Miocene carbonates of the Luconia Province, offshore Sarawak: Implications for regional geology and reservoir properties from strontium-isotope stratigraphy

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New insights into the geological history of Central Luconia carbonates, offshore Sarawak, Malaysia are derived from the application of strontium (Sr)-isotope stratigraphy. This relatively new geochemical dating technique, integrated with seismic, log and core data, significantly refines the previously available age resolution during the period of carbonate deposition despite extensive diagenetic alteration of the carbonates. A unified concept is proposed of platform evolution tied to global variations in sea-level and the regional distribution of reservoir architecture. Evidence is presented for major karstification events during

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and after platform growth and their influence on the regional distribution of reservoir properties.

Sr-isotope analyses suggest that the carbonate platforms of the Luconia province are Early to Middle Miocene in age. Overall growth and subsequent demise coincide with a second-order eustatic sea-level cycle (TB2). Major karst horizons and the thicker flooding, aggradation and progradation packages are linked to third order eustatic sea-level fluctuations. Simultaneous with the second order sea-level drop towards the end of the Middle Miocene prograding siliciclastics split the province into southern area with low relief carbonate banks and a central and northern area with high relief platforms. Low relief banks were buried while high relief platforms experienced prolonged exposure and karstification prior to drowning during the Late Miocene and Pliocene. The duration of the hiatus is proportional to the distance of the platform from the Baram delta and varies from a minimum of 2 million years to up to 6 million years.

The regional distribution of pore types, porosity and permeability are linked to the growth history, and the time available for exposure and burial diagenesis. In the heavily karstified platforms of the central and northern area of the province drilling losses can be expected throughout the section but are probably most frequent due to the penetration of cave systems at third order cycle boundaries associated with sudden vertical shifts of facies with pronounced permeability contrasts.