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Title: Evolution of the Huanghe(Yellow River) delta: Phase Change Caused by Dam Effects

Abstract:

The Huanghe (Yellow River) with its annual sediment discharge of about 1�109 t yr-1 to the sea used to be the second largest river in the world in terms of sediment discharge. A modern Huanghe delta of 2700km2 was formed with a fast seaward prograding rate of 22.5km2yr-1 since 1855 when its river course changed from the Yellow Sea coast to the Bohai Sea coast. However, the water and sediment discharge of the Huanghe to the sea has been sharply decreased in recent 30 years to 1/10 of it was before due to sharply increasing of water consuming, and the Huanghe delta is undergoing strong erosion due to the shortage of the river water and sediment supply. The decrease of annual water and sediment to the sea from 1950-2002 illustrates a stepped character in 1969 and 1986 in coinciding with completion and functioning of two large reservoirs, the Longyangxia and Liujiaxia, on the river in 1969 and 1986, respectively. The water regulating, flood-peak shaping and storing functions of the large reservoirs are resulted in sharp increase of water consuming, which lead to the decrease of the water and sediment reduction in 3 phases, namely, 1950-1968, 1969-1985, 1986-2002. Based on the bathymetric records of 36 sections on the delta coast from 1976 to 2002 the erosion-accumulation balance of the Huanghe delta was calculated, and the result shows that the active delta region is consisted of an accumulation area in the middle with two erosion areas in its two sides since the river course shifted from delta northeast to the east coast in 1976. The abandoned river delta lobe before 1976 has been eroded strongly. Its coast has retreated back landward by 7-8km with a maximum of 12km. The only accumulation area is the new delta lobe that has prograded seaward by more than 60km since 1976 with a maximum accumulation thickness of more than 14m. However, the accumulation area has changed to be an erosion area since 1997. Changes of the delta coastline identified by the LANDSAT images from 1976 to 2001 illustrate that the coastline is under overall erosion since 1998. Therefore, the Huanghe delta, which had been prograding seaward for thousands years in the past, has changed from construction phase to destruction one in recent 30 years due to dam effects. The former bird-food-like delta is shaping to be a wave-dominated one.

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