Introduction to Log Analysis and Petrophysical Characterization (G104)

Tutor(s)

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Overview

This course will review basic interpretation techniques from conventional logs with a focus on key reservoir properties.

Duration and Logistics

Classroom version: A three-day classroom course comprising a mixture of lectures and exercises. The course manual will be provided in digital format.

Level and Audience

Fundamental. This course is designed for those without any experience or familiarity with logs.

Objectives

You will learn to:

1. Introduction and review of key rock properties and terminology used.
2. Understand the wellbore environment and how this can affect the data acquired.
3. Review data types and acquisition technologies.
4. Understand log types and evaluate appropriate display scales.
5. Evaluate and QC log data.
6. Review the Archie equation and how it is used to determine water saturation.
7. Understand the limitations and pitfalls of the described interpretation techniques particularly with respect to deepwater reservoirs in the Gulf of Mexico.

Course Content

Day 1: Introduction

The rock properties of interest. What do we want our models to predict?

- The Wellbore Environment
    - Focus on OBM
- Acquisition and Types
    - LWD(RT/MEM), WL, CH?
- Introduction to Log Types and what they measure and what we can use them to identify.
    - Mudlog
    - Triple/Quad Combo
    - NMR
    - MDT
        - Pressure
        - Fluids
    - Core
- Basic displays/scales for different log types and/or environments

Day 2: Computing Rock Properties

Log data conditioning

- Log QC and Corrections
- Concatenating logging runs
- Basic rock properties
    - Lithology/Sandstone composition
    - Clay and clay types
    - Clay vs. Shale
- Clay volume
- Porosity
- Crossplot methods, Quicklook evaluation, two and three mineral models, shaly sand models
- Rw and Formation Salinity/Temperature
- Archie equation and shaly sand models (to fully understand the system prior to calculating water saturation)
- Fluid saturation calculations
- High level integration of log, core and pressure data

Day 3: Case Studies and Suggested Exercises (with focus on the deepwater GOM)

- OBM invasion looking like pay
- Ashes
- Thin Beds
- Bad Data
- Rw differences