AAPG International Conference
Barcelona, Spain
September 21-24, 2003

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Hydrocarbon Potential of Western Madagascar

Western Madagascar can be divided into a Permo-Triassic failed rift and a Late Jurassic-Tertiary passive margin. The failed rift is characterised by potential reservoirs in the Lower Sakamena, Upper Sakamena and Isalo Sandstones. A thick seal is provided by the Middle Sakamena Shale which also forms the principal source rock. Three trapping styles can be recognized; tilted fault blocks, drape anticlines and roll-over anticlines. The tilted fault blocks are ineffective because they depend on up-dip fault seals. The drape anticlines are more effective traps provided that sealing shales are present but they are associated with heavy, biodegraded oil. Roll-over anticlines occur on the downthrown sides of fault blocks but these have yet to be tested. The passive margin is characterised by potential reservoirs in the Middle Jurassic Bemaraha Limestone and the Cretaceous Tsiandava and Sitampiky Sandstones. Seals are provided by the Late Liassic Beronono/Andafia Shale, the Callovian Beboka Marl and various Cretaceous shales. Potential source rocks occur in the Beronono/Andafia and in the slope carbonates of the Bemaraha. Three trapping styles are developed; tilted fault blocks, compressional anticlines and stratigraphic traps. The tilted fault blocks are are not always covered by a seal and no reservoirs are present. The compressional anticlines are associated with good quality Cretaceous sandstone reservoirs and porous Bemaraha limestones in places. These anticlines formed after oil migration but some are charged with gas. Stratigraphic traps are developed in Cretaceous lowstand wedges and submarine fans that offer the best chance of finding commercial oil accumulations on the passive margin.