Fundamentals of Petroleum Systems: Source, Maturation and Migration (G120)

Tutor(s)

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Overview

This hands-on course enables attendees to enhance their skills and critically evaluate all aspects of hydrocarbon charge, including source presence, maturation, migration, commodity type and timing. Lectures and exercises focus on characterization and prediction of hydrocarbon charge adequacy using core, well log and seismic data. Global examples, cover a range of basin and depositional settings, will be discussed and used in the exercises.

Duration and Logistics

Classroom version: A 3-day course comprising a mix of classroom lectures and discussion (50%), and hands-on exercises with subsurface datasets (50%). The lecture materials will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises. Exercises manuals will be printed for each student to enhance learning by interpreting using pencil on paper.

Level and Audience

Fundamental. This course is intended for geoscientists, reservoir engineers and petrophysicists who want to understand the basic concepts of petroleum systems.

Objectives

You will learn to:

1. Characterize source rock presence from cores, well logs and seismic and learn to predict source adequacy and risk from first principles.
2. Understand the controls on source rock maturation and describe fundamental controls on maturation and maturation timing using burial history charts.
3. Assess the fundamental controls on hydrocarbon migration and apply the principles of primary and secondary migration to predict hydrocarbon charge pathways and risk migration adequacy for plays and prospects.
4. Assess commodity implications from source rock type and maturity.

Course Content

Topics to include:

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- Controls on source rock development across all geologic settings.
- Mapping source candidates and assess their adequacy using cores, well logs and seismic data.
- Understand the fundamental controls on source rock maturation (basal heatflow, sediment/rock conductivity, surface temperature).
- How thermal maturity is calibrated to core data (vitrinite reflectance, Tmax, fluid inclusion data, borehole temperature data).
- Use burial history diagrams to evaluate maturation timing and understand controls on subsidence and uplift.
- Understand the fundamental controls on hydrocarbon migration.
- Use maps and seismic data to articulate primary and secondary migration and migration loss.
- Understand source type and maturation controls on commodity (oil vs. gas) types.
- Perform risk analyses on all components of charge (source presence, maturation, migration, timing) in exploration settings.