Salt Tectonics – From Concepts to Application (G020)

Tutor(s)

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Overview

This course covers all aspects of global salt tectonics. It discusses the origin and nature of evaporite basins and provides instruction on the essential elements of salt mechanics, diapirism, salt-related structural styles and salt-sediment interaction. Covered material ranges from fundamental concepts and practical application, to the influence of salt on petroleum systems. Lectures are complemented by exercises interpreting a variety of seismic data, illustrating characteristic structural styles and evolutionary development of salt basins.

Duration and Logistics

Classroom version: A 4-day 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.

Virtual version: Eight 3-hour interactive online sessions presented over 8 days. A digital manual and exercise materials will be distributed to participants before the course. Some reading and several exercises are to be completed by participants off-line.

Level and Audience

Advanced. The course is intended for geoscientists who wish to strengthen their skills in evaluating 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. Evaluate how salt impacts deformation in different tectonic environments, including rift basins, divergent margins and convergent-margin fold-and-thrust belts.
5. Interpret typical salt and stratal geometries associated with salt evacuation and diapirism.
6. Predict how drape folding around passive diapirs impacts stratal geometries, faulting and reservoir distribution in diapir-flank traps.
7. Understand why and how allochthonous salt forms and how salt sheets / canopies evolve.
8. Assess the effects of salt on various aspects of the petroleum system, including trap formation, reservoir presence and quality, hydrocarbon maturation and migration, and weld seal.

Course Content

Course Details

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 from worldwide salt basins.

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

Contractional salt tectonics

- Thin-skinned shortening
- Diapir initiation and rejuvenation
- Thick-skinned shortening

Strike-slip salt tectonics

Vertical salt tectonics

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

Salt dissolution

Allochthonous salt tectonics

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

Salt and petroleum systems

- Trap formation and timing
- Reservoir deposition and facies
- Hydrocarbon maturation and migration

Salt and weld seal