

N662: Salt Tectonics and Halokinetic Sequences Concepts in the Onshore Lusitanian Basin (*Portugal*)

Instructor(s): Pedro Barreto

Format and Duration

Field - 4 Days
Moderate Physical Demand

Summary

This field-based course offers an in-depth exploration of salt tectonics and its interactions with sedimentary processes, focusing on the unique geology of the onshore Lusitanian Basin. Participants will gain hands-on experience and insights into the implications of salt-related deformation on reservoir properties, hydrocarbon accumulations, geothermal potential, and carbon capture, utilization, and storage (CCUS) on upturned salt diapir flanks. Participants will observe in the field structural and sedimentary features that are usually only visible on seismic and/or drill cores. The outcrops will be compared with seismic examples from Lusitanian and Peniche Basins, perfect for understanding tectono-sedimentary structures at different scales, while allowing observation of sub-seismic scale features that are only visible on outcrops.

Business Impact: Attendees will gain first-hand insights into salt-related deformation and sedimentation processes, directly applicable to reservoir properties, hydrocarbon accumulations, geothermal potential, and CCUS projects. This immersive experience equips them with advanced skills, reducing operational risks and optimizing resource management.

Learning Outcomes

Participants will learn to:

1. Outline fundamental salt tectonics concepts.
2. Recognize the structural and sedimentary features associated with salt diapirs.
3. Analyze halokinetic sequences and their impact on sedimentation and reservoir properties.
4. Evaluate hydrocarbon accumulations and CCUS potential on salt diapir flanks.
5. Assess the role of salt bodies in geothermal gradient and fluid flow.

Training Method

This is a 4-day field-based course (0.5 days classroom, 3.5 days field). Participants will understand salt tectonics concepts while observing world-class field examples, which include visiting the deepest evaporite in Portugal quarry and several other outcrops of salt structures in Central Portugal.

Physical Demand

The physical demands for this class are MODERATE according to the RPS field course grading system. Some field localities may require walking approximately 2 km on easy terrain. Short walks (approx. 100m) over large boulders along the beach may be required.

Who Should Attend

This course is essential for professionals working in salt basins, as it enhances understanding of salt tectonics' impact on seismic interpretation, sedimentation, reservoir properties, hazard prediction during

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drilling, CCUS, geothermal energy, and more.

Course Content

Introduction to Salt Tectonics:

- Evaporitic sequences.
- Halokinesis: salt walls and diapirs.
- Internal structure and deformation of diapirs.

Halokinetic Sequences:

- Concepts of halokinetic sedimentation.
- Deformation of adjacent rocks due to passive diapirism.
- Recognition of onlaps onto growing salt diapirs.
- Types of unconformities: J-hook, low-angle wedge, and high-angle flap-onlap unconformities.
- Erosion and reworking of diapiric crest and flanks.
- Carbonate and clastic deposition and structures adjacent to salt diapirs.
- Dissolution processes and their effects on sedimentation above diapirs.
- Geometry and trapping mechanisms of hydrocarbons on saltier flanks.

Hydrocarbon Accumulations, CCUS, and Geothermal Potential on Diapir Flanks:

- Distinction between oil seeps and hydrocarbon accumulation.
- Examples of exhumed biodegraded oil fields.
- Concepts of lateral and top seals, trap, and reservoir.
- Concepts of gross rock volume (GRV), net pay and fill-to-spill.
- Geometry and trapping mechanisms of hydrocarbons on soapier flanks.
- Implications of salt bodies in thermal gradient of diapir flanks

Itinerary (*Subject to change*)

Day 1: Cross-section of Santa Cruz Diapir

Day 2: Eastern and western flanks of Caldas da Rainha-Óbidos Diapir

Day 3: São Pedro de Moel Diapir and exhumed paleo oil fields

Day 4: Western flank of Caldas da Rainha-Óbidos Diapir and thermal SPA visit in Alcobaça