N387: Exploration and Development in Fluvio-Lacustrine Systems

Format and Duration
Classroom - 3 Days

Instructor(s): Gary Nichols and Philip Hirst

Summary

This course considers fluvial, alluvial fan and lacustrine depositional systems as exploration targets and in terms of field development. The controls on these systems will be assessed at a variety of scales to aid the understanding of the distribution of source rocks and reservoir units in continental basins. Topics covered include stratigraphic analysis and correlation, tectonic, climatic and base level controls on facies distributions, system-scale variations in sandstone body architecture, and dimensions and connectivity of reservoir units. Exercises based on subsurface data form a key element of this workshop.

Learning Outcomes

Participants will learn to:

1. Understand the characteristics of alluvial fan, fluvial and lacustrine systems in sedimentary basins.
2. Evaluate and integrate the controls on lacustrine and fluvial depositional systems.
3. Develop tools for the prediction of field-scale distribution of reservoir units.
4. Analyse the variation in stratigraphic architecture of fluvial successions in terms of connectivity within a reservoir.
5. Evaluate the different scales of heterogeneity in fluvial successions and their effects on reservoir quality.
6. Use appropriate correlation techniques in fluvio-lacustrine systems.
7. Assess tectonic controls on basin margin alluvial fan characteristics.
8. Integrate different data types in the analysis of continental depositional systems.

Training Method

This is a classroom workshop presented as a mixture of seminars, case study presentations, workshops discussions and exercises of varying duration in the classroom.

Who Should Attend

The course is aimed at relatively experienced exploration and development geoscientists, petrophysicists and reservoir engineers.

Prerequisites and Linking Courses

Participants are expected to have a background in clastic sedimentology. For those wanting an introduction to fluvial sedimentology and reservoir geology at the Basic Application Level there are courses N155 (Introduction to Clastic Depositional Systems: A Petroleum Perspective) and N156 (Clastic Depositional Systems in a Basinal Framework: Exploration and Reservoir Implications (Pyrenees, Spain). Course N108 Exploration and Geological Model Development in Fluvial Reservoirs (Ebro Basin, Spain) provides and opportunity to consider many of the topics covered in N387 in a field context and apply them to the building of reservoir models.

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Course Content

1. Continental Rift Basins
1.1 Controls on Sediment Accumulation in Rifts
1.2 Sediment Supply

2. Fluvial Systems
2.1 Fluvial and Alluvial Systems
2.2 River Forms
2.3 Channel-fi lling Processes
2.4 Trends in Fluvial Systems
2.5 Floodplain Deposition
2.6 Patterns in Fluvial Deposits
2.7 Soils and Palaeosols
2.8 Fluvial Systems Summary
2.9 Fluvial Form in Modern Continental Sedimentary Basins: Distributive Fluvial Systems
2.10 Ancient Fluvial Distributary Systems
2.11 Fluvial Distributary Systems and Lakes
2.12 Conditions for the Formation of a DFS: Tectonic and Climatic Settings
2.13 The Stratigraphic Architecture of Fluvial Distributary System Deposits

3. Alluvial Fans
3.1 Morphology of Alluvial Fans
3.2 Processes of Deposition on Alluvial Fans
3.3 Fluvial Deposits Forming Alluvial Fans
3.4 Modifi cation of Alluvial Fan Deposits
3.5 Controls on Alluvial Fan Deposition

4. Lacustrine Systems
4.1 Lake Formation
4.2 Lake Hydrology
4.3 Lake Margin Deposits
4.4 Deep Lake Facies
4.5 Saline and Ephemeral Lakes
4.6 Controls on Lake Facies

5. Case Studies
5.1 The Ebro Basin, Southern Pyrenean Foreland Basin,C enozoic, Northern Spain
5.2 Lacustrine Case Study: The Orcadian Basin -Old Red Sandstone
5.3 The Clair Field, Devonian West of Shetland

6. Reservoir Modelling in Continental Systems
6.1 Introduction to Geocellular Models
6.2 What Aspects Need to be Considered when Modelling Continental Systems?
6.3 How Good is my Static Model?