

De-risking Carbonate Exploration (G008)



Tutor(s)

[Paul Wright](#): Independent Consultant.

Overview

This is a 'what you really need to know about carbonates' course, in order to attempt to de-risk carbonate prospects. Carbonate rocks are complex; however, there are basic principles that provide a framework in which such complexity may be rendered understandable. The course focuses on large scale rules, risks, uncertainties, strategies and workflows, with a heavy emphasis on seismic facies. It does not focus on appraisal or development aspects.

Duration and Logistics

Classroom version: A 4-day classroom course comprising a mix of lectures (75%) and exercises (25%). The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

Virtual version: Eight 3-hour interactive online sessions presented over 8 days. A digital manual and exercise materials will be distributed to participants before the course. Some reading and several exercises are to be completed by participants off-line.

Level and Audience

Advanced. This course is really aimed at explorationists with at least a basic knowledge of carbonates but will also prove useful to more experienced geoscientists by providing a synthesis of recent advances in understanding carbonate reservoirs, supported by potentially highly practical methodologies for framing uncertainties for reservoir presence.

Objectives

You will learn to:

1. Frame likely carbonate plays in relation to a given stratigraphic age and basin type.
2. Identify the main types of carbonate platform as seen from seismic data, de-risk certain types of features and assess the likely presence of key seismic facies.
3. Evaluate for a given interval and platform type the likely reservoir facies (platform interior, carbonate sands, reefs, slope systems and chalks) and assess the likelihood of reservoir presence.
4. Understand how the development of primary and secondary porosity has varied through geologic time and how these changes impact upon reservoir quality.
5. Appreciate the principal modes of formation of dolomites and the predictive uses of different dolomite models.
6. Understand and identify the diverse origins of palaeokarstic macroporosity, associated risks and the different strategies for developing palaeokarstic reservoirs.

Course Content

Course Details

The course consists of lectures and exercises. The lectures focus on specific reservoir systems based on broad seismic facies and develop the methodology for defining the likelihood of reservoir-prone facies and of the diagenetic conditions for reservoir presence. For each major reservoir type a set of key associations and factors are evaluated as a form of flexible workflow. This approach is complemented by a series of exercises, including seismic, for identifying possible leads and carrying out de-risking procedures.

Topics

- A refresher on the basics of carbonate rock composition
- Carbonate platform types and seismic expression
- Plays, traps and reservoirs – generalities
- How carbonates change through time and how to predict likely reservoir-prone systems at different stratigraphic intervals
- Source rocks, including intraplatformal basins
- Isolated carbonate buildups – de-risking targeting carbonate ‘bumps’
- Platform margin plays: facies-controlled reservoirs and diagenetic controls (dolomite, fracturing, karst)
- Platform interiors – Late Paleozoic ice-house grainstone-to-build and fill systems, greenhouse systems and dolomite models
- Carbonate sands – tide, wave (barriers islands, infralittoral wedges) and internalites. Emphasizing how to determine possible sandbody geometries from regional to local data sets
- Slope and basinal carbonate plays, including fan lobe systems and chinks
- Dolomites – especially HTDs and hydrothermal burial corrosion-related reservoirs
- Paleokarst – types, facies, identification, exploration strategies and risks