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## N416: Southeast Asian Carbonate Systems and Reservoirs

Format and Duration

Instructor(s): Moyra Wilson

Classroom - 4 Days

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### Summary

This course provides a thorough grounding in the concepts, terminology and models used to interpret, assess and predict carbonate reservoirs, with a particular focus on southeast Asian systems. Grain-, to seismic- to global-scale variability in modern and ancient carbonates as well as their pore systems evolution are evaluated. The emphasis is on understanding controlling influences to better predict the heterogeneity so commonly encountered in carbonate rocks and reservoirs.

### Learning Outcomes

Participants will learn to:

1. Establish the primary controls on carbonate deposition temporally and spatially.
2. Characterise southeast Asian Cenozoic carbonates and contrast with modern and ancient systems developed elsewhere.
3. Apply commonly used classification schemes to carbonates, differentiate the principal components, textures and mineralogy of carbonate rocks.
4. Differentiate the main types of carbonate platform, their variability, scale and distribution of likely reservoir units.
5. Use a process-product approach as a methodology for evaluating carbonate systems.
6. Assess the primary depositional and secondary diagenetic controls on porosity development in carbonate reservoirs.
7. Establish the primary controls on the variety of carbonate platforms developed in southeast Asia and assess their potential as hydrocarbon reservoirs.
8. Distinguish the principal modes dolomitisation in southeast Asian carbonates.
9. Review the principal exploration and production issues particular to southeast Asian carbonate reservoirs.

### Training Method

This is a classroom course, comprised of lectures with numerous exercises involving sample study, platform evaluation, sequence development and reservoir characterisation. If access can be gained to appropriate material, the classroom time will be augmented by examination of cored subsurface carbonate reservoir intervals.

### Who Should Attend

Exploration and production staff working in carbonate reservoirs who require a better understanding of the controls on the distribution and heterogeneity of these reservoirs, particularly in southeast Asia carbonate systems.

### Prerequisites and Linking Courses

The course is suitable for those with little prior knowledge beyond a basic understanding of geology, but will also challenge those with carbonate experience.

The Nautilus Training Alliance has a broad portfolio of carbonate courses that provide further training in

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aspects such as carbonate seismic interpretation, sequence stratigraphy, petrophysics, core evaluation, reservoir characterisation and modelling, please see our website at [training.rpsgroup.com](http://training.rpsgroup.com) for further details.

### Course Content

Almost half of the world's hydrocarbon production comes from carbonate reservoirs. In SE Asia, potentially hydrocarbon bearing carbonates occur in most marine basins, excellently placed with respect to source and seal rocks, often forming highly productive exploration targets. However, carbonate reservoirs are notoriously fickle and unpredictable. Carbonates in SE Asia differ significantly from their better-studied arid counterparts. The course is designed to cover all aspects of carbonates as reservoirs with particular emphasis on those developed in the SE Asian region in the Cenozoic.

The first part of the course will address aspects common to carbonate systems in general such as: the controls on their global distribution, the variety of carbonate depositional systems and platform types, carbonate mineralogy, grain types and classification, how carbonates differ from siliciclastics, diagenesis etc. Following the establishment of these principles discussion will be largely centered around the variety of SE Asian carbonate systems and their characteristics as reservoirs.

Typical course content and itinerary given below, timings may vary:

#### Day 1:

- An Introduction to Carbonate Systems
- The global context of SE Asian carbonate systems and reservoirs
- Equatorial SE Asian setting: impacts on carbonate systems
- Global variability in carbonate systems: the arid subtropics versus humid tropics
- Carbonate versus siliciclastic systems
- Carbonate mineralogy and components
- Modern SE Asian carbonate systems and sediments
- A process to products approach to evaluating carbonate systems and reservoirs
- Platform-scale variability in modern environments, biota, components and deposits
- Carbonate depositional systems and facies development
- SE Asian reefal systems over time and the global biodiversity hotspot
- Grain-to-platform scale variability in carbonate systems
- Primary porosity variability across modern platform environments
- Carbonates in SE Asia: their tectonic and environmental context
- Exercises: Modern carbonate grain variability, Modern carbonate platform environments.
- Planned excursion: Modern carbonate systems & reefs – Aquarium visit (NTA only)

#### Day 2

- Carbonate classification schemes
- Study techniques in carbonate systems
- Carbonate diagenesis and controls

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- Carbonate platform models and their seismic characterisation
- Carbonate pore systems development and reservoir quality
- Carbonate versus siliciclastic sequence development and reservoir characterisation
- Paleogene SE Asian carbonate systems and reservoir development
- Paleogene land attached versus isolated platform variability
- Paleogene large versus small-scale carbonate systems: deposit and pore system variability
- Syntectonic carbonate systems and reservoir development
- Diagenesis of Paleogene SE Asian carbonate systems
- Pore systems and reservoir development in Paleogene SE Asian carbonates
- Exercises: Carbonate rock classification, environments and reservoir quality, Palaeogene carbonate systems.

### Day 3

- Platform and sequence development in SE Asian carbonates and their seismic characterisation
- Neogene SE Asian carbonate systems and reservoir development
- Neogene land attached versus isolated platform variability
- Onshore to offshore variability in land attached carbonate systems and reservoirs
- Neogene siliciclastic, nutrient, and volcanogenic influenced reefs and carbonate systems.
- Diagenesis of Neogene SE Asian carbonate systems
- Pore systems and reservoir development in Neogene SE Asian carbonates
- Reservoirs in SE Asian carbonate buildups, and controlling influences
- Modern analogues for buildups
- Diagenetic influence on Neogene SE Asian reservoir systems and reservoir models
- Deeper platform systems in SE Asia and winnowed pelagic reservoirs
- SE Asian slope deposits and burial diagenesis in reservoir development
- Subaerial exposure, palaeokarst and reservoir development
- Fractured carbonate systems in SE Asia
- Exercises: Platform and sequence development in SE Asian carbonates and their seismic characterisation, Neogene carbonate systems, Reservoir characterisation

### Day 4

- Deeper platform systems in SE Asia and winnowed pelagic reservoirs
- Fractured carbonate systems in SE Asia
- Dolomitisation and dolomite reservoirs in SE Asia
- Summary of SE Asian carbonate reservoir development
- Comparison between paleogene versus Neogene carbonate and reservoir systems
- Predicting carbonate reservoir systems in SE Asia
- Exploration and production issues in SE Asian carbonate systems
- Local to global influence on SE Asian carbonate systems and reservoirs
- The future of reefs and carbonate systems in SE Asia.
- Exercises: Platform and sequence development in SE Asian carbonates and their seismic characterisation and rock properties, Neogene carbonate systems, reservoir characterisation

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