplift of the Canaway Ridge and other associated basement highs, which caused major deformation resulting in folding and faulting of the Devonian sequence. During the mid-Carboniferous Kanimblan Orogeny anticlines which had been formed in the Devonian sequence were eroded to produce a widespread erosional platform. A thin veneer of Devonian sediments connects the Barcoo Trough to the Warrabin Trough in the south.

Cooper Basin sediments are unevenly distributed over the Barcoo Trough as a result of further basement movements during the Permian and Triassic. The absence of coal measures in some areas can be clearly inferred from the presence of good quality deep reflection which would otherwise have been masked.

Eromanga Basin sediments of Jurassic to Late Cretaceous age were deposited conformably over a large widespread area. Movements of basement blocks during the Tertiary have structurally deformed the Eromanga Basin sequence to produce low amplitude folds within the Thomson Syncline, the deepest part of the Eromanga Basin in the area.

There is up to 4200 m of sediments in the area, 1450 m of which lie in the Barcoo Trough. This trough is north trending, and it has a smaller sub-basin on its western flank abutting the Windorah Anticline. In the Thomson Syncline depth contours to the reflector associated with the Wyandra Sandstone Member in the Lower Cretaceous Cadna-owie Formation indicate general coincidence of the depositional axis with that of the underlying Barcoo Trough sequence. The axis of the Thomson Syncline determined from surface mapping as coincident with the Thomson River lies west of the axis of the Barcoo Trough.

The recent seismic data and those from previous seismic surveys are being further analysed to provide information on the evolution of the basins and their petroleum prospectivity as part of the 'Central Eromanga Basin Project'.

#### REFERENCES

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