



N043: Gulf of Mexico Petroleum Systems

Format and Duration

Instructor(s): Mark Rowan, John Snedden, Adry Bissada, Lesli Wood and Niven Schumaker

Classroom - 5 Days

Summary

Leading experts present an overview of petroleum systems in the Gulf of Mexico (GOM). The course provides an understanding of the hydrocarbon source, reservoir and trapping styles with particular emphasis on the deepwater settings in the northern GOM. Attendees will learn methods and principles to optimize their exploration and exploitation efforts in the basin.

Learning Outcomes

Participants will learn to:

1. Analyze the tectonic history, regional stratigraphic framework, structural styles, depositional systems and physiography of the Gulf of Mexico (GOM).
2. Apply the principles of salt-related deformation to petroleum exploration and production in the GOM.
3. Contrast supra-salt and sub-salt exploration targets.
4. Demonstrate how depositional environments, texture and compaction can control reservoir quality in the offshore northern GOM.
5. Use regional stratigraphic markers to build exploration frameworks and identify reservoir play fairways.
6. Use petroleum geochemistry data and basin modeling techniques to assess the roles of source rock richness/types, maturity, migration and reservoir processes on oil quality.
7. Determine the risks of petroleum charge access/volume in the Gulf of Mexico.
8. Critique the origin, significance and methods of predicting geopressure in the Gulf of Mexico.
9. Apply seismic geomorphology concepts to better understand the processes, sources and sinks for deepwater sedimentary deposits.

Training Method

A five-day classroom course comprising lectures, exercises and case studies.

Who Should Attend

Geologists, geophysicists and engineers who are seeking an overview of the northern Gulf of Mexico for exploration or exploitation. The course will especially benefit those who are unfamiliar with or have recently begun working in the GOM.

Prerequisites and Linking Courses

There are no prerequisites for this course.

An excellent follow-on to N043 is N343 (Depositional Evolution of the Gulf of Mexico Sedimentary



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Basin), an exercise-rich course at the Skilled Application Level. Linking courses to N043 are: N023 (Salt Tectonics Field Seminar: Diapirs and Associated Deformation, Nova Scotia, Canada); N071 (Workshop in Geological Seismic Interpretation: Salt Tectonics); N072 (Workshop in Geological Seismic Interpretation: Deep Marine Systems); and N232 (Salt Tectonics: Global Styles, Spanish Outcrops, Basque-Cantabrian Pyrenees, Spain).

Persons seeking a deeper understanding of petroleum geochemistry can take N084 (Petroleum Generation and Migration) followed by N010 (Geochemistry and Petroleum System Modelling).

While N043 introduces participants to geopressure prediction, this topic is addressed more fully at a Basic Application Level in N013 (Overpressure in Petroleum Systems and Geopressure Prediction) and at a Skilled Application Level in N249 (Advanced Pore Pressure Prediction Workshop: Concepts, Mechanisms, and Workflows).

Course Content

The course covers the structural setting and tectonic history of the basin; its stratigraphic infill; the nature and distribution of the principal hydrocarbon source rocks, source rock maturation history and impact on fluid types/quality; the main depositional systems and the active structural processes that shape and control the sediments. A section on seismic imaging provides insight to the range and limitation of the 3D time and depth datasets that significantly contribute to our understanding of the subsurface.

Topic 1

- **Structural Architecture of the Gulf of Mexico (Mark Rowan):** Overview of the dominant structural trends and styles of the basin and their impact on the petroleum systems. Topics will be addressed from the bottom up: crustal architecture of the conjugate passive margins and consequent salt deposition; gravity-driven deformation and diapirism at the autochthonous salt level; and canopy formation and associated shallow deformation.

Topic 2

- **Depositional Evolution of the Gulf of Mexico (John Snedden):** Tectonostratigraphic framework (Triassic to Present). Deep basin seismic strike correlation exercise, part I.

Topic 3

- **Reservoir Geology (John Snedden):** Exploration Play history, onshore to offshore. Key GOM reservoir depositional processes and reservoir characteristics. Deep basin seismic strike correlation exercise, part II (deepwater fans).

Topic 4



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- **Petroleum Geochemistry of the Greater Gulf of Mexico Petroleum Systems - Principles and Practice (Adry Bissada):** Age and nature of source intervals, maturity and charge, seeps, oil types and biodegradation.

Topic 5

- **Depositional Systems and Reservoirs, Southern Gulf of Mexico (Lesli Wood):** Comparison of petroleum systems in the Mexico-portion of the Gulf of Mexico with those in the U.S. Gulf of Mexico along the eastern Mexico margin.
- **Geopressure (Niven Shumaker):** Introduction to the development and prediction of overpressure in the Gulf of Mexico petroleum system.