Paper Number: 1664

2D Seismic stratigraphic analysis of the JC-A1 well, Durban Basin, East Coast, South Africa

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A 2D seismic transect line from the underexplored Durban Basin off the East Coast of South Africa has been used in integration with JC-A1 well logs to carry out seismic stratigraphic analysis according to the method suggested by Catuneanu [1]. Based on the reflector configuration and surface discontinuities, eight seismic stratigraphic sequences (S1–8) were identified. Each sequence is characterised by various seismic facies and well log signatures. Identified seismic sequences within the Early Cretaceous to Tertiary deposits vary in thickness. On the well log, each sequence is characterised by distinct lithofacies apart from three sequences (S6, S7, and S8) which are described according to their seismic configuration. Sequence 5 represents a high stand system tract with a thick carbonaceous bed and a pebble sandstone bed; sequence 4 is interpreted as a transgressive systems tract with shaley sandstone, carbonates and clayey beds, while sequence 3 represents a highstand systems tract subdivided into three members, namely the blocky claystone unit (S3a); the alternating clay, silt, sand, and carbonate unit (S3b) as well as the sandstone and clay unit (S3c). A channel feature, recognized in sequence 3 and filled by sediments displaying by both chaotic and parallel to sub-parallel seismic facies, is incised into the older beds. Evidence of forced regression is seen further basinward, representing a falling stage systems tract capped by a low stand systems tract. Sequence 2 displays alternating sandstone, clay and siltstone layers. Sequence 1 is the oldest sequence with silty sandstone and diamictite layers. V-shaped depressed sediment features observed on the outer shelf and slope are linked to gas or fluid escape processes. Continued in-depth seismic stratigraphic analysis may lead to the delineation of new exploration plays in the underexplored Durban Basin.

References:

[1] Catuneanu, O. (2006). Principles of Sequence Stratigraphy. Elsevier: 105-278