N361: Petroleum Geology of Kurdistan

Instructor(s): Richard Jones

Format and Duration
Classroom - 5 Days

Summary

This course examines the key elements of the hydrocarbon systems prevalent in Kurdistan; source, reservoir, trap and migration are evaluated in relation to regional stratigraphy, and integrated with the geodynamic history of the Middle East from Lower Palaeozoic times to the present day. Theoretical concepts are illustrated with extensive examples of surface and sub-surface geology from across Kurdistan.

Learning Outcomes

Participants will learn to:

1. Describe the key elements of hydrocarbon systems in Kurdistan, and place these elements within a regional litho-stratigraphic framework.
2. Identify four-way closing anticlines as potential hydrocarbon traps, using satellite imagery and geological maps.
3. Examine anticlines to assess the structural integrity and look for evidence that a trap is breached.
4. Summarise overall structural geometry from 2D seismic data.
5. Categorise Kurdistan reservoirs in relation to matrix and fracture permeability and porosity.
6. Describe the key components of a conceptual fracture network model.
7. Interpret stacked petroleum plays in terms of multiple source rocks and reservoirs.
8. Relate the regional stratigraphic framework to a plate tectonic model for the wider Middle East region, incorporating opening of the Tethys oceans, and closure to form the Zagros mountain belt.
9. Use regional geodynamics to predict timing of hydrocarbon migration and variation in maturity across Kurdistan.

Training Method

This is a classroom course. Classwork will consist of keynote presentations, combined with hands-on practical exercises. Theory covered in the classroom will be richly illustrated with real case studies from the wider Zagros region: the main emphasis of the course will be the direct applicability of theoretical concepts to specific examples from Kurdistan.

Who Should Attend

The course is aimed at early-career geoscientists, as well more experienced geologists looking to consolidate their understanding of Kurdistan petroleum geology. Cross-discipline workers such as geophysicists and reservoir engineers may also benefit from the course as an update and refresher.

Course Content

Regional plate kinematics & Middle East geodynamics

- Overall tectonic framework with timing of main events
- Proto-Tethys, Paleo-Tethys, Neo-Tethys oceans
- Oblique closure, transpression, and Zagros collision

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Core structural concepts (refresher)

- 3D fold geometries, anticlinal traps, trap integrity
- Thrusts and thrust-related folding
- Fractures and fracture systems
- Fractures in relation to folding
- Structural inheritance, basement reactivation

Zagros stratigraphy

- Litho-stratigraphy, bio-stratigraphy, chrono-stratigraphy
- Stacked reservoir-seal pairs
- Mechanical stratigraphy in relation to regional folding & thrusting
- Multiple detachment levels

Regional Petroleum Systems

- Zagros play types
- Proven petroleum systems

Mapping surface geology

- Importance of field survey
- Use of satellite imagery to complement fieldwork

Sub-surface data & interpretation

- Challenges of seismic interpretation
- Borehole logs and correlation
- Use of satellite imagery to complement fieldwork

Balanced cross-sections

- Construction, balancing and restoration
- Assumptions and limitations

Fractured reservoirs

- Characterising fracture networks
- Influence of mechanical stratigraphy on fracture systems
- From outcrop to Discrete Fracture Network (DFN) modelling

Surface & near-surface processes: gravity, erosion, evaporite dissolution