TETRA TECH RPS ENERGY | TRAINING

# EC039: Stratigraphic Methods and Sequence Stratigraphy

Format and Duration
Self-Paced - 9 Hours

## Summary

A stratigraphic framework is essential to all scales of subsurface analysis, from regional studies to reservoir studies. This course provides information about different techniques for correlating and dating strata, considering each in terms of the underlying principles, their application and limitations. Particular emphasis is placed on the use of microfossils in biostratigraphic approaches to establishing the age of strata and to the use of sequence stratigraphic principles in subsurface correlation. Sequence stratigraphy provides a framework for correlation and determining the distribution of facies in the subsurface, based on the recognition of different surfaces and trends in strata.

## Learning Outcomes

Participants will learn to:

1. Be familiar with the principles of lithostratigraphy, biostratigraphy, chronostratigraphy and sequence stratigraphy and the scenarios where they can be applied.
2. Know the main types of microfossil fauna and flora that are used in dating and correlating rocks in the subsurface.
3. Be aware of the workflows employed in biostratigraphy and what information can be determined from the data.
4. Understand the concepts that underly sequence stratigraphy, including the controls on base level fluctuations, plus the rates and magnitudes of change.
5. Become cognisant with relevant terminology such as sequence boundaries, maximum flooding surfaces, parasequences and systems tracts.
6. Be able to interpret successions of strata in terms of sequence stratigraphic principles and use as a basis for correlation.

## Training Method

This is a self-paced e-learning course, consisting of 9 modules. Within each module the learning materials are structured into short sections, each including interactive text and image content, animations, video, and audio. Each module has a scored quiz at the end to provide the learner with their learning progress. This course has a learning time of approximately 8-12 hours.

## Who Should Attend

This course is designed to provide geoscientists and engineers with a foundational knowledge of sequence stratigraphy involved in the exploration, evaluation and production of subsurface reservoirs.

## Course Content

### Stratigraphy: Concepts and Lithostratigraphy

This module provides the nomenclature of geological time units and an introduction to stratigraphic charts. It also covers the principles of lithostratigraphy, nomenclature and stratigraphic relationships and the application of lithostratigraphy and lithostratigraphic correlation.

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## Biostratigraphy, Dating and Correlation

A variety of dating and correlation techniques are introduced in this module: Biostratigraphy, Radiometric dating, Chemostratigraphy and Magnetostratigraphy. Each are considered in terms of their use in conjunction with lithostratigraphy.

## Sequence Stratigraphy Principles

The basis of sequence stratigraphy is that a change in base level (usually relative sea level) results in a change in the patterns of sedimentation in almost all depositional environments. Importantly, these patterns can be recognised on seismic reflection profiles and in sedimentary successions in core and well-logs, providing an integrated approach to the analysis of subsurface data. It also provides a means of predicting facies distributions based on these patterns.

## Sequences and Parasequences

In this module, the terminology that has become part of the lexicon of sequence stratigraphy is introduced and defined. Terms include depositional sequence, parasequence, maximum flooding surface, sequence boundary and systems tracts (lowstand, highstand, transgressive and falling stage).

## Subsurface Sequence Stratigraphy

The sequence stratigraphic approach to the analysis of sedimentary successions can be applied to different types of data and be used to help combine information from different sources. It can be applied in the field using graphic sedimentary logs of the strata and it can be used in the subsurface using borehole core and wireline log data. The approach can also be applied to seismic reflection profiles that provide images of subsurface stratigraphic relationships. Patterns can be related to a general model and predictions made about likely trends both laterally and vertically.

## Causes of Sea Level Change

In this module the main causes of changes of relative sea level were identified: Aspects of plate tectonic processes affect the sea level on a global scale and these also have to be considered. Eustasy is a global phenomenon involving changes in the volume of water in the world's oceans due to changes in the volumes of continental polar ice, so every shoreline will experience the same amount of sea level rise or fall at the same time.

## Microfossils

This module comprises an account of the main microfossil groups and considers the different Microfossil groups used through geologic time.

## Micropalaeontological Data

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In this module the techniques for the sampling for microfossils are introduced and there is an account of data collection processes.

### Applied Micropalaeontology

Micropalaeontology can be used as a means of establishing palaeoecological patterns which aid in the understanding of palaeoenvironments. Biostratigraphic techniques, especially using microfossils, are a key part of sequence stratigraphic analysis.