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Sequence Stratigraphy and Depositional Cycles in the Tungyintao Basin, Offshore Northern Taiwan

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ABSTRACT

The Tungyintao Basin, offshore northern Taiwan, is part of the East China Sea rift system. The basin is a half-graben, filled mainly with Tertiary sediments derived principally from the Chinese mainland. This research used 1,840 kilometers of industrial seismic reflection sections and 2 exploration wells to investigate an area of about 10,000 square kilometers.

Three syn-rift and two post-rift seismic sequences are separated by an angular breakup unconformity. The Late Cretaceous to early Late Paleocene initial rift phase was characterized by deposition of fan-delta systems in incipient structural lakes. During Late Paleocene to Early Eocene, with gradually rising base-level and subsidence, deep-water sedimentary facies were deposited. At the beginning of Eocene, thin limestone was deposited on the ridges surrounding the basin, marking the first marine invasion of this area. The final stage of the syn-rift basin was marked by deposition of large Eocene and Early Oligocene (?) deltaic systems. After Early Oligocene breakup, the basin became stabilized, with only gentle tilting toward the southeast. Principal depocenters shifted far to east, where thick Miocene fluvial and deltaic systems were deposited in the Okinawa Trough. During Late Miocene to Quaternary, fluvial systems originating in East China continued to transport sediment to the Okinawa Trough. An oceanic lithosphere, associated with the spreading of South China Sea, that extended from the East China Sea to the South China Sea, was consumed along the Manila Trench from Late Oligocene to Early Pliocene.

Although, the development of the seismic sequences is probably controlled by regional tectonics, the overall stacking of the sedimentary strata in the basin reveals two early transgressive (retrogradational) and late regressive (progradational) cycles. Seismic sequences A, B, and C are actually second-order supersequences. These three second-order supersequences combine to form a supersequence set below the breakup unconformity. On top of the breakup unconformity, seismic sequences D and E also stack to form a 30 My supersequence set. Based on the stacking of these supercycles, the age of seismic sequence A is mostly likely to be from latest Cretaceous to early Late Paleocene (supercycle TA1). And seismic sequence B is from early Late Paleocene to Early Eocene (supercycle TA2).

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