

The sedimentary environments and provenance of the late Quaternary sediments, in South Yellow Sea shelf, eastern China

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The late Quaternary sedimentary systems are mainly controlled by sea-level changes, sediment supply and regional subsidence. The late Quaternary source materials of South Yellow Sea shelf were controlled by Yellow and Yangtze rivers. So sediment provenance is very important not only for “source to sink (S2S)” processes but also for land-sea interaction.

The South Yellow Sea is a semi-enclosed epicontinental sea between China to the west and Korea Peninsula to the east. Since the late Quaternary, the South Yellow Sea has experienced several eustatic sea-level changes and sediment supplies alternatively from old Yellow and Yangtze Rivers. Previous work did not documented the late Quaternary environments and sediment provenance in this region. Several boreholes are used: 1) to synthesize the long term sedimentary environments since the late Quaternary; 2) to discriminate the source materials and appraise the contribution of Yellow and Yangtze rivers; 3) to evaluate the driving forces controlling the formation of South Yellow Sea shelf.

The sedimentary facies analysis indicates the South Yellow Sea shelf experienced fluvial and tidal influenced fluvial environments during MIS6. Then the fluvial environment was replaced by tidal flat, estuary and delta front environments during the transgression taking place in MIS5. Delta front environments dominated the South Yellow Sea shelf during the transgression occurred in MIS3. During MIS2, the shelf was cut by network of valleys and filled with coarse materials within the fluvial channels and fine materials beyond the channels. During the Holocene, transgression environment developed in early period followed by tidal dominated coast to shelf environments in late period in South Yellow Sea shelf and estuary to delta environments in Yangtze River mouth area.

Detrital zircon U-Pb ages were employed to analyze the provenance of source materials. By comparison of Yangtze and Yellow rivers U-Pb age spectrum, the Yangtze River is characterized by 100~300Ma and 700~900Ma zircons and Yellow River is dominated by 300~500Ma and 1800~2000Ma zircons. The zircons younger than 150Ma merely found in Yangtze affiliated sediments and the zircons between 1300 and 1600 Ma only found in Yellow River affiliated sediments. For zircons between 1800 and 2000Ma and between 2200 and 2500Ma, the particles from Yellow River are more than those from Yangtze River. The results indicate the late Quaternary sediments are mostly from the old Yangtze River and occasionally influenced by Yellow River, e.g. during some periods in MIS6 and MIS2 and Holocene.

The core-recorded strata have revealed the study area experienced the similar estuary to delta processes in MIS 5 as the Yangtze delta in the Holocene. The deltaic successions dominate the South Yellow Sea shelf during the MIS 5 and MIS 3. The source province indicates the old Yangtze attributed a lot to delta sediments. Sea-level cycles and source material supplies play an important role in the late Quaternary coast and shelf successions.

Keywords: sedimentary environment , source provenance, deltaic successions, zircon U-Pb ages