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Structural Interpretation of The Zagros Fold-Thrust Belt (Northern Iraq)

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SUMMARY

Recently Northern Iraq has been the focus of extensive hydrocarbons exploration with high success rate as confirmed by the discovery of large oilfields mainly in fractured carbonate reservoirs. The fault and fracture network was produced by tectonic evolution of the area located in a complex structural domain in between the Arabian and Eurasian plates.

Evidences for the Arabia–Eurasia Plates convergence can be observed across the entire mountain range of the Northern Iraq and related to a combination of shortening on E-W/NW-SE-trending folds and thrusting, both related to several shortening stages occurred between Cretaceous and Miocene.

It is proven that most of the oil accumulation of Northern Iraq originated by a migration from earlier deeper accumulations which were initially hosted in stratigraphic or old structural traps, and which are now largely depleted. The structural evolution of the area has enhanced lateral migration from different source rocks of Upper Jurassic to Lower Cretaceous ages into the present-day traps which includes Late Tertiary inversion anticlines. During Late Tertiary, large scale folding and faulting/fracturing produced the deformation and leakage of older structures holding hydrocarbon that allowed the late migration to shallower limestone reservoirs (Cretaceous – Tertiary), or escape to surface. Hence in this portion of the Iraqi Zagros range most of the oil and gas discoveries lies into carbonate rocks reservoirs, such as the Cretaceous Qamchuqa Shiranish, Hartha and Kometan formations (all important carbonate fractured reservoirs), and the Tertiary Fatha (Lower Fars) Formation (limestone dominated unit).

In general, fracturing percentage is variable and becomes more localized close to faults. Fault zones could be relatively narrow and characterized by an intense fracturing. The prediction and exact characterization of the faults and fractures network is a crucial factor for the positive results of hydrocarbon exploration.

The study area, part of Iraq, lies north of Latitude 35° North. The main purpose of this study was to examine the nature of the High Folded Zone and the structural styles across this region. The interpretation is based on the integration of the available geological and geophysical subsurface data, stratigraphy and tectonic published information, present day stress field measurements and a new structural interpretation based on remote sensing techniques for all the anticlines in the high folded zone. These data were integrated to build a regional structural model and to provide a detailed structural description of the folds located in the High Folded Zone.