A new look at the Gippsland Basin

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Major extensional structures have recently been identified in the Bass Strait basins, following a deep seismic survey conducted in 1982 by the Bureau of Mineral Resources and reappraisal of company data. The Gippsland Basin, like the Bass and Otway Basins, was initiated during the Early Cretaceous by north-northeast-south-southwest extension.

Extensional structures in the Gippsland Basin consist of rotational planar normal faults that are up to 5 km in strike length and terminated by a perpendicular set of subvertical transfer faults that trend between 205° and 210°. The normal faults dip between 30° and 60° and show displacements of up to 5 km. Displacements on the transfer faults are mostly sinistral (left-lateral), giving rise to the overall easterly trend of the basin and its bounding structures (e.g., south-bounding Foster Fault System). A major transfer fault zone passing beneath the Kingfish, Halibut, Fortescue, and Tuna oil fields separates predominantly northeast-dipping normal faults to the east. Another major transfer fault possibly terminates the major transfer fault zone terminating significant extension in the southeast Bass Basin.

Identification of the Early Cretaceous extensional structures is limited to the basin margins, owing to the paucity of good quality deep seismic information in the centre of the basin. However, some transfer faults can be matched across the basin and, in places, they are coincident with magnetic trends and sea-bed canyons.

The extensional structures have been a major influence throughout the development of the basin. The normal and transfer faults have partly controlled the distribution and orientation of Late Cretaceous subsidence structures and were important controls on the development of late Eocene and younger hydrocarbon-bearing structures. These structures were, in the main, produced by wrench reactivation of transfer faults and reverse movements on older normal faults during Eocene to Recent northwest-southeast compression.