

N563: A Structural Geology Toolbox for Geoscientists and Engineers (*Virtual Outcrops*)

Instructor(s): Douglas Paton

Format and Duration

Classroom - 3 Days

Virtual - 5 Sessions

Summary

This course blends observations from global outcrops with seismic data across a range of scales to address the key structural concepts that all practitioners should be aware of. It covers the main principal structural styles present within petroleum basins with a focus on a) understanding the interdependency of E&P data across a range of scales and resolutions, b) interaction of structure with basin fill and reservoir distribution and c) impact of structures on imaging and modelling. Through group discussions, participants will develop their own discipline-specific toolbox from these concepts, which they can apply directly to their day-to-day workflows. In doing so, attendees will consider and discuss how structural concepts commonly provide a mechanism to facilitate a cross-disciplinary approach to the subsurface.

Business Impact: All too often within Exploration and Production, the perception of structural geology revolves around estimating fracture distribution and fault transmissibility. Whilst this is important, structural geology concepts are critical to all elements of the workflow from **basin screening, prospect generation, play fairway analysis, and reservoir modelling/production**. It is essential, therefore, that all Petroleum Geoscientists and Engineers, regardless of their specialism, understand how structural geology impacts their **workflows** and the inherent **uncertainties** within them.

Learning Outcomes

Participants will learn to:

1. Appreciate how structures impact all elements of the E&P workflow.
2. Establish a structural geology toolbox that is appropriate for non-structural geology specialists and workflows.
3. Appreciate the importance of integrating observations at a range of scales (basin to prospect to reservoir).
4. Recognise the limitations of geophysical imaging on structural interpretation and develop domain specific (e.g., geophysical interpretation, sedimentology, reservoir modelling) strategies to account for this uncertainty.
5. Differentiate between pre, syn and post kinematic packages and understand the importance of applying these concepts to the interpretation and modelling of sub-surface data.
6. Understand how different strategies and components of the toolbox, need to be employed to interpret data in extensional, compression, multi-phase, and salt-dominated settings.

Training Method

This is a classroom or virtual classroom workshop comprising practical exercises using outcrop imagery and seismic data, supported by a series of short lectures and discussions.

Who Should Attend

Geophysicists, sedimentologists, petrophysicists, reservoir modellers, and petroleum engineers. Multidisciplinary team attendance would be highly beneficial.

N563: A Structural Geology Toolbox for Geoscientists and Engineers (*Virtual Outcrops*)

Instructor(s): Douglas Paton

Format and Duration

Classroom - 3 Days

Virtual - 5 Sessions

Course Content

The course content can be adapted live during the workshop and can be tailored to the requirements of individual participants or teams.

Each part of the workshop will develop a component of the toolbox that is applied to a specific structural style and setting to allow participants to explore setting-specific issues, as well as underlying generic concepts. The proposed general structure of the workshop is as follows:

What is structural geology and why it is much more than just fractures and fault seal?

The importance of application of structural geology across the Exploration and Production workflow. The interface of seismic interpretation, structural geology, reservoir distribution/integrity, and reservoir modelling.

Extension

What lessons can we learn by making multi-scale observations from rift systems to reservoir normal faults?

Contraction

Just how much are we missing on seismic data and what impact does that have on geophysical interpretation and reservoir prediction?

Multi-phase deformation

Most settings have multiple phases of deformation. Why is it important to identify this and what impact does this have on geometry, fluid flow, and critical-stress on faults?

Just how complex can it get?

When salt plays a role in the basin or asset, the system can become more complex in 2, 3, and 4 dimensions. This session will bring together concepts developed through the workshop and consider how a structural tool box can be applied to complex subsurface scenarios.