

## N269: Sequence Stratigraphy and Subsurface Prediction: Methods, Limitations and New Developments

Format and Duration  
Classroom - 3 Days

Instructor(s): Peter Burgess

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### Summary

An appreciation of the assumptions behind sequence stratigraphic models and methods, and an assessment of the validity and limitations of these assumptions is critical for successful subsurface prediction. This course will explain these assumptions and demonstrate methods that can be used to move beyond them to make useful, scenario-based predictions. Case studies will be used to understand how strata are interpreted in standard sequence stratigraphic models (e.g. facies, surfaces, and stacking pattern response to relative sea level changes), to consider alternative interpretations, and to make an assessment of the uncertainty present in all the model-derived predictions. There will be an emphasis on critical thought, and the application of simple stratigraphic forward models to illustrate how multiple scenarios can help assess uncertainty in the application of sequence stratigraphy to subsurface evaluation. The course will cover: basic assumptions of the sequence stratigraphic models and methods, important limitations of these assumptions, recent developments in the models, and application of stratigraphic forward modelling as a tool to address some of these limitations.

### Learning Outcomes

Participants will learn to:

1. Judge the different sequence stratigraphic methods, models and predictions.
2. Appraise all of the standard sequence and seismic stratigraphic methods such as interpretation of seismic reflections and terminations.
3. Evaluate how additional variables not included in the standard models (e.g. variable sediment supply) may impact on seismic and sequence stratigraphic methods, uncertainty and predictions.
4. Organise log and outcrop data in terms of a sequence stratigraphic hierarchy in addition to correlation and, away from data point predictions, reservoir and seal development, with a critical assessment of their underlying assumptions and the impact this has on the uncertainty involved in the prediction.
5. Validate simple scenario methods based on output from stratigraphic forward modelling tools to help assess the degree of uncertainty present in predictions.

### Training Method

A classroom course comprising presentations from the instructor and interaction from the participants, particularly focussed on a discussion of their own experience of the issues being presented. Practical exercises (some workstation based) are focused around the interpretation of subsurface data and the application of simple stratigraphic forward models to subsurface prediction.

### Who Should Attend

Geoscientists with a good working knowledge and hands-on experience of sequence stratigraphic principles applied to subsurface prediction. The course would suit those working in exploration, appraisal, and field development where there is a benefit in looking at the field in a semi-regional context.

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### Course Content

- Standard sequence stratigraphic models and predictions, Part 1: Siliciclastic models.
  - Exercise: the standard model and chronostratigraphic diagram exercise.
- Standard sequence stratigraphic models and predictions, Part 2: Carbonate models.
  - Exercise: manual modelling of a carbonate platform.
- Model assumptions and consequences for prediction.
  - Exercise: assumptions involved in log and outcrop correlations.
  - Exercise: seismic interpretation, assumptions about timelines.
  - Exercise: seismic interpretation, consequences of assumptions about lowstand bypass.
- The basics of stratigraphic forward modelling and why it is useful.
  - Stratigraphic forward modelling exercise: reproducing basic sequence architectures.
  - Stratigraphic forward modelling exercise: exploring non-uniqueness.
- Modifications to siliciclastic models.
  - Stratigraphic forward modelling exercise: exploring the consequences of variable siliciclastic sediment supply.
  - Stratigraphic forward modelling exercise: exploring the consequence of variable sediment transport rates.
- Modifications to carbonate models.
  - Stratigraphic forward modelling exercise: exploring the consequences of variable carbonate production and transport rates.
- Sequence stratigraphic predictions based on modelling multiple scenarios.
  - Stratigraphic forward modelling exercise: modelling multiple scenarios and creating predictive maps.
- Summary of consequences for subsurface prediction and mapping.