New Petroleum Systems Related to the Structuring of Meso-Cenozoic Basins in North African Plate Tunisian Margin

Mourad Bédir¹, Mohamed Soussi², Hakim Gabtni¹, Hajer Azaiez¹, Taher Zouaghi³, Sami Khomsi³, Dorra Tanfous-Amri², Afif Arbi¹, Faten Houatmia¹, and Akram Soltani²

Abstract

Atlassic Meso-Cenozoic Petroleum proven systems of carbonate and siliciclastic deposits in the North African plate Tunisian margin are distributed to a platform and basin mosaic that is studied here for more petroleum systems structuring understanding and discoveries for new objectives. Modern integrated studies had been undertaken to highlight the tectono-sequence deposits structuring and the relationship between platform to basin potential zones. Subsurface studies were based on petroleum wells, wire line logging, seismic reflection and gravimetric data and seismic stratigraphy of system tract distribution calibrated to surface structural, sedimentology and sequence stratigraphy for carbonate and siliciclastic characterization and basin modelling. Sedimentary cover basin structuring is controlled by deep-seated E-W and N-S strike slip flower Master faults connected to NE-SW and NW-SE Reidels. These faults guided a Triassic, Jurassic and Cretaceous carbonate deposits in a pull a part rift platform and basins induced by a regional N-S to NE-SW extensional strains accompanied by Upper Triassic salt pillow to diapirs bodies and basic magmatic intrusions along faults since the Jurassic period exhibiting rim synclines, prograding deposits, turbidites, Reefs and pinch outs. These rift-sealed basins constitute new targets with complete petroleum systems ingredients. Upper Cretaceous to Eocene Pyrenean and Miocene to Quaternary Alpine and Atlassic NW-SE compressional strains reactivated platform-basin borders deep-seated new ramified transpressional faults inducing basin inversions, salt intrusions, folding, thrusting and foreland basins. Carbonate and siliciclastic source rocks and reservoirs of respectively Cretaceous and Tertiary deposits exhibit prograding system tracts, Reefs, deltaic to deep-sea fan channels and turbidites. These reservoirs represent a new petroleum exploration targets. Both rift and compressional superposed basins present structural and stratigraphic hydrocarbon traps and prospects along faulted transition borders with stratigraphic unconformities, pinch outs, Flower faults and fold flanks closures. Basin modelling and timing events suggest a maturation, expulsion, migration and trapping of hydrocarbons towards platform-basin borders.
New Petroleum Systems Related to the Structuring of Meso-Cenozoic Basins in North African Plate Tunisian Margin

Mourad Bédir 1, Mohamed Soussi 1, Hakim Gabita 1, Hajar Azaiez 1, Taher Zouaghi 1, Sami Khomsi 1, Doreh Tanfous-Amer 1, Afif Arbi 1, Faten Houdatma 1 and Akram Soltani 1

1. Georesource Laboratory, Center of Earth Research and Technologies, Bujor Cédria Technopark, BP. 273, 8020 Soliman, Tunisia. bedmour@yahoo.fr
2. Department of Geology, University of Tunis El Manar. Campus 10606 Tunis, Tunisia. 3. Faculty of Earth Sciences, University of Kind Abdullah. Jeddah, Saudi Arabia

ABSTRACT

Meso-Cenozoic Petroleum proven systems of carbonate and siliciclastic deposits in the North African plate Tunisian margin, are distributed to a platform and basin mosaic that is studied here for more petroleum systems structural understanding and discoveries for new objectives. Modern integrated studies had been undertaken to highlight the tectono-sequence deposits structure and the relationship between platform to basin potential zones. Subsurface studies were based on petroleum wells, line logging, seismic reflection, gravimetric data and seismic stratigraphy of system track distribution calibrated to surface structural, sedimentology and sequence stratigraphy for carbonate and siliciclastic characterization and basin modeling.

Sedimentary cover basin structuring is controlled by deep-seated E-W and N-S strike slip flower Master faults connected to NE-SW and NW-SE Riedels. These faults guided a Triassic, Jurassic and Cretaceous carbonate deposits in a pull a part rift platform and basins induced by a regional N-S to NE-SW extensional strains accompanied by Upper Triassic salt pillow to Diapir bodies and basic magmatique intrusions along faults since the Jurassic period exhibiting rim synclines, prograding deposits, turbidites, Reefs and pinch outs. These rift sealed basins constitutes new targets with complete petroleum systems ingredients.

Upper Cretaceous to Cenozoic Pyranean and Mesozoic to Quaternary Alpine and Atlantic Cretaceous - SE compression reactivated platform-basin borders deep-seated new ramified transpressional faults inducing basin inversions, salt intrusions, folding, thrusting and foreland basins. Carbonate and siliciclastic source rocks and reservoirs of respectively Cretaceous and Tertiary deposits exhibit prograding system tract sy, Reefs, delatic to deep sea fans channels and turbidites. These reservoirs represent a new petroleum exploration targets. Both rift and compressional superposed basins present structural and stratigraphic hydrocarbon traps and prospects along faulted transition borders with stratigraphic unconformities, pinch outs, Flower faults and fold faults closures. Basin modeling and timing events suggest a maturation, expulsion, migration and trapping of hydrocarbons towards platform-basin borders.

Keywords: Tunisian margin, Petroleum systems, Meso-Cenozoic, Seismic, Basin Modeling

OIL AND GAS FIELDS PETROLEUM SYSTEMS DISTRIBUTION AND STRUCTURING:

NEW PETROLEUM TARGETS RELATED TO STRUCTURAL-STRATIGRAPHIC TRAPS PROSPECTS

PETROLEUM BASIN MODELING