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Study of a Rebuilt Deep Water Reservoir in the Qiongdongnan Basin, South China Sea

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Abstract: A large-scale deep water channel was developed in the central depression belt parallel to the northern continental slope of the South China Sea. The length and width of the channel are 570 km and 3 to 11 km, respectively. In this study, the rebuilt deep water reservoir was studied based on seismic attribute fusion, 3D visualization technology, and high-resolution sequence stratigraphic theory. Deep water sediments, including deep water channel, levee, lobe, and mass-transport deposits (MTDs), were recognized. Both internal structure and external geometry of these complex deep water deposits are described. Polygonal faults, compressional ridges resulting from rotation and thrusting, and a digitation model indicating flow direction were also mentioned in this study. Types of bases (flat, stepped erosional, and local erosional) resulted from different forces of MTDs are discussed. These depositional and structural characteristics indicated that the center of subsidence was shifted and the sea bed topography was changed due to tectonic events, resulting in the change of flow direction in deep water channels of different formations. This can be confirmed by the distribution and shape of sandstones. The sedimentary model of Qiongdongnan Basin was concluded as 'Convergent-Type', which can be described as follows: proximal sediments from both sides' heights were transported into the canyon as turbidity flows, and deposited on both sides of the escarpments. These deposits were then reworked by new turbidity flows which flowed along the canyon, and were distributed locally as remnant sediments. By the guidance of this technique and model, the sandstone prediction was highly consistent with the exploration drilling, which enabled oil and gas discoverys.