

Salt Tectonics of the Gulf of Mexico (G092)



Tutor(s)

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Overview

The objective of this 3-day course is to provide geoscientists with a detailed explanation of those aspects of salt tectonics applicable to the northern and southern Gulf of Mexico (GoM) salt basins. It consists primarily of lectures, with examples from the GoM and other basins, that are supplemented by practical exercises. The emphasis is on fundamental mechanics and processes, structural geometries and evolution, salt-sediment interaction and the implications for hydrocarbon exploration and production.

Duration and Logistics

A 3-day in-person classroom course, comprising a mix of lectures (75%) and seismic exercises (25%). The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

Level and Audience

Intermediate. The course is intended for geoscientists working the Gulf of Mexico and is also applicable to salt basins around the world.

Objectives

You will learn to:

1. Understand the implications of layered-evaporite sequences for velocity-model building and seismic interpretation.
2. Describe how halite differs from other lithologies and how that impacts deformation in salt basins.
3. Characterize the ways in which extension, contraction and differential loading trigger salt flow and diapir initiation / growth.
4. Interpret typical salt and stratal geometries associated with salt evacuation and diapirism.
5. Predict how drape folding around passive diapirs impacts stratal geometries, faulting and reservoir distribution in diapir-flank traps.
6. Understand why and how allochthonous salt forms and how salt sheets / canopies evolve.
7. Assess the effects of salt on various aspects of the petroleum system, including trap formation, reservoir presence, hydrocarbon maturation and migration and seal.

Course Content

This course will focus on the structural geology of salt basins, the geological interpretation of seismic data and the interactions between salt and surrounding strata. Each day's lectures will be supplemented by appropriate seismic-based exercises using 2-D and 3-D seismic data.

Salt basins

- Layered evaporite sequences
- Tectonic settings

Fundamentals of salt tectonics

- Mechanics of halite and other evaporites
- Drives and processes of gravitational failure of divergent margins
- Definitions

Extensional salt tectonics

- Thin-skinned extension and diapir initiation
- Diapir reactivation
- Thick-skinned extension

Translational salt tectonics

Contractional salt tectonics

- Thin-skinned shortening
- Diapir initiation and rejuvenation

Strike-slip salt tectonics

Vertical salt tectonics

- Passive diapirism
- Salt movement triggered by differential loading
- Turtle structures and expulsion-rollover structures
- Near-diapir folding and faulting
- Dissolution

Allochthonous salt tectonics

- Salt sheet initiation and advance
- Styles and evolution of sheets and canopies

Implication for the petroleum system

- Trap formation and timing
- Reservoir distribution and facies
- Hydrocarbon maturation and migration
- Salt and weld seal