Seismic Interpretation: the Nuts and Bolts! (G113)

Tutor(s)

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Overview

We'll look at the why, what, and how of seismic interpretation over five days. Seismic theory, acquisition, processing and project set-up concepts will be referred to throughout the course. The two key questions framing the course are what do we want to know about the subsurface and what is the key question to answer from our interpretation?

Duration and Logistics

Classroom version. A 5-day course comprising a mix of lectures, case studies and exercises. Course materials will be provided in digital format but most exercises will be done on paper.

Level and Audience

Fundamental. Intended for early career geoscientists and for technical support staff who work with seismic data.

Objectives

You will learn to:

1. Explain the fundamentals of seismic data acquisition and processing.
2. Use common seismic attributes to characterize reservoirs.
3. Initiate fault and horizon mapping and understand what we are interpreting from a geological perspective.
4. Use synthetic seismograms to understand the seismic character, tie geological tops to seismic horizons and validate the time-depth curve for depth conversion.
5. Illustrate when and why we acquire or use a vertical seismic profile (VSP).
6. Perform time-to-depth conversions using simplified velocity models.
7. Apply basic seismic stratigraphic interpretation principles including mapping channels, pinch-outs and unconformities.
8. Explore the process of reporting and presenting seismic interpretations in addition to archiving data.

Course Content

Session 1

Anatomy of a seismic section

- What do you wonder about the seismic?
- How were the seismic data acquired and processed? Some fundamentals.
- What information can we extract?
- What might a reconnaissance workflow look like?

Session 2

Fundamentals of structural interpretation

- Seismic display and various seismic attributes.
- Fault mapping. Identifying hanging wall and footwall cut offs. Mapping fault sticks and fault planes.
- Horizon mapping. What we are interpreting from a geological perspective. Considering character, correlation, and coherency to manually and auto track horizons.
- QC and clean-up of faults and horizons.
- Creating a map that answers a critical question.

Session 3

Well to seismic ties

- Creating and using synthetic seismograms to understand the seismic character, tie geological tops to seismic horizons and validate the time-depth curve for depth conversion.
- Discuss whether sample synthetic seismograms are fit for purpose.
- When and why we acquire or use a vertical seismic profile (VSP).

Session 4

Depth conversion

- Why, when and how we depth convert seismic and derivative products.
- Depth conversion vs depth processing.
- Creating a velocity model.

Session 5

Stratigraphic interpretation

- Creating a process for identifying, cataloguing and high-grading features of interest.
- Mapping channels, pinch outs, unconformities, and isolated geo-bodies.
- Useful seismic attributes, including spectral decomposition and amplitude variation with angle (AVA).

Session 6

Wrapping it all up

- Expectations of a report or presentation.
- Archiving data and interpretations.
- Presenting to others.
- Where to go from here.