

INTEGRATION OF LOG AND SEISMIC DATA

EXP002

COURSE DESCRIPTION

During the exploration and development stages, understanding the subsurface geometry, incorporating both structural and stratigraphic frameworks, and properly characterizing the reservoir are essential to understanding the 4D development of the petroleum system.

Seismic and well log datasets represent the cornerstone of information extraction in oil and gas exploration/development, and it is critical that these datasets are properly integrated. Critical reservoir components can be further constrained through integration of core (whole or sidewall), cuttings, and formation test data (LWD, wireline, pressure transient, etc...).

The course focuses on the fundamental principles and methodologies of accurately extracting critical data and information transfer. It is practically based, including integrating multiple datasets, quick-look and advanced techniques for critically analyzing/reviewing key calculations and maps (utilizing participants' data as appropriate), and benefits/drawbacks of modern computing. No single dataset provides the "ground truth" but rather when properly used can help constrain an interpretation, be it exploratory subsurface mapping or detailed reservoir characterization.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand the fundamentals of key data sets; including well log, core and cuttings, seismic, and formation fluid test data.
- Understand techniques of data integration; including depth synchronization, upscaling/downscaling, etc.
- Understand pitfalls of individual data sets, and how inclusion of other datasets can help constrain uncertainty.

WHO SHOULD ATTEND

Geologists, Geophysicists, Exploration/Production Managers, and Reservoir Engineers.

COURSE DURATION

5 Working Days

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COURSE OUTLINES

1. General review of and integration of various data types

- The “need” for sound subsurface mapping and reservoir characterization.
- Well log analysis.
- Review of key log types.
- Azimuthal (image) logs.
- Log correlation.
- Data extraction .Reservoir characterization – Shale volume, porosity, water saturation, permeability, etc.

2. Cuttings Analysis.

- Drilling mud.
- Flowline gas detection and analysis.
- Cuttings sampling and analysis.
- Micropaleontology and nannopaleontology.
- Real-time formation evaluation.
- Integrated geopressure/geomechanical analysis.

3. Core Analysis

- Core acquisition.
- Standard core analysis.
- Petrographic and mineralogic Investigation.
- Multi-sensor core logging.
- Special core analysis (SCAL) techniques.

4. Seismic Analysis

- Brief review of principles of reflection seismology.
- 2D versus 3D (and 4D time-lapse) interpretation/mapping concepts.
- Attribute analysis and AVO.

5. Formation Testing.

- Drill stem testing.
- Wireline and LWD formation testing.
- Pressure transient analysis.

6. Dataset Synchronization

- Data conditioning, including upscaling/downscaling.

- Log/core/cuttings synchronization.
- Synthetic seismograms.
- Seismic inversion techniques.

7. Pitfalls and differences between datasets

- Resolution variations (lateral and vertical).
- Scaling variations.
- Time to depth conversion (both seismic and well log data are acquired in time and must be converted to depth).
- Phase wandering on seismic data and issues with tie to well data.
- Elastic properties.

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