

INTERNATIONAL EXPLORATIONISTS

Characteristics of Tertiary Carbonate Reservoirs In Southeast Asia

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Social Period, 5:30 P.m., Dinner and Meeting, 6:30 p.m.

Post Oak Doubletree Inn

Study of Tertiary basins and carbonate reservoirs throughout Southeast Asia has revealed that a variety of both buildups and non-buildups can form hydrocarbon reservoirs. Buildups forming reservoirs range from the typical "walled-reef" coral-rich complexes with up to hundreds of meters of vertical relief, to low-relief carbonate mudbanks with only a few meters of relief during deposition. Recognizing the geometry, facies distribution, and tectonic setting of these different types of buildups can significantly influence exploration and field development programs focused on carbonate reservoirs.

While a classification system for reef types based on overall morphology (e.g., barrier reef, fringing reef, pinnacle reef, etc.) is certainly useful, improved insight into reefs such as those in the Kepulauan Seribu of the western Java Sea, for example, can be considered "walled-reef complexes" that have a marginal rigid reef framework, backreef

skeletal sands, and steep forereef slopes. Lateral correlation of facies in such reef complexes can be difficult because the different facies accumulate nearly vertically through time. Examples of analogous reefal reservoirs occur in the Philippines, around parts of the south China Sea including the Central Luconia Province of Malaysia, and probably in the NSB (North Sumatra Block) pinnacle reefs.

Another common type of carbonate buildup, particularly in tectonically stable back-arc basins, is the low-relief carbonate mudbank. The sheltered depositional setting in these basins, in combination with deposition during a time of gradually rising sea level (particularly during the Early Miocene), favored formation of these mudbanks over walled-reef complexes. Characteristics of these buildups include: 1) an abundance of skeletal packstones and wackestones containing branching coral fragments and larger

benthonic foraminifers; 2) abundant depositional micrite matrix; 3) an absence of rigid reef framework and marine cements; 4) a generally low-relief, lenticular shape; and 5) development on relatively flat carbonate shelves with associated argillaceous carbonates being deposited contemporaneously in slightly deeper water off the buildup. Reservoir "flow units" in these buildups tend to have formed in response to sea level fluctuations and be laterally correlative across the field.

More than 16 billion barrels of oil and oil-equivalent hydrocarbons occur in Miocene buildups of Southeast Asia. These hydrocarbons are approximately equally divided between true walled-reef complexes, mainly in rift margin basins, and low-relief carbonate mudbanks, mainly in back-arc basins. Other types of carbonate reservoirs include both non-reefal shelf carbonates and deeper water reef talus and planktonic foram-rich limestones.

DR. MARK W. LONGMAN - Biographic Sketch



Mark became interested in geology while a student at Albion College in Michigan. He subsequently obtained a Ph.D. in Geology from the University of Texas at Austin (in 1976) and then began working as a research geologist for Cities Service Company in Tulsa. Much of his work while at the Cities Service Research Laboratory focused on carbonate reservoirs around the world, and particularly on carbonate diagenesis as a control on reservoir development. After five years at the Research Lab, Mark moved to Denver to begin work as an explorationist, first with Coastal Oil and Gas company, and then with Buttercup

Energy. Since 1984, he has worked mainly as a consulting geologist, and has been involved in a number of studies that focused on Southeast Asian Tertiary carbonate reservoirs. He specializes in using carbonate petrography to interpret depositional environments, diagenetic textures, and porosity evolution in hydrocarbon reservoirs. He has published papers on topics including reef facies, carbonate diagenesis, and reservoir studies. His talk will be based on a recent year-long consulting project for Petroconsultants Australasia which focused on the Tertiary carbonate reservoirs throughout southeast Asia.