

N402: Seismic and Sequence Stratigraphy for Subsurface Exploration and Development

Instructor(s): Peter Burgess

Format and Duration

Classroom - 4 Days

Virtual - 8 Sessions

Summary

This course provides a strong theoretical background and hands-on practical examples to demonstrate how the principles of seismic and sequence stratigraphy can be applied in subsurface mapping, correlation and prediction, across a range of scales, in both siliciclastic and carbonate settings. The course delivers a refresher on basic sequence and seismic stratigraphy, and then builds on this to develop deeper understanding of the key aspects that define and determine the subsurface predictive power of the seismic and sequence stratigraphic method and model. The course also provides an update on all of the latest developments in seismic and sequence stratigraphy, including use of numerical stratigraphic forward modelling methods to demonstrate and explore key elements, and finishes with an appraisal of the uncertainty inherent in the methods and models and how this impacts on subsurface prediction.

Business impact: Seismic and sequence stratigraphic methods allow interpretation and prediction of reservoir, seal and trapping at basin, play and prospect scale, guiding exploration and production planning processes.

Learning Outcomes

Participants will learn to:

1. Understand how accommodation and supply are fundamental controls on how strata accumulate.
2. Understand how determining accommodation and sediment supply controls on siliciclastic and carbonate strata allows prediction of petroleum system elements and subsurface heterogeneity across a wide range of basin types and sedimentary environments, even with few data, and understand the various sources of uncertainty associated with these predictions.
3. Apply the principles of seismic and sequence stratigraphy to evaluate regional basin-scale seismic sections, defining significant boundaries, megasequences, key geological intervals, predict the distribution of source rocks, reservoirs and seals, and construct plays and leads on the basis of this sequence stratigraphy, with little or no well control.
4. Appraise sequences and system tracts on seismic data and well logs for use in predicting reservoir, source and seal heterogeneity.
5. Appraise sequences and system tracts on seismic data and well logs for use in identifying stratigraphic trapping potential in different basins.
6. Understand the assumptions that underpin the sequence stratigraphic method and models and critically assess how these impact on uncertainty in subsurface interpretation and prediction.

Training Method

A classroom course comprising lectures, practical exercises, and case studies.

Who Should Attend

Geoscientists who require a working knowledge of stratigraphic principles applied to play fairway analysis, basin analysis, and reservoir description.

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Experienced geoscientists who wish to broaden their knowledge of these principles in the application of exploration and development subsurface analysis and prediction.

Course Content

- Course Introduction and Controls on Strata
 - *Exercise: Relative sea-level modelling in Excel*
- Basin types, style of fill, simple petroleum system predictions
 - *Exercise: Basic sequence stratigraphy and Chronostratigraphic diagram exercises*
- Siliciclastic sequence models & method
 - *Exercise: Correlation exercises*
- Carbonate sequence stratigraphic model - how is it different?
 - *Exercise: Manual and numerical Stratigraphic Forward Modelling carbonate modelling part 1*
- Siliciclastic and carbonate seismic stratigraphy
 - *Exercise: Seismic stratigraphy exercises (including Ottway rift)*
- Siliciclastic sequence model subsurface predictions
 - *Exercise: Numerical SFM with Javascript - standard sequence geometries*
 - *Exercise: Barrow delta exercise - bypass to a detached fan*
- Carbonate sequence model subsurface predictions
 - *Exercise: Carbonate build-up and sequence stratigraphy*
 - *Exercise: Manual and numerical SFM carbonate modelling part 2 - predictions*
- Sequence model assumptions and subsurface predictive power
 - *Exercise: Barrow delta exercise - how good is the slug?*
 - *Exercise: Offshore Morocco - where is the siliciclastic sand?*
- Developments in siliciclastic sequence stratigraphic subsurface prediction
- Developments in carbonate sequence stratigraphic subsurface prediction
 - *Exercise: Numerical SFM variable sediment supply etc*
 - *Exercise: Correlation of 2D versus 3D models: why 3D is so critical*
- Pragmatic sequence stratigraphy - things that work best.
- Summary & discussion - consequences for subsurface prediction and mapping