

Keynote address 4

## Evolution of the island arc and marginal basins of the Western Pacific

DAVID A. FALVEY

Australian Geological Survey Organisation

The modern island arcs and marginal basins of the Western Pacific commenced evolving towards the end of the Cretaceous with the formation of the Tasman Basin and the rifting of the Australia-Pacific convergent plate boundary from eastern Australia. Further marginal basin expansion and island arc fragmentation took place throughout the early Tertiary, with the arc system reaching its greatest easterly/northeasterly extent by the end of the Oligocene. At the beginning of the Miocene the process of arc reversal began, first in the northwestern extremity of the arc system (now the New Britain Arc). Reversal of the Solomon Arc occurred in the mid Miocene and of the New Hebrides/Fiji Arc in the late Miocene.

The processes of backarc seafloor spreading, arc fragmentation and arc reversal have, together with climatic factors, shaped the petroleum potential for the present Western Pacific island arc terranes. Limited exploration drilling, plus reconnaissance multichannel seismic surveys conducted through the early 1980s suggest that thick volcanoclastic forearc or intra-

arc depocentres have low potential. Instead, the areas marginal to these depocentres and adjacent to major islands may have significant potential. On such basin edges, the complex tectonic history will favoured the growth of marginal reef systems bordered by deep graben and half-graben basins. The marginal marine and coastal environments have been, in large part, intensely productive of organic material favourable to petroleum generation. Stripping mechanisms, such as cyclones and tsunamis, harvest this material and deposit it in the deep basins adjacent to reef bodies, with subsequent maturation and migration into reefal reservoirs. This marginal play has not been tested. Promising shallow-water target areas include: in northeastern Papua New Guinea—shore edge of New Ireland basin and nearshore borders to the Queen Emma and Bougainville basins; in Solomon Islands—Manning Strait, eastern Iron Bottom Sound and Mbokokimbo basin; in Vanuatu—southwest Vanikolo basin, western East Santo basin; in Fiji—shoreward Bligh basin; in Tonga—Eua Channel area.

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