

Tectonic-Sedimentary Evolution of Shallow Marine Oil-Bearing Miocene Syn-Rift Carbonate Sequences, Zeit Bay Field, Southern Gulf of Suez, Egypt

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Abstract

The Zeit Bay Field is one of the main oil fields in the southern dip-province of the Gulf of Suez. Detailed chronostratigraphic, sedimentologic facies analysis and wireline log calibration were carried out to study the evolution of the Miocene oil-bearing syn-rift sequences in the Zeit Bay Field. The evolution of the 3rd order cycles (1.5, 2.4) of the syn-rift strata on the Exxon's scale, coincides fairly well with the development of the main successive tectonic events of the Miocene rifting. The early rift stage is dominated by deposition of Basal Miocene Clastics (Cycle 1.5, S10 equivalent) as prograding fan deltas fed from NW feeding margin and limited by the eastern Precambrian Basement highs. With increasing the tectonic accommodation during the Late Aquitanian time, the first marine record occurred as a subtidal lagoon with patch reefs (Cycle 2.1, S20 equivalent) in the back side of the eastern basement high. The intra-Rudeis event during Early Burdigalian created more accommodation accompanied by the global sea level rise, and resulted in the development of the depositional Cycle 2.2 (S30 equivalent) being built-up mainly of lagoonal carbonate facies of dolomites and dolomitic limestones forming the main reservoir in the Zeit Bay Oil Field. During the mid-Clysmic tectonic event, the main extension occurred creating more accommodation and tilting of the block. As a result, reefal facies and talus cones of the Upper Rudeis Formation of Early Langhian were developed forming the lower part of depositional Cycle 2.3, keeping patchy basement outcrops in the North and East. During the Late Langhian tectonic event, extensive uplift of rift shoulders occurred creating more accommodation in the subsided block, where shales and thin limestone interbeds were developed on basal feldspathic sandstones of the Kareem Formation (Cycle 2.4 S40/S50 equivalent). The thick evaporite section of the Belayim Formation of latest Langhian/Early Serravalian age was developed concomitant with the Post Miocene quiescence tectonics forming the main seal cap.