Core and Outcrop Sedimentological Study

Core and outcrop analog sedimentological logging are an essential step in understanding the relationship between depositional environments, sequence stratigraphy, diagenesis and present day reservoir properties in both carbonate and clastic rocks. Core logs and outcrops provide a direct sample of the sedimentary beds internal physical structures and nature of the bed contacts, as well as the macroscopic mineralogical and diagenetic composition. In addition, the relationship between types of fractures (i.e. open vs closed) and matrix porosity can be directly observed and macroscopic connectivity evaluated.

Core Logging

- Characterisation of key sedimentary features (grain size, texture, physical and biological structures, detrital components, diagenetic components, macroporosity)
- Characterisation of bed boundaries and recognition of significant bounding surfaces
- Characterisation of matrix macropore system and any relationship with the fracture network

Core and outcrop sedimentological data should also be used to help interpret image logs. Full circumference and slanted core photos can be downloaded alongside the borehole image in the ImageLog software.

Image Log Interpretation

Interpretation of micro-resistivity and ultrasonic borehole image logs for sedimentology, fracture and geomechanics studies is a cornerstone of our services. Our interpretation underpins reservoir quality models or supports operational activities such as selection of perforation or testing intervals.

Other well data can be loaded alongside the image for identification of fracture porosity vs matrix porosity, significant bounding surfaces and formation flow properties.

Sedimentology

- Image facies
- Dipmeter analysis for structural tilt
- Bedform types and geometries
- Unconformable / conformable bounding surfaces
- Karst-related features (breccias, cave fills, pipes)

Petrography and Diagenesis Analysis

As well as identifying the main macroscopic sedimentological characteristics of the interval of interest, a key step in understanding the reservoir development is the petrographic study of the rocks.

Petrography

- Carbonates and clastics (semi-quantitative data-basing of core, outcrop, sidewall cores and ditch cuttings samples to main detrital and diagenetic components, pore types)
- Microfacies analysis (in particular for carbonates)

Diagenesis

- Applied carbonate and clastic diagenesis
- Detailed cement stratigraphy (with the aid of cathodoluminescence techniques)
- Temperatures, timing and nature of the diagenetic phases and relationship with burial history, hydrocarbon migration, fracturing and porosity evolution
- Design and interpretation of multidisciplinary analytical programmes including:
  - SEM
  - XRD
  - Cathodoluminescence petrography
  - Fluid Inclusions Microthermometry
  - Stable Isotopes

Reservoir Models

The interpretation of sedimentological and petrographic data from cores, outcrops and ditch cuttings is integrated with any available wireline log, image log and core analysis data to develop a facies / reservoir model for the interval of interest. This approach applies from well to domain and reservoir scale.

- Integrated sequence stratigraphic analysis of outcrop and subsurface sections: core and cuttings evaluation integrated with wireline logs, image logs and seismic data to generate facies models and maps
- Integration of facies, diagenesis, porosity evolution, fracture and dynamic properties to assess reservoir and prospect quality

We can deliver a full workflow from data analysis to software-based fracture and reservoir models.

- Multi-well studies and correlations
- Analogue studies
- Integration of well and reservoir scale data to evaluate variations in well performance
- Static conceptual facies and reservoir models with relevant parameters for simulation

Training

Customised in-house or field-based training courses in ‘Carbonate Sedimentology, Sequence Stratigraphy and Diagenesis’ can be delivered to meet client requirements.

The course can be delivered as a customised version dedicated to individual companies, so that information and issues can be discussed in full confidentiality. In addition, we can offer an extended version of this course to include our ‘Fractured Reservoir’ course, to fully cover the issues and challenges presented by carbonate reservoirs.

Standard Course Content:

- Carbonate Sedimentology and Sequence Stratigraphy:
  - Carbonate factory and biological controls over carbonate sediments
  - Grain composition, mineralogy and rock classification
  - Carbonate platform facies models
  - Carbonate depositional systems and sequence stratigraphy

- Carbonate Diagenesis and Sequence Stratigraphy:
  - Marine, meteotic, burial diagenetic environment
  - Dolomitisation
  - Porosity classification - primary vs secondary porosity
  - Cements morphology and distribution
  - Carbonate diagenesis in a sequence stratigraphic framework

- Petrography and other analytical techniques (optional):
  - Photos petrographic analysis and cathodoluminescence
  - Stable isotopes
  - Fluid inclusions

In a fractured reservoir expect the unexpected...

...but reduce the risk with our comprehensive sedimentology and FRC services

Services

Our skilled geologists and engineers can support you with a range of services from the well scale to domain to reservoir scale. Our results support risk reduction in simulations, volumetric calculations and well planning and can apply at appraisal, development or secondary recovery stage.

Client List

- Adnoc
- Anadarko
- BP
- Certica
- Chevron
- Cepsa
- ConocoPhillips
- DNO
- Emerald Energy
- ENI / AGIP
- E.ON
- Geisel Energy
- Heritage Oil
- Hess
- Hunt Oil
- Hurricane Exploration
- Mærsk Energy
- Kufpec
- JXK Oil & Gas
- Maersk Oil
- Nexen
- Oil Search Ltd
- OMM
- POG
- Petro-Agip
- Petro-Canada
- Premier Kufpec
- Sade E & P Operations
- Schlumberger
- Shell
- Shahid Gas Energy
- Statoil
- Sterling Energy
- Total
- Tullow
- Venture Production
- Woodside Energy