RELATIVE TIMING OF HYDROCARBON MIGRATION IN THE MIOCENE SUBIS LIMESTONE OF NW SARAWAK

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Quarrying on the southern tip of Subis Hill exposed the uppermost part of the carbonate buildup, revealing the existence of two reefal sequences. At the base of each sequence is algal- foraminiferal packstone which acted as substrate upon which coral thickets and head and algal encrustation grew. The upper part of the reef is composed of rudstone representing the demise and breakdown of the reef. The sequence is finally capped by miliolid-rich wackestone probably deposited in lagoonal setting. The reefal sequences were transgressed by reef flank sediments consisting essentially of thick algal-lepidocyclina packstone beds. Basinwards the sequence is composed of shale with interbeds of graded packstone. These packstones are rich in planktonic foraminifera and derived shallow-water fauna.

These sediments were subjected to a phase of early marine diagenesis. Subsequently they were exposed and were affected by meteoric water in the vadose and phreatic environment. Pore space were later partly or completely occluded by calcite cements, which in places are ferroan and poikilotopic. Minor dolomitisation also occurred but was restricted mainly to the flank sediment. Microrhombic dolomite crystals form patches in the lime mud and in fossils having high magnesium calcite as their skeletal constituent.

With increasing burial, compaction of the limestone led to the formation of fracture and stylolites. Bedding-parallel stylolites preceded the formation of bedding-oblique stylolites. Into these fractures and other vugs, saddle dolomite and coarse calcite grew competitively. Several generations of the saddle dolomite were formed and cannibalised. Timing of the saddle dolomites and coarse calcites formation span from a pre-stylolite phase to well into the phase in which these bedding-oblique stylolites were developed. Hydrocarbon migration took place at around the time of the saddle dolomite formation.

The history of sedimentation and early diagenesis of this limestone can be explained in terms of cycles of relative sea level changes. Later diagnetic events were the results of burial followed by folding and fracturing. Late Pliocene uplift led to the exhumation of the Subis Limestone.

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