

Square-bending of the Yellow River related to the collision of Indian and Euro-Asian plates

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Many of the major rivers of the world follow structural lows and major tectonic lineaments and their development records the structural history of the region through which they flow. Where tectonism has been persistent for long periods of time, active deformation will produce a channel response that will be superimposed on the long-term tectonic effects. Major valley deformation or total disruption of the river system can, in turn, be the result of long-term tectonism.

The Yellow River, which is one of the largest rivers of the world, is developed on the northeast margin of the Tibetan Plateau. The current course of the Yellow River, involves an unusual 1500-km-long angular band around the Ordos tectonic block, although sedimentary evidence suggests that the river once followed a more direct path eastward into the Bohai Sea. The geologic and topographic evidence reveals that the Yellow River formed in the Eocene and underwent a major course change around the Ordos block in the Late Miocene-Early Pleistocene as a result of folding and uplift in the northeastern margin of the Tibetan Plateau, as well as rifting around the Ordos block. The change in course of the Yellow River predates flat-lying Pliocene-Pleistocene sediment deposits that unconformably overlie folded Eocene-Miocene strata. These tectonic changes are probably related to collision between the Indian and Eurasian plates. This study demonstrates that large river courses are the result of long-term tectonism and may be an excellent method for understanding the effect of active tectonics on river morphology, behavior, and sedimentology.