





D477: A Systematic Approach to Defining and Evaluating Stratigraphic and Subtle Combination Traps (*Distance Learning*)

Tutor(s): Mark Thompson, Mike Mayall and Stuart Archer

4 Days	Competence Level: Skilled Application
 Virtual Course	
 Computer Usage	

Summary

Business Impact: Many stratigraphic and combination traps are discovered serendipitously, throughout a basin's exploration history. They are often perceived as high risk and volumes are commonly underestimated, especially where the column height is larger than the structural spill. In this course we will develop a consistent and **systematic workflow** for the **deliberate identification** and **evaluation** of such traps. This is important as these subtle traps often get risked in an inconsistent manner across organisations but they can contain significant resources. Course participants will acquire the necessary skills to enhance value for their employers by **identifying new prospects**, performing robust **geological risk assessments**, and generating more accurate **resource volume assessments**.

Topics include classification schemes; defining a regional framework; formulation of a geological model; trap domains; regional angular unconformities; stratigraphic edges; risking and volumetrics.

Learning Outcomes

Participants will learn to:

1. Apply a methodical approach, through a systematic workflow, to identify stratigraphic and subtle combination traps within the appropriate tectonic and sequence stratigraphic context.
2. Appreciate the rich set of analogue fields world-wide in various plate tectonic and mega-sequence settings for both carbonates and clastic reservoirs. Deploy these analogues to help guide exploration in similar basins.
3. Evaluate prospects involving stratigraphic and subtle combination traps in terms of risk and resource estimation uncertainties.
4. Work to deliver an efficient exploration screening result in a "learning by doing" scenario, applying the workflow taught on the course.

Duration and Training Method

A virtual classroom course divided into 8 three-hour webinar sessions (equivalent to a four-day classroom course), comprising a number of informative exercises designed to get across the principles, punctuated by a series of short talks.

Greater than 50% of the time will be spent on exercises guided by industry experts with more than 35 years of experience each. Case histories are taken from a rich variety of tectonic settings and a large variety of depositional environments, both for carbonates and clastics.

Who Should Attend

This Skilled Application level course is aimed at exploration geoscientists with experience of seismic interpretation and a firm grasp of stratigraphic concepts and the fundamentals of petroleum systems. Team leaders and managers of exploration teams could also benefit from participation in this course.



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Prerequisites and Linking Courses

There are no specific prerequisites for this course, although familiarity with seismic interpretation would be beneficial, such as that acquired on N085 (Introduction to Seismic Interpretation) or N040 (Interpretation of 3D Seismic Data).

Related field courses in structural geology include N016 (Structural Geology for Petroleum Exploration, Nevada, USA) and N116 (Structural Geology for Petroleum Exploration, SW England).

Course Content

1. Introduction

- Classification schemes, understand the impact and importance of stratigraphic and subtle combination traps globally. Review the track record over last few decades.
- Exercise: Trap description methodology in terms of trap edges.

2. Regional framework: plate tectonic and mega-sequence settings for traps in carbonates and clastics

- Regional Framework:
 - Megasequences.
 - Location of analogue traps in extensional settings.
 - Location of analogue traps in compressional settings.
 - Description by systems tracts.
- Trap identification and classification (Exercise) – N Slope Alaska.

3. Integrated geological model: a revision of critical aspects of prospect elements



- Formulation of a geological model:
 - Role of pre-existing and syn-depositional topography on reservoir GDE's. Growth structures. The importance of sediment entry points and dispersal.
 - Impact of top seal thickness and environment of deposition.
 - Effects of early hydrocarbon generation synchronous with quartz cementation.
 - Concept of the first carrier. Coupled systems (source in close proximity, above or below the reservoir).
 - Migration foci - importance of chasing the molecules.
 - Seal effectiveness v available charge.
- Trap domains maps talk.

4. Regional angular unconformities

- Super-crop and sub-crop maps, case history LKU N Slope.

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- 2 exercises: SNS and Gippsland.

5. Stratigraphic edges – pinch-outs and erosional truncation

- Defining play-scale pinch out geometries on seismic data.
 - Exercises –Senegal, Sergipe.
- Defining paralic prospect scale stratigraphic traps.
 - Talk paralic traps.
 - Exercise - Brookian N Slope.
- Defining deep-water prospect-scale stratigraphic traps. Including lobes, channels, MTC's and 'waste zones'.
 - Exercises –Senegal, Sergipe, Guyana, Angola, Jubilee.
- Defining carbonate prospect-scale stratigraphic traps talk.

6. Aspects of risking and volumetrics

- Use of seismic attributes and direct hydrocarbon indicators (DHI's). Seismic limitations such as data quality, resolution, dip limitations. 3 cases for discussion.
- Risking guidelines and pitfalls. Relative risking with structural traps.
- BRV criteria: Importance of defining the geological model(s) – depth conversion, impact on resource estimation uncertainties, including reservoir quality changes towards pinch-outs, and possible volume underestimation. Exercise to emphasize dependency between column height and available charge volumes.
- Learning from well failures using a 'failure criteria lookback methodology' North Sea Case History. West of Shetland case history and exercise.
- Portfolio Management Exercise.

7. "The edges of the wedges": a suggested work flow (talk)

8. Kopervik exercise

- Participants will apply the work flow and lessons from the previous part of the course on a seismic dataset from the North Sea.
- Define the regional setting, construct a play cartoon, draw a trap domain map, and discuss risking and portfolio management of identified stratigraphic traps.