Diagenesis and depositional environment of the F6 reef complex, Central Luconia Province, Offshore Sarawak

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Detailed petrographic and palaeontologic investigations of carbonate cores and ditch-cuttings of six F6 wells found the F6 Reef Complex to have a very distinct internal architecture with well defined litho-stratigraphic zonation. Although the diagenetic overprint is very marked with virtually all porosities being secondary, the distribution of porous beds is mainly controlled by the primary depositional environment. Freshwater leaching and dolomitization mainly affected the protected and reefoid sediments while the argillaceous, open marine offreef and bank sediments became tight through compaction. These tight open marine intervals corresponding to the trangressive phases during carbonate growth can be traced across the entire F6 Reef Complex and form excellent stratigraphic markers for well correlation. The alternation of porous and tight intervals is clearly depicted by porosity log and gives a layered appearance on seismic impedance sections.

This detailed analysis of both the depositional pattern and the sequence of diagenesis allows the F6 carbonates to be subdivided into six stratigraphic zones, each with well defined rock types and porosity-permeability characteristics. The subsequent recognition of this zonation on well logs and seismic data permits a better lateral reservoir prediction and construction of a geological model for reserve calculation.

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