# Bass Basin surveying and deep seismic information

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BMR recorded 3209 km of seismic, gravity, and magnetic data between March and May 1982, using a contract vessel, Lady Vilma. Traverses were centred on the Bass Basin and connected with traverses across parts of the Gippsland and Otway Basins. A seismic processing contract was let in June 1982 to Geophysical Service Inc., Sydney. The contractor completed tests, batch processing, and migration of BMR 1982 data and reprocessing of 941 km of data by June 1984. Recording and processing details are given in Table 1.

The major volume of digital processing was made available to lease holders in the survey area in April 1983. and then released to the general public in October 1983. These results provide the highest quality seismic information available in the deepest parts of the Bass Basin and also give good quality seismic correlations between the adjacent basins in Bass Strait. Reprocessing of 1975 regional seismic data by the same techniques used for 1982 data has shown that the 1982 recording techniques improved data quality by use of high channel numbers, high digital sampling rates, longer seismic records, and large capacity tuned airgun arrays.

Analysis of the Bass Basin structure showed that seismic events need to be record ed down to basement. Shallow data recorded in the past to 4 or 5 seconds two-way time do not allow analysis to adequately discriminate between basin-forming structures and the effects of superimposed later tectonic movements. The origin of the Bass Basin and its structural history are important in defining the thermal and sedimentary histories, which in turn are used by the hydrocarbon industry to define subsidence curves.

A thermo-mechanical model of the Bass Basin was developed by Garry Karner in BMR during 1983. The model is based on stretching of the lithosphere by brittle and ductile failure of the crust and mantle, respectively. The results provide an analysis of competing isostatic effect of crustal subsidence, which forms a rift phase, and a following slower thermal decay, which forms a superimposed flexural phase. Structures from deep in the Bass Basin show that large extensions took place in the Early Cretaceous. The magnitude of this extension and the dimensions of the known rift basin have been applied to the model, and the results provide a series of thermal decay curves that are used in geohistory models. There are a number of thermal decay curves developed for various positions within the Bass Basin whose form depends on basement structure and relative proximity of the test sites to a depocentre or basin margin. The example discussed here is located over an elevated region of basement near the basin depocentre and this provides an estimate of thermal maturation during burial history.

The value of detailed deep seismic information is also discussed by scientists studying sedimentary facies and other scientists working on a grid of data to define broad leads in hitherto unexplored Cretaceous and Paleocene sequences.

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