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Structural Controls for Preferential Deposition and Preservation of Source Intervals and Syn-Rift Reservoirs for the Northeastern Red Sea and the Suez

An integrated GIS-based play evaluation along with potential field modeling, balanced cross sections and reconstructions of the Northeastern Red Sea (NERS) and Gulf of Suez (GOS) provide exploration insights to target thick high net-gross syn-rift reservoirs juxtaposed to extensive source-kitchens.

The two largest synrift GOS fields, Morgan and Belayim-Marine, have been previously recognized to be located along border fault transfer zones that have optimized the deposition and preservation of high net to gross sands while being positioned ideally for hydrocarbon entrapment. Initial mapping with sparse seismic data and reconstructions of the NERS indicate comparable depositional sequences and similar block sizes along the inboard areas, making reservoir preservation the critical issue due to increased extension.

Although crestal block erosion remains a great concern, our initial analyses of the structural controls on facies development for the NERS is encouraging. Preliminary mapping of the drainage systems, border faults, transfer zones and sub-basins demonstrate great variation from blocks 40 through 49 highlighting specific areas for further investigation. The southern Yanbu-Jiddah and Umluj-Al Wajh sub-basins (blocks 43-49) are bound by curvilinear down to the W-SW border faults separated by a suture-controlled accommodation zones. While the northern blocks 42-40 are bound by north-northwesterly Nadj-trending planar faults overprinted by a strong northeasterly Aqaba trend such that transpressional and transtensional features are common. The suture-controlled accommodation zones, along with a reactivated Proterozoic Nadj graben, (Aznam trough) have the potential to have localized thick synrift sediments similar to that of GOS.