N288: Interpretation of Seismic Data in Structurally Complex Settings

Tutor(s): Gloria Eisenstadt

5 Days	Competence Level: Skilled Application
Classroom Course	
Computer Usage	

Summary

Seismic interpretations are often carried out in areas with multiple episodes of structural deformation. This course develops skills in interpreting 2D and 3D seismic data sets that show examples of structural reactivation and superposition of different structural styles, directions and timing. The course combines structural analysis with a practical application of a workstation-based workflow and a set of "best practices" that can be used to approach complex data sets.

Learning Outcomes

Participants will learn to:

1. Select an appropriate structural analysis workflow for interpreting a data set.
2. Select restoration techniques to diagnose interpretation errors.
3. Evaluate map patterns to recognize reactivated structures.
4. Judge the usefulness of traditional fault analysis tools in areas of multiple deformations.
5. Judge if older faults have been reactivated.
6. Evaluate growth stratigraphy to determine timing of each deformation event.
7. Integrate curvature analysis and coherence into fault mapping.
8. Assess the impact of ductile layers on patterns of fault reactivation.
9. Assess and realistically present interpretation risks and uncertainties.

Duration and Training Method

A five-day classroom course comprised mainly of paper- and PC-based interpretation exercises and supporting lectures. The course learnings will be platform independent, but examples will be worked using IHS Kingdom software. The approximate ratio of exercises to lectures is 70:30.

Who Should Attend

This course is designed for the experienced interpreter working with complex seismic data, but could be applicable for geoscientists with a minimum of four to five years experience interpreting seismic data and at least a college level course in structural geology.

Prerequisites and Linking Courses

This course is designed as a Skilled-Level follow-on to Basic-Level N090 (Seismic Structural Styles Workshop). A basic knowledge of seismic interpretation is assumed, as presented in N085 (Introduction to Seismic Interpretation).

Geoscientists taking this course may also wish to consider field courses on the Nautilus Structure and Tectonics portfolio such as Basic level N016/N116 (Structural Geology for Petroleum Exploration Nevada, USA and SW England, UK respectively) or Skilled level N053 Compressional Structural Styles: Models for Exploration and Production (Alberta, Canada).

N288: Interpretation of Seismic Data in Structurally Complex Settings

Tutor(s): Gloria Eisenstadt

5 Days	Competence Level: Skilled Application
Classroom Course	
Computer Usage	

Course Content

Many exploration areas have experienced multiple periods and directions of deformation. The resulting fault and fold patterns are usually complex and often misinterpreted. 2D and 3D seismic data in complex areas present very different problems for the interpreter. 2D seismic data sets are less time consuming to interpret but usually there are not enough data to constrain the interpretation. Complexly deformed 3D datasets can present a different challenge, as the frequency and complexity of the faulting can be overwhelming. In both cases, experience in unraveling multiple deformations, evaluating confusing map patterns, best use of seismic attributes for structural interpretation, and guidelines for interpretation are essential.

This course will introduce the seismic interpreter to 2D and 3D seismic data sets that show examples of structural reactivation and superposition of different structural styles, directions and timing. It will review and discuss existing structural concepts of reactivation fault patterns produced by more than one episode of deformation.

Structural interpretation topics covered will include:

- Structural analysis work flow – how to determine the best way to approach each data set
- Quick restoration techniques to diagnose interpretation errors
- Differentiating strike-slip deformation from oblique reactivation of basement faults or inversion
- Recognizing map patterns of reactivated structures
- How useful are traditional fault analysis tools in areas of multiple deformations?
- Do older faults always get reactivated?
- Is lineament analysis useful?
- Use of growth stratigraphy to determine timing of each deformation event
- Use of curvature analysis and coherence as a proxy for fault mapping
- How ductile layers change patterns of fault reactivation