Oil Exploration and Development

Utilising Sequence Stratigraphy and Applied Biostratigraphy

Introduction

In oil exploration and production, biostratigraphy is frequently used as a service for paleoenvironmental and age interpretation. However, important insights into the data generated for in-depth sequence analysis—such as unconformities and sequence breaks—as well as the identification of flooding and condensed surfaces and their application to the identification of facies (reservoir to non-reservoir) are frequently not fully realised. Consequently, the intended high resolution stratigraphical connections are also not found.

The most effective use of bio stratigraphical data is when it is combined with sedimentological, petrographically, and seismic interpretations. The goal of this training session is to demonstrate the optimal application of sequence stratigraphy and applied biostratigraphy in oil exploration and development. We'll talk about the drawbacks of using bio stratigraphical data, which frequently has to do with the geological setting in which formations were deposited. By recognising them and frequently applying them to comprehend the geology, this aids in unlocking the tool and bringing to light the potential benefits that optimal application of this method can yield.

With practical examples from Africa, the Middle East, Europe and Southeast Asia, this training session will present the applied application of biostratigraphy and sequence stratigraphy in both an exploration and development setting.

The following will be covered in this Course N Carry Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development training course:

- An overview of the several groups of microfossils
- An explanation of the rules of stratigraphy and how to determine a chronostratigraphic using biostratigraphy
- How to use specific microfossil groups as paleoenvironmental indicators and which ones to use for different ages of sediments
- What to avoid and how avoiding them can improve one's grasp of geology
- How to recognise important seismic signals using biostratigraphy and bio facies
- How to make the most use of bio stratigraphical data by combining it with other geological data (sedimentological, petrographically, and geochemical)
- How a high-resolution sequence stratigraphy is constructed using integrated bio stratigraphical data
- How play definition and play-based inquiry can benefit from the application of biostratigraphy

- Working examples of applied stratigraphy for exploration and development from Africa, Asia, and Europe

Objectives

Upon completion of this training course on Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development, participants will possess the following skills:

- Understand which ages of sediment and palaeoenvironment of deposition each type of microfossil can be used in.
- Gain knowledge on how to best utilise biostratigraphical data as an interpretive tool by integrating it with other geological data.
- Gain more proficiency in interpreting seismic data by learning to identify important markers and how to integrate biostratigraphical information to interpret these as a geological succession.
- Analyse the palaeoenvironment through the use of biostratigraphical assemblages.
- Utilise biostratigraphy as a development and exploration prediction tool.

Training Methodology

Upon completion of this training course on Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development, participants will possess the following skills:

The foundation of this training course on Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development will be PowerPoint presentations for each module, which will be followed by engaging solo and group exercises. Furthermore, to encourage participants to actively become aware of the predictive potential of sequence stratigraphy and applied biostratigraphy, there will be workshop sessions centred around actual exploration and development instances. In order to analyse actual working instances, training course participants are also requested to bring along biostratigraphic data, logs, and seismic when applicable from their own firms.

Organizational impacts

The advantages for the organisation will be as follows:

- Optimal utilisation of bio stratigraphical data, which is frequently obtained by an organisation but underutilised
- Organising programmes and biostratigraphical analyses to get the best findings at the lowest possible cost
- Higher resolution reservoir correlations (flow unit correlations for static models), spanning from exploration to development scenarios
- Sequence, and following integration with the seismic data, facies interpretations and improved reservoir prediction capabilities

- New definitions for plays, which in turn lead to new lead and prospect identification
- Revitalization of established exploration regions using fresh concepts to locate overlooked oil accumulations
- Creation of fresh ideas and exploratory plays for wildcat drilling

Personal Imapct

It is frequently unclear to the non-specialist geoscientist how to make the most use of bio stratigraphical data from corporate reports. The knowledge and skills needed to feel at ease using and integrating this data into daily work processes will be imparted by this training course on Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development. This will support their efforts in developing already-existing fields as well as in searching for new hydrocarbons.

- Supplying a useful working knowledge of several bio stratigraphical methods
- Knowing how to design and enhance a bio stratigraphical programme, from choosing which microfossils to process to choosing the ideal sample spacing
- Discover how to leverage bio stratigraphical data in well-to-well correlations to your advantage.
- Discover how to avoid common mistakes when using bio stratigraphical data and how to best apply it to sediments from various ages and palaeoenvironments.
- Discover how to combine bio stratigraphical data with other geological and seismic data, as well as how to use it to identify sequences and sequence boundaries.
- Discover how to apply bio stratigraphical data for reservoir correlations and facies interpretations in appraisal and development scenarios, as well as for novel play definitions in exploration areas.

Who should attend?

A wide range of specialists can benefit immensely from this Course N Carry Applied Biostratigraphy and Sequence Stratigraphy in Oil Exploration & Development training course, but in particular:

- Exploration Geologists
- Geologists for Development
- Seismic Interpreters
- Experts in sedimentation
- Petrographers
- Professionals in the upstream subsurface who are interested in discovering hydrocarbon plays in active petroleum systems and making the best use of geological data as a forecasting tool in sedimentary basins

Course Outline

Day 1

Using Stratigraphy to Explain Micropaleontology

- The Stratigraphic Laws
- Techniques for Dating Age of Sediments and Igneous Rocks
- Chrono stratigraphy and the Stratigraphical Column
- The Various Microfossil Groups and Methods of Preparation
- Palynomorphs, or organic microfossils, comprise Acritarchs, Chitinozoans, Dinoflagellates, Pollen, and Spores.
- Inorganic microfossils, such as Ostracoda and Micro foraminifera

Day 2

The Biostratigraphy

- Evolution of Microfossils via the Stratigraphical Column
- Creating Charts with Stratigraphical Ranges
- Fossil assemblages, the first and last downhole occurrences
- Maximas, Frequency Polygons, Abundance increases, and Numerical Methods
- List of Fossils
- The relationship between biostratigraphy and chrono stratigraphy and stratigraphical type sections

Day 3

Correlation Methods and Bio stratigraphical Correlations

- Constructing a Bio stratigraphical Cross Section and Choosing a Datum
- Pitfalls with downhole caving, reworking, contamination, and bio stratigraphical data
- An explanation of biozones
- Combining Petro graphical and Sedimentological Information
- The Combination of Information on Geochemistry
- Finding Inconsistencies or Pauses in the Sequences

Day 4

Paleoenvironments, Seismic Sequence Stratigraphy, and Biostratigraphy

- Making Use of Micropalaeontology in Paleoenvironmental Analysis
- Different types of microfossils: marine and non-marine

- Preservation of Various Lithologies and Microfossil Groups
- An explanation of water depth derived from many fossil groups
- The Bio stratigraphical Data-Based Sequence Boundary Identification
- Finding Condensed Sequences and Maximum Flooding Surfaces Using Bio stratigraphical Data
- Finding Low stand System and High Stand System Tracts Using Bio stratigraphical Data
- Combining Seismic Sequence Stratigraphy with Bio stratigraphical Data Integration
- The Difficulties, Realising the Solution Concerning the Geology and the Restraints

Day 5

Using play-based exploration techniques to define play

- Definition of Hydrocarbon Play: What Is a Play?
- The application of integrated biostratigraphy in play-based exploration methods
- The Potiguar Basin, Brazil's Equatorial Marginal, has the deltaic to marine Cretaceous Alagamar Play.
- The Lower Congo Basin in Angola's Cenozoic deepwater turbidites and related salt play
- The Arabian Plate's Early Silurian Hot Shales: Characterization of the Source Rock