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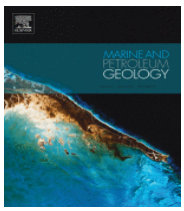

Unravelling Cenozoic carbonate platform fluid expulsion: Deciphering pockmark morphologies and genesis in the Tanintharyi shelf of the Andaman Sea as promising hydrocarbon reservoirs

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Abstract

Pockmarks, intriguing seafloor geological and geomorphological features, are commonly observed in marginal basins with hydrocarbon potential. As a Cenozoic marginal sea, the Andaman Sea is known for its significant petroleum reserves, and exploring its back-arc continental margin has revealed favourable conditions for petroleum occurrences. This study focuses on the Tanintharyi passive continental margin in the Andaman Sea, employing extensive stratigraphic and morphological analyses based on 2D and 3D seismic data interpretation techniques. Specifically, sub-seafloor characteristics of the Tanintharyi shelf region were investigated, focusing on comprehensively understanding pockmark morphologies, including their generation, evolution, migration, preservation, and the complete process leading to seabed leakage. This study revealed the potential of the Oligocene/Early Miocene carbonate platform in the Tanintharyi shelf region as a significant hydrocarbon

reservoir for the upwelling buoyant fluids from the deep East Andaman Basin. Besides reservoir function, this carbonate platform serves as a passageway for the migration of fluids from the deep-sea area to the shallow-sea area, thereby playing a pivotal role in supporting fluid expulsion mechanisms in shaping a pockmark train adjacent to truncated sedimentary formations surrounding a geomorphological high on the contemporary seafloor. Additionally, the study examines the influence of changes in sedimentary facies and the tectonic setting of the Andaman Sea on pockmark evolutions, with a specific emphasis on the role of the uppermost shallow marine shale beds in developing sub-seafloor overpressure systems due to their impermeable seal rock properties. The article presents substantial evidence for the initiation of pockmark fields during the Middle Miocene period, followed by their transformation into pockmark trains on the present-day seafloor, attributed to the triggering effect of sub-seafloor overpressure systems due to changes in sedimentary dynamics in the Andaman Sea.

Keywords:

Andaman Sea, geomorphological features, pockmark, carbonate platform