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Sequence stratigraphy and depositional evolution of slope basins in mid -northern margin of South China Sea

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The slope basins in mid-northern margin of South China Sea is favorable for the distributions of oil, gas and gas hydrate resources, which sediments and basin infilling are the directly recorders of the geological evolution of continental margin and the spreading history of South China Sea. By using the multi-channel seismic data acquired by the projects of “China and Germany Joint Study of Marine Geosciences in the South China Sea” and etc., which have been reprocessed and the prestack depth migration and acoustic impedance of some lines have been processed, and combined with the ODP Leg 184 core data and oil well data, the sequence stratigraphic division and correlation of Cenozoic in the middle-northern margin of South China Sea have been carried out, and the seismic facies, depositional facies, sea level change, depositional history and plaeo-slope topographic evolution of each sequence depositional stage have also been studied.

According to the seismic reflection property including continuity, amplitude, frequency, and reflection terminal such as onlap, down lap and truncation, fifteen sequence boundaries in Cenozoic of the study area have been interpreted, which are named as $SB_1$to $SB_{14}$and SB_{tg}. By correlating with well data their ages are respectively assigned to 1.6Ma, 3.8Ma, 5.5Ma, 8.2Ma, 10.5Ma, 13.8Ma, 15.5Ma, 16.5Ma, 17.5Ma, 21Ma, 23.8Ma, 30Ma, 32.5Ma, 39.4Ma, except the SB_{tg} which can not be given an exact age.

The sea level change in study area shows a rising trend, similar to that in the Pearl

River Mouth Basin, and can be divided into five stages, including 30-21Ma, 21-16.5Ma, 16.5-13.8Ma, 13.8-5.5Ma and 5.5Ma-present. The development of sequences in the study area were controlled by sea level change, tectonic subsidence and paleogeographic conditions (such as wide and slow topography of the slope), and the sequence boundaries can be classified into three genetic types, that is (1)formed by tectonic uplift and erosion, (2) formed by sea level fall and tectonic uplift, and (3) formed by sea level fall. The system tracts in the sequences were dominated by lowstand system tracts, and the transgressive system tracts and highstand systems are characterized by abyssal sediments, which may be similar to condensed section.

During Cenozoic the depositional facies in the study area experienced the stages of fluvial-lake, continental-marine transition, coastal-shallow marine, and deep sea, reflecting the history of tectonic subsidence and uplift, and can be divided into three stages: (1) Paleogene (Cretaceous?) -early Oligocene, being the rifting stage, and the sediments in Shenhu-Yitong Ansha uplift and the northern part were dominated by lake sediments, while the area south to the Dongsha uplift developed marine sediments of deep sea facies. (2) late Oligocene-early Miocene, the depositional facies changed from continental-marine transition to coastal-shallow marine and deep sea. (3) middle Miocene-present, which was dominated by deep sea facies. The paleoslope topographic evolution can also be divided in to three stages: (1) Eogene, before the formation of the slope, showing the topographic pattern of sags alternated with uplifts. (2) early Miocene, the slope had formed, but the sags still existed and formed slope basins. (3) the end of early Miocene, the slope basins had been fully infilled, and the unified pattern of continental shelf-slope-abyssal basin formed, in accordance with the cease of the spreading of South China Sea.