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Gas-hydrate Petroleum System in Shenhu Area, Northern Continental Slope of the South China Sea

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Gas-hydrate petroleum system is favorable for elaborating the occurrences of gas hydrate, involving stability conditions, gas source, availability of water, gas migration, sediment conditions (reservoir, trap and seal), and timing, which should be verified by the actual evidences in the different geological conditions. In 18 April-11 June of 2007, a gas hydrate drilling expedition (GMGS-1) in Shenhu Area, northern continental slope of the South China Sea (SCS) was performed by Guangzhou Marine Geological Survey (GMGS). Eight sites were drilled and the result showed that the distribution of gas hydrate was inhomogeneous. In this study, the high-resolution 2D/3D seismic data, core and logging data from the eight sites, and the geochemical data from the samples have been taken as the main study materials. Based on the integrated analysis of the geological, geophysical and geochemical researches, the gas-hydrate petroleum system in Shenhu gas hydrate drilling area was described. The result shows that, the regional temperature and pressure herein for were suitable the gas hydrate formation. The methane forming gas hydrate was mainly produced biogenically, which could be documented from pore-water geochemical analysis of the core samples. The gas chimneys associated with the small-scale faults (normal

faults in Pliocene submarine fan and detachments faults in Quaternary slide), which acted as the vertical and lateral migration pathways, could be regarded as the gas-bearing fluid influx system. The drilling results manifested that gas hydrate happened in the fine-grained sediments, which corresponded to the Quaternary slide with silt and silty clay. Although the lithology and grain size were similar in slide, two parts could be deduced through the high-resolution sequence stratigraphical frame and seismic facies analysis. The deposits at the bottom with chaotic reflectors ascribed to the redeposition of sediments from the northwest eroded by turbidite channels at 1.8 Ma, and the upper parts with continuous and high-amplitude reflectors corresponded to the sediments failures triggered by prominent progradation on the lower slope during Quaternary, which might be considered as the potential reservoir and seals for gas hydrate. Once the methane-bearing fluid migrating through the vertical and lateral pathways entered the gas hydrate stability zone and captured by the favorable deposits, the gas hydrate would be formed and stored.

Key words: gas-hydrate petroleum system, Shenhu Area, South China Sea

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