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A Digital Workflow for Structural Analysis Using Remote Sensing Data: A Case Study from Eastern Yemen

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. The structure of the Umm Er Radhuma Formation was interpreted by picking control points on the base of the widespread Eocene Jeza Formation. The control points were then back-interpolated onto a digital elevation model constructed from Russian topographic maps. Contouring of the gridded control points generated a structure map of the Umm Er Radhuma Formation. The interpreted structure maps and faults were combined with well and seismic data to develop 2D structural cross-sections and 3D models of the study area. Structural mapping shows two distinct structural provinces which contain both Mesozoic and Cenozoic structures, but with different potential trap geometries.