

Otway margin - a Bass Basin and Gippsland comparison

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The Otway Basin has provided an ideal area for testing currently proposed models for the formation of passive continental margins. Despite intensive studies in the Atlantic Ocean of regions like the Bay of Biscay, West Africa, and northeast North America, and the North Sea, many processes of continental margin development are poorly understood. The distinction of different types of margin development relies on accurate data from the earliest periods of continental breakup, and most of the Atlantic margin transects have been unsuitable, owing to thick sedimentary sequences, which also include halite. The Otway Basin was surveyed by two long traverse lines during the 1982 Bass Strait Geophysical Survey, and these data augmented by reprocessed 1979 Shell 'Petrel' lines in the same area. Results of these surveys show that detailed sedimentary and structural information is readily available across the whole margin, and some deeper events have been recorded from the upper crust. These high quality data owe their origin to a low sediment supply over long periods of geological time and to high quality recording and processing techniques developed by BMR.

Studies of the deep section in the Bass and Gippsland Basins provide evidence for a regional north-northeast rift and apparent extension at the primary stage of continental separation in the Early Cretaceous. This extension direction is probably also present throughout the Otway Basin. Recognition of the dominant trend for the later, mid-Cretaceous rift in the Otway Basin relied on an analysis of widely spaced lines within the continental margin. Further high-quality geophysical survey data will be required in the future to confirm the tectonic fabric. The present-day trend of the tilted basement blocks and Early Cretaceous sediment across the deep continental margin was imposed during the thermal decay phase of continental margin formation. This follows a possible northwest trend of the earliest breakup phase of the Antarctic and Australian continents. The period from 65 Ma to 44 Ma was a time when the seafloor spreading direction changed to nearly north-south. Also, structures can be seen in BMR traverses across the Torquay Embayment at the northeast end of the Otway Basin, in lines in the Bass Basin, and along the northern margin of the Gippsland Basin. They were formed by a tectonic event that folded and faulted all pre-Pliocene sequences. The structures are consistent with southeast-northwest compression, and this stress field has been measured throughout southeastern Australia. The origin of this regional stress has been attributed to late Miocene to Recent interplate stress transmitted from the Pacific/Australia plate boundary.

Dredged rock samples are required from the deep-water sequences of the rift and postrift fill of the Otway Basin margin. Estimates of age and lithology have been extrapolated over 150 km from shelf exploration wells, and on the slope are expected to be different. The trends of structures within the sea floor and the position of suitable sample sites within continental slope are prime objectives for future scientific investigation in the Australian margin.