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Structural Analysis in Eastern Yemen Using Remote Sensing Data

The structural geology of the petroleum basins of Yemen predominantly reflects the Mesozoic break-up of Gondwanaland. Interior basins formed during major rifting events in the Late Jurassic and Early Cretaceous. In the Tertiary the earlier structures were overprinted by extension associated with the opening of the Gulf of Aden. Drilling for hydrocarbons commenced in 1961 with the first commercial discovery by Hunt Oil in 1984 in the Marib Al Jawf Basin in western Yemen. Activity spread to eastern Yemen with a series of discoveries made by Nexen and Total in the Masilah region through the early 1990's.

Digitally processed Landsat TM images covering the central and southern portions of the Sirr-Sayun Basin have been used to map surface geology and structure. Jurassic and Tertiary extensional faults were mapped in the Hadramawt Group from the satellite data and extrapolated to analogous subsurface structures identified on a 2D seismic grid. Faults trending SE-NW controlled extension during both Late Jurassic and Early Cretaceous rifting episodes, creating a series of horsts and grabens extending through the study area. The underlying Infracambrian Najd Fault Zone controls the orientation of the SE-NW trending faults. Late Tertiary rifting reactivated earlier faults and created new E-W faults orientated parallel to the mid-oceanic ridge active in the Gulf of Aden. Structural mapping shows two distinct structural provinces which contain both Mesozoic and Cenozoic structures, but with different potential trap geometries. This has obvious implications for a hydrocarbon exploration strategy in the area.