Structural Styles and Tectonics: Advanced Interpretation and Evaluation Workshop (G118)

Tutor(s)

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Overview

The workshop is a follow on from the introductory course G111 and will focus on developing the concepts and skills presented therein. It will go into more detail on the structural styles for each tectonic setting and outline the uncertainty in sub-surface data that has to be considered.

Duration and Logistics

Classroom version: A 4-day course comprising a mix of lectures and exercises. The manual will be provided in digital form and participants will be required to bring a laptop or tablet computer to follow the lectures.

Level and Audience

Intermediate. The course is aimed at more experienced subsurface geoscientists who want to focus on the structural uncertainties in data, at all scales.

Objectives

You will learn to:

1. Appraise the impact of normal fault identification and fault mapping on reservoir understanding.
2. Gauge the limitations of seismic imaging for reverse faults, their temporal variation and impact on reservoir presence and distribution.
3. Validate strike-slip deformation on seismic sections and reconstruct the 3D and 4D evolution of strike-slip systems.
4. Evaluate negative and positive structural inversion and its impact on hydrocarbon systems and basin fill.
5. Manage the impact of deformation close to or beyond seismic resolution with respect to subsurface prediction and modeling.

Course Content

Course Details

Each session will comprise a combination of lectures and practical material. Using group and individual exercises we will consider how a key component of interpretation is an appreciation of the uncertainty inherent in the data at all scales. Throughout the courses participants will be encouraged to present their observations and interpretations to illustrate the variability that arises in data interpretation and to discuss its implications.

Session 1: Normal Faults

- Recognising normal faults on seismic sections
- Identification of isolated normal faults and linked fault arrays
- Impact of fault identification and mapping on reservoir understanding

Session 2: Normal faults and rift basins

- Linked arrays, additional fault complexity on mature fault systems
- Hydrocarbon plays on rift basin

Session 3: Reverse faults

- Awareness of the variety of compressional structures that occur
- Development of the key structural styles of reverse faults and the associated folding
- Consideration of the limitations of seismic imaging for reverse faults

Session 4: Interaction of reverse faults and 3D Geometry

- Consideration of the lateral and temporal variation of reverse structures
- Impact on reservoir distribution and presence

Session 5: Complex, multi-phase deformation

- Strike-slip deformation (recognising strike slip deformation on seismic sections)
- 3D and 4D evolution of strike-slip systems and impact on basin fill

Session 6: Inversion tectonics

- Identification of both negative and positive structural inversion
- Impact on hydrocarbon systems and basin fill

Session 7: Structural geology at reservoir scale

- **Beyond seismic resolution:** The aim is prediction, validation and impact of deformation close to or beyond seismic resolution. This session will consider A) statistical approaches and B) use of seismic attributes to predicting and model this deformation.
- **Into the reservoir model:** This final session will integrate the learning from the course and consider how it impacts the reservoir models from exploration and production perspectives. It will discuss how this affects fluid flow through faults and impacts both exploration and production.

Optional Session: Salt tectonics

This session will cover some of the key elements associated with salt basins.