Summary

This course raises the quality of geological thinking using the medium of 3D seismic data. It enables seismic interpreters to improve their seismic interpretation skills through a better understanding of the nature and limitations of seismic data. It describes modern techniques for eliciting structural and stratigraphic information from those such and includes many examples of seismic data in a variety of geologic settings.

Learning Outcomes

Participants will learn to:

1. Analyse seismic data quality to ascertain what reliability of interpretation is possible, accounting for issues of resolution, positioning errors, multiples and imaging artefacts.
2. Employ modern techniques for structural and stratigraphic interpretation of 3D seismic data which honour geological principles.
3. Verify the bandwidth and phase of a seismic dataset and illustrate their implications for interpretation and well calibration.
4. Determine which seismic events to map by identification of key surfaces and packages.
5. Use seismic facies analysis to extract information about depositional processes.
6. Reconstruct geological history and establish the presence of unconformities.
7. Distinguish between a variety of geological settings as exhibited on in 3D seismic.
8. Question what image problems may result from complex structure.
9. Examine seismic data to identify potential direct hydrocarbon indicators (DHIs) and fluid contacts.

Duration and Training Method

A five-day classroom course with lecture sessions that will include many real data examples supplemented by hands-on practical exercises working with paper seismic sections.

Who Should Attend

Graduate-level geophysicists and more experienced subsurface professionals from other disciplines (geology, reservoir engineering) who require of a working knowledge of seismic interpretation techniques.

Prerequisites and Linking Courses

There are no prerequisites for this course, however for those with little or no prior knowledge of the seismic method either N085 (Introduction to Seismic Interpretation) or N080 (Geophysics for Sub-Surface Professionals) or is recommended as a precursor. N085 is designed for those with a Geoscience background, while N080 may appeal more to Engineers. N160 (Seismic Interpretation of Structural Styles: A Workshop for Petroleum Geoscientists) may appeal to those with an interest in structural geology and seismic interpretation. For further details please consult the Nautilus Training Alliance website.

Course Content

This course is designed to be a practical introduction to the interpretation of 3D seismic data using sound geologic principles and includes many real data examples to illustrate the principles of seismic
Day 1: Introduction

- Benefits of 3D over 2D seismic
- Basics of the volume:
  - Resolution and bandwidth
  - Imaging issues, multiples, illumination
  - Positioning, pull-up/push-down
  - Assessing data quality, noise, processing artefacts
  - Phase and well calibration
- Practical interpretation advice:
  - Optimizing display settings, scales, colour bar
  - Importance of integration
  - Be holistic
  - Think packages!

Day 2: Stratigraphic methods

- Mapping stratigraphy
  - Correlation of single events
  - Identification of key surfaces
  - Mapping issues
- Seismic facies analysis
- Depositional processes indicated in seismic

Day 3: Reconstructing past geological history and structural evolution

- Significance of unconformities
- Structural Interpretation
  - Extensional fault systems
    - Geometry and timing, growth packages
    - Links to depositional history
  - Deepwater thrust and fold belts
    - Interactions between sedimentation and tectonics
    - Imaging problems due to complex structure

Day 4: Structural Evolution contd.

- Wrench fault systems
  - Detection and analysis
- Salt basins
- Structural analysis of reservoirs

3D seismic interpretation Case Studies
• Catalogue of other geologic features seen in 3D data
  - Fluids and DHIs
  - Diagenesis on seismic data

Day 5: Case Studies cont’d

• Intrusions
• Seals: using 3D to improve risking methodology
• Final messages and review / questions