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Trajectory variation and depositional architecture of the deltaic systems of the Late Oligocene to Quaternary and their response to the tectonic and sea level change, Pear River Mouth Basin, northern South China Sea

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Based on integrated analysis of abundant seismic, well logging and drilling core data, the trajectory and depositional architecture of the deltaic depositional systems of the Late Oligocene to Quaternary in the Pear River Mouth Basin and their relation to tectonic and sea level change are documented in the study. The deltaic systems, fed by the long-term active fluvial systems (Paleo-Zhujiang) from the western basin margin, display various depositional geomorphologies and frequently shifted basinwards or landwards since the late Oligocene along the northern continental margin of the South China Sea. Various scales of progradational clinoforms of deltaic-shoreline clastic deposits are recognized based on integrated analysis of seismic and well data, in terms of which the palaeowater depths of the deltaic deposits are estimated. The delta systems with palaeowater depths around 30 to 80 m are regarded as inner shelf deltas deposited along the basin margin during relative highstand of sea level and those with palaeowater depths of 300-1000m are identified as shelf-edge deltas which prograded into the outer shelf to shelf edge when sea level fell. Based on the trajectory variation of the delta systems, seven regional transgressive-regressive cycles (composite sequence, 4-10Ma) and twenty subordinate ones (sequences) are identified in the Late Oligocene to Quaternary in the study area. In term of this a sequence stratigraphic framework is established, with dating based on biostratigraphy of Calcareous Nannofossil and Foraminifera and palaeomagnetic ages of the IODP in the study area, which reflects the regional change of sea level in the basin.

Compared with the sea level curve of Haq, the sea level changes in the study area seems to be generally controlled by global sea level change. But it is also apparent that the sea level variation has been significantly affected by tectonic movements in the study area. The study shows that the composite sequence boundaries and the maximum marine transgressions were enhanced or accelerated by tectonic uplift or rapid basin subsidence. It is found that the shelf edge delta systems are typically associated with sandy turbidite fan deposits along the prodelta slopes, which may shift basinwards as the progradation of the delta systems progresses. The shelf-edge delta sandy deposits and the associated prodelta turbidite fan systems have proven to be the most important oil/gas bearing reservoirs in the continental slope area.