

Channel morphology change of an alloegenic river channel in a very arid environment due to human interventions

Guo-An Yu (1), Markus Disse (2), He Qing Huang (1), and Xiaofang Liu (1)

(1) Key Laboratory of Water Cycle and Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China, (2) Technical University of Munich, Munich, Germany

Hydrological and fluvial processes of many dryland rivers have already been strongly influenced by various human interventions such as land reclamation and flow regulation, as the result of the accelerated expansion of human activities from temperate and humid environments into arid environments. Gauged hydrological data, channel bed survey and satellite images were used to analyze the temporal change of channel morphology of the main stem Tarim River, an alloegenic river channel flowing in a very arid environment in northwest China, responding to ever increasing human impacts in recent decades. Surveyed channel cross sectional profiles in the upper reaches have shown that the mean channel bed elevation was in a fluctuating and silting trend in the last three decades, and the aggradation majorly occurred after the flood season, whereas scouring (incision) mainly occurred during the main flood season. The mean channel width and braiding intensity of the upper braided reaches followed an obvious decreasing trend. The channel embankments and gradual reclamation (occupation) of previous river flood plains and convex banks to farmlands is the major cause for the channel narrowing. The mean channel width and sinuosity index of the middle meandering reach in recent decades showed a gentle decreasing and increasing trend, respectively. The sinuosity index also differed quite clearly between the current and old (abandoned) channels. The meandering intensities (mean sinuosity index over a certain channel reach) of current meandering channels were obviously lower than the old channels. Human activity has changed the fluvial processes of the Tarim River and has restrained, to some extent, the evolution of channel patterns (meander development and channel avulsion).