TETRA TECH RPS ENERGY | TRAINING

N751: Deep-Water Clastic Depositional Systems in a Source-to-Sink Context *(Pyrenees, Spain)*

Instructor(s): Rene Jonk

Format and Duration

Field - 5 Days
Low Physical Demand

Summary

Well-exposed exposures of the Pyrenean Foreland Basins in northern Spain offer unique opportunities to observe a range of different styles of sand- and mud-rich deepwater slope-to-basin-floor depositional systems and the linkages to updip shelfal and fluvial delivery systems. This course combines field activities with core examination, lectures, and exercises in deepwater systems, including subsurface examples from the North Sea, West Africa, and the Guyana-Suriname Basin. Field activities focus on deepwater lithofacies descriptions, stratal geometries, and practical applications for recognising key stratigraphic surfaces.

Participants describe core and integrate outcrop (including 3D virtual models), core, and well-log information with seismic data to generate high-resolution maps of reservoir styles in different deepwater settings. Engineering data is utilised to emphasise how this type of information can improve the prediction of reservoirs and their performance. Play fairway mapping of regional source-to-sink systems is used to discuss reservoir, source, and seal play-scale risking. Course examples include core, well-logs, and seismic datasets that are compared and contrasted with extensive outcrop exposures to help participants extrapolate 2D outcrop information into 3D views of reservoir-scale depositional systems using high-resolution photogrammetry models of the outcrops. Aspects ranging from frontier exploration, through discovery appraisal, to field development are discussed.

Learning Outcomes

Participants will learn to:

1. Evaluate the sedimentological processes of transport, erosion, and deposition in deepwater depositional systems and their impacts on reservoir architectures.
2. Describe deepwater lithofacies and relate them to stratal geometries.
3. Risk reservoir presence and seal adequacy for prospects and field segments.
4. Interpret deepwater environments of deposition based on lithofacies associations and stacking patterns.
5. Utilise outcrop analogues and depositional models to understand the 3D distribution of reservoir facies.
6. Correlate rock properties to facies and build geologic models.
7. Perform facies mapping to highlight impacts on reservoir performance during appraisal and production.
8. Integrate play-scale assessments of reservoir, source, and seal within a source-to-sink stratigraphic context.

Training Method

This is a field course in the Pyrenean Foreland Basins. Fieldwork includes presentations, sedimentological

exercises, modelling exercises, and discussions. Short classroom sessions comprise a core visit, subsurface case studies, and reviews of the fieldwork.

Physical Demand

The physical demands for this course are LOW according to the Tetra Tech RPS field course grading system; the course requires basic fitness levels. Fieldwork is carried out in the relatively gentle topography of the southern Pyrenees, at altitudes of 500–1,200 m (1,650–3,940 ft). Access to the outcrops is straightforward, with many localities being roadside stops. Some short walks of up to 0.5 km (0.3 miles) take in riverside paths and scrubland. Transport will be by coach on paved roads.

Who Should Attend

This course is relevant to all subsurface scientists (geologists, geophysicists, and engineers) who wish to broaden and deepen their knowledge of deep marine clastic plays. Managerial and commercial staff will also benefit from participation. This field course is suitable for multi-disciplinary team attendance.

Course Content

- Interpret depositional settings and related reservoir architecture and lithofacies associations.
- Interpret sequence stratigraphic surfaces in outcrop, logs, and seismic within deepwater settings.
- Use core and well logs to interpret environments of deposition.
- Evaluate reservoir geometry and connectivity in different depositional environments.
- Apply interpretation and mapping techniques for core, well logs, and seismic lines in deepwater settings, from exploration to production scales.
- Develop mapping strategies for reservoir, source, and seal play elements in deepwater settings.
- Identify and map play fairways within a sequence stratigraphic source-to-sink context.

Course Itinerary (Indicative)

Day 0:

- Arrive in Spain (Barcelona) airport

Day 1:

- Drive to Aínsa
- Field - Basin introduction and deepwater systems fundamentals

Day 2:

- Field - Confined systems (channels, levees, and channel-lobe transitions, core visit),

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Day 3:

- Field - Distributive systems (channel-lobe transitions and basin-floor fans), reservoir architecture and seal evaluation

Day 4:

- Field - Play-scale reservoir, source, and seal aspects of deepwater depositional systems - linkages between fluvial, deltaic, slope, and basin-floor deposition

Day 5:

- Classroom - Course review and wrap-up
- Return to Barcelona airport (PM)