Poster 9

Geological architecture of the Miocene carbonate buildups from the Central Luconia Gas Province, offshore Sarawak, Malaysia.

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In the carbonate province of Central Luconia, two types of buildups have been identified from seismic and well evaluations.

1. The pinnacle-type buildups are generally poorly defined on seismic due to the steepness and stringer development of their flank. These buildups are high relief, conical shape features situated on the flanks of the regional highs or developed in the basinal areas. Reefoid carbonates formed during middle Miocene time in a proximal position to clastic influx. Diagenesis caused extensive dolomitisation of the coral/algal limestone. Well correlations show a large degree of heterogeneity between the wells.
2. The platform-type buildups are well expressed on modern seismic. These buildups are large, elongated and fairly flat-top structures located on fault-bounded regional highs. In spite of common external geometry, clear differences occur in internal layering. Three distinct architectures have been identified: the internal relief type, the flank zone type and the laterally extensive layer-cake type.

Seismic, wireline log and core interpretation were combined to analyse the depositional and diagenetic patterns of one platform-type buildup. This integrated approach reveals the fundamental control of relative sea level changes on the internal architecture of the buildup. The cyclic depositional pattern includes:

1. Small-scale sequence (<10 ft) which can be recognised on core,
2. Reservoir unit-scale cycle (>200 ft) which are identifiable on logs and seismic.

The platform-type carbonates are made up of 3 depositional sequences deposited during the Tortonian and Messinian stages (late Miocene). Superimposition of two successive diagenetic cycles has been evidenced from petrographic and geochemical analysis. Dating using Sr isotope method indicates that minor dolomitisation is associated with period of subaerial exposure. The Messinian diagenetic cycle which is related to the 5.5 Ma sea-level lowstand, partly overprints the Tortonian diagenetic cycle which occurred during the 6.3 Ma sea-level lowstand.

Distribution of the reservoir rock types in the platform buildup can be predicted on a simple 1-D model. Preparation of 2-D and 3-D reservoir models in the near future is feasible assuming that reservoir cyclicity can be recognised in non-cored wells, estimation of the reservoir properties in the buildup margin/flank is correct and the impact of burial diagenesis on reservoir performance is properly evaluated.

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