





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

Tutor(s): Peter Burgess

3 Days	Competence Level: Skilled Application
	Classroom Course
	Computer Usage

Summary

Sequence stratigraphic models are founded on certain assumptions, some of which are increasingly questionable. This course focuses on the assumptions that underpin the models and explores the consequences of these assumptions for subsurface prediction. The course describes new results and methods, forward modelling and scenario-based approaches that modify and enhance the sequence stratigraphic model and may allow better prediction.

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.

Duration and Training Method

A three-day classroom course. Teaching is carried out in an informal way with presentations from the instructor and with interaction from the participants, particularly focussed on a discussion of their own experience of the issues being presented. Practical exercises (some work-station 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.

Prerequisites and Linking Courses

The classroom course N402 (Seismic and Sequence Stratigraphy for Subsurface Exploration and Development) offers a thorough introduction to sequence stratigraphy whilst course N011 (High Resolution Sequence Stratigraphy: Reservoir Applications, Utah, USA), explores field based experience of sequence stratigraphy in outcrop with associated examples and exercises. Equivalent experience in the application of sequence stratigraphy to subsurface prediction would be equally valid. Course N477 (A Systematic Approach to Defining and Evaluating Stratigraphic and Subtle Combination Traps) would be a



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

Tutor(s): Peter Burgess

3 Days

Competence Level:
Skilled Application



Classroom Course

Computer Usage

useful additional classroom class to follow on from course N269,

Course Content

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.

- 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.