

Sediment budgets of the Yellow River delta during 1976–2012 with morphological changes and sediment accumulation rates

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The Yellow River (Huanghe) is a major sediment supplier to the Bohai Sea and the Yellow Sea, resulting in the formation of the huge, dynamic delta complex. In 2012 and 2013, extensive bathymetric and high resolution seismic profiles, and sediment cores and surface sediment samples were collected off the new delta lobe in the south Bohai Sea. This study examined the delta sedimentation and morphology of the new lobe and provided a quantitative assessment of the modern fluvial-derived sediment dispersal with mainly core data and bathymetric mapping.

Both the water depth changes and the ages of marine sediments give valuable information on sediment dynamics and sedimentary processes on subaqueous deltas and their adjacent shelf in the Bohai Sea. The two methods were used to estimate the sediment budget in the Yellow River delta shelf during 1976–2012. Since 1976 the river's channel has been located on the east side of delta complex and has built out broad sedimentary lobe. In 2012, extensive bathymetric and high resolution seismic profiles, vibrocores in the survey lines and surface sediments were collected. This study examined the sedimentation and morphology in the modern Yellow River delta and in Laizhou Bay, based on analyses of (1) radionuclides (^{137}Cs , ^{210}Pb , ^{134}Cs), (2) sediment structure and texture, (3) surface sediment distribution pattern, as well as (4) the morphological change during 1976 to 2012. Bathymetric profiles, especially the South-North profiles, revealed the present morphology of the delta front which exceeds previous estimated boundary, and this also was validated on basis of analysis of ^{137}Cs in cores. The ^{137}Cs onset depths corresponding to the depths of lithological changes and morphological changes indicate that it can be a proxy to track the dispersal of Yellow River-derived sediments in the study area. Synthesis of bathymetry, seismic profiles, ^{137}Cs profiles and surface sediment pattern show that the depocenter occurs in the south flank of the Yellow River delta (morphologically a spit) in west of Laizhou Bay, probably resulting from the headland eddy in this area. ^{137}Cs profiles and morphology changes show clearly the distribution of sediment thickness in the whole study area and sediment dispersal pattern from the delta front to the Laizhou Bay since 1976, and ^{210}Pb profiles provide reliable accumulation rates only in shelf area.

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