Geology and seabed resources in the South China Sea: a Malaysian perspective

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Abstract

The geological characteristics of the South China Sea and its potential seabed resources are closely related to its tectonic development and rifting history. The difference in the tectonic histories between its northern passive margin and southern 'hybrid' collisional-passive margin has given rise to contrasting seabed geomorphologies. Geological/geomorphological data indicate a relatively flat ocean floor (abyssal plain) underlain by oceanic crust at the centre, surrounded by variably extended/rifted continental crust with differing thicknesses, intermediate between that of normal continental and oceanic crust. This has resulted in the rugged bathymetry that characterizes much of the continental slope regions (between the shelf and ocean floor) on both sides of the conjugate rifted margins of the South China Sea. Tectonic models constructed over the years, based on various geological/geophysical evidences, are now able to explain (although not yet fully) the origin of these features.

Seabed resources activities in the South China Sea has so far been concentrated on the exploration for and exploitation of oil and gas, which is mainly in shelfal waters (<200 m depth). Since the early years of oil exploration on the coast of Sarawak (the Malaysian state of northern Borneo) in the 1950s, there are now over 6000 wells drilled in the entire South China Sea region. Most of the wells, from offshore Taiwan and South China, through the Vietnamese margin to the northern Sarawak/Brunei and Sabah margins are on the shelf areas, but an increasing number of wells are being drilled in the deep-water areas, in water depths of down to 2500 m. The South China Sea margins now has a estimated total oil/gas reserves (recoverable) of 56 billion barrels of oil equivalent (boe), and half of this is found in the 300 or so fields on the Sarawak, Brunei and Sabah shelf/slope area. As the search for conventional hydrocarbons continues further into deeper waters and in the outer continental margins, not just here but globally, significant future resource may lie in the gas hydrate deposits of the deep water regions, including those of the South China Sea. In the deep waters off North Borneo, hydrates have been reported from sediments in water depth between 300 m and 3000 m, and may prove to be significant in the future. For non-hydrocarbon resources, such as metallic minerals, Malaysia has so far not explored their potential beyond about 100km of its coastlines.

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