

STRUCTURAL AND DEPOSITIONAL CONTROLS OF THE SEDIMENTARY FILL OF THE ALGOA BASIN SOUTH AFRICA AND ITS HYDROCARBON POTENTIAL

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The Algoa basin, located on the southeastern margin of South Africa, is a Mesozoic rift basin covering an offshore area of 4000 square kilometers. This half graben is bounded by Recife arch and Port Alfred arch, and its offshore portion is composed of two sub basins, the Port Elizabeth and Uitenhage Troughs, initiated during the breakup of Gondwana in the Middle to Late Jurassic.

The sediments filling the basin are divided into: Synrift in the Oxfordian to Aptian (152 my to 113 my); Canyon fill in the Aptian to Albian (113 my to 103 my); and Thermal subsidence in the Albian (post 103 my). Using seismic data, well data, (including cuttings, cores, and log character), and Soekor (Pty) Ltd. completion reports 24 unconformities and associated depositional sequences were recognized and correlated across the basin. The rift to drift transition in the offshore Algoa Basin was punctuated by the Aptian 13Atl (113 my) and the Albian 14Atl (103 my) unconformities. The Algoa canyon is incised into the 13Atl surface and filled from four feeder entry points by fluvial dominated deltas controlled by the tectonic fabric of the horsts and grabens. Higher amplitude/continuous reflectors at the base of prograding clinoforms correspond to the basinward turbidity systems. The 14Atl unconformity surface truncates the canyon fill and is an ubiquitous surface in the Outeniqua basin marking the boundary between pronounced changes in tectonic and sedimentary style that separate the rift to drift phases of extension.

Future exploration of the basal canyon slope fans and/or prograding wedges sands should focus on the near west side of the Uitenhage fault and along the axis of the canyon fairways in the locally un-faulted Algoa canyon area. Structural analysis indicates the basin is dissected by a series of W-SE trending faults. The faults may have induced hydrocarbon migration in the area. Rock-Eval pyrolysis analysis suggests that the Algoa Source rocks are less than 100 meters thick, and are mostly gas prone with a potential for oil prone source rock down dip from the study area. Most of the source rocks seem to be either in the immature or in the early maturation stages.