
N358: Fine-Grained Carbonate Reservoirs (*Etretat, Northern France*)

Instructor(s): Andy Gale

Format and Duration

Field - 4 Days

Low Physical Demand

Summary

The course focuses on the identification, characterisation, and interpretation of chalk facies, including pelagic chalks, redeposited chalks, condensed sequences (including hardgrounds), and the parameters controlling reservoir properties in each of these. Diagenetic processes affecting poroperm will be considered in detail. The fracture characteristics and history, and effects on permeability of each facies will also be covered. The Normandy coast provides extensive exposures of Cenomanian to Santonian Chalks, which record progressive deepening of the Cretaceous sea, recorded in the gradual cut-off of clastic supply and an increasingly oceanic depositional regime in which white pelagic chalks dominated. The region was strongly affected by deep erosive currents that created spectacular channels, on the flanks of which, extensive redeposition took place in the form of slump sheets and debris flows, analogous with those present in the Central Graben of the North Sea.

Business impact: The course will help participants develop a detailed understanding of **chalk depositional processes, facies, diagenetic processes and products**, and how these are controlled by primary productivity, sea level, local tectonics and other extrinsic factors (e.g. Milankovitch cyclicity). This provides a firm basis for understanding parameters that **control reservoir quality** in chalk depositional systems, and is applicable **throughout the E&P life cycle**.

Learning Outcomes

Participants will learn to:

1. Characterise the depositional processes that control facies distribution within a variety of chalk successions.
2. Explain how sea level changes control stacking patterns, sequences, and facies distributions in chalks and hence overall reservoir potential.
3. Evaluate the diagenetic processes taking place in chalks, the interaction between sedimentation and diagenesis, and the products of these and their effects on porosity and permeability.
4. Integrate logs for correlations with coeval successions, identify marker horizons, and incorporate other data including biostratigraphy and chemostratigraphy.
5. Relate the physical characteristics of individual facies to fracture style and thus controls on permeability.
6. Assess redeposited chalks with regards to their likely lateral extent, geometries, and reservoir potential.

Training Method

A field course comprising fieldwork and classroom presentations and exercises in a 75:25 ratio. Practical class and field-based exercises are based on field logging, identification of key lithologies and diagenetic processes and their interpretation in terms of depositional systems.



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The physical demands for this class are **LOW** according to the Tetra Tech RPS field course grading system. Basic fitness is required. The majority of field localities are beach locations accessed by steps or hard surfaced slipways. The longest walk on the class is just over 3 km (2 mi) along a small road giving access to a beach. One locality involves the descent and ascent of a series of steep steps in order to access the outcrop. Transport is by coach on paved roads.

Who Should Attend

This course is multi-disciplinary and is designed for geoscientists, petrophysicists, and reservoir engineers involved in exploring carbonate basin settings or appraising and developing fine grained carbonate reservoirs. The lectures and exercises, as well as field discussions will integrate the various disciplines.

Course Content

Day 1: Arrival and Introduction

- Arrival at Paris Charles de Gaulle Airport and transfer to Domaine Saint Clair, Étretat
- Afternoon: Safety brief and introductory lectures on chalk petrography and sedimentological control on facies
- Afternoon: Short excursion to view the cliffs in Étretat

Day 2: Fieldwork and Classroom

- Morning: Lectures
 - Diagenesis and its control on poroperm
 - Correlation in chalks - what is possible and how can it be achieved?
 - Chalk reservoirs
- Afternoon: Fieldwork
 - Port Petrolier; Field identification of chalk facies and diagenetic products, assessing poroperm, logging, sequence stratigraphy, exercises
 - Tilleul: slump sheets; channels, mounds, exercise

Day 3: Fieldwork

- Morning: Fecamp; fractures, reservoir examples
- Afternoon: Senneville; chalk facies variability, debris flows, regional hardgrounds and basinwide correlation

Day 4: Fieldwork and Classroom



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- Morning: Fieldwork at Vaucottes; slump sheets
- Afternoon: Fieldwork at Banc à Cuves; channels, slump sheets, seismic resolution, exercise
- Evening: Course wrap up and summary

Day 5: Departure

- Transfer to Paris Charles de Gaulle Airport for departure