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Anatomy of a Half Graben - Coupled Sequence Stratigraphic and Structural Evolution of the Southern Hammam Faraun Fault Block, Suez Rift, Sinai, Egypt

Rift basin evolution is a fundamental control on sequence development and variability. The results of this study suggest that, despite regional controls, local structural controls, particularly fault growth and interaction, can lead to marked variability in facies stacking patterns, sandbody geometry and key stratal surfaces. We document the tectono-sedimentary evolution of the southern part of the Hammam Faraun fault block, on the Sinai margin of the Miocene Suez Rift, to illustrate: i) the evolution of a fault population from rift initiation to the development of major crustal-scale tilted fault blocks, and ii) the temporal and spatial development of syn-rift sequences in response to this structural evolution. The initial syn-rift succession comprises the alluvial Abu Zenima Formation and the tidally-influenced and shallow marine Nukhul Formation. These are locally developed in growth synclines and half graben adjacent to short (1-4 km long), low displacement (<1 km) segments distributed across the fault block. Onlap and facies relationships record growth folding and fault linkage during Abu Zenima and Nukhul times. In contrast to the subaerial and marginal marine Abu Zenima and Nukhul Formations, the younger Rudeis Formation is composed of deeper water mudstones, with local coarse-grained deltaic and turbiditic units in the hanging wall of the border fault to the Hammam Faraun fault block. Thickness and facies data suggest that syn-rift sequence evolution was associated with cessation of activity on many of the intra-block fault zones linked to localisation of slip on the major border faults bounding the Hammam Faraun fault block.