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Sediment Transport Characteristics and Trends in the Lower Mississippi and Atchafalaya Rivers

Charles Demas

U.S. Geological Survey, Louisiana Water Science Center, Baton Rouge, Louisiana, USA, Email: crdemas@usgs.gov

Abstract

The Mississippi River is the largest river in the United States and has the third largest watershed in the world (3.225×10^6 km^2), draining 41% of the contiguous United States and parts of Canada. The Mississippi River and its distributary, the Atchafalaya River, transport about 1.72 10^6 metric tons of sediment each year (Meade and Moody, 2008), critical for maintaining the Louisiana coastline.

Suspended-sediment loads in the Mississippi River have declined significantly since the 1950's. Based on data collected from the 1950's to the early 1980's, Kessel (1988) estimated that suspended-sediment loads declined by more than 70% since the 1850's. More recent data collected by the U.S. Army Corps of Engineers (USCOE) and the U.S. Geological Survey (USGS) indicate the rate of decline has changed. Mississippi River data collected between 1976-2007 by the USCOE at Tarbert Landing, Miss., when analyzed in 10-year increments, show suspended-sediment loads decreased by 20% between 1975-1986 and 1996-2006. Suspended-sediment loads in the Atchafalaya River at Simmesport, La., decreased by 38.1% during the same period. No significant change in discharge in the Mississippi and Atchafalaya River occurred during these same periods. This indicates that suspended-sediment concentrations and annual fluxes in the Mississippi and Atchafalaya Rivers are supply rather than discharge limited.

Sediment transport characterization studies completed on the Mississippi River south of Tarbert Landing, Miss., in the 1980's indicate that there is a net decrease in suspended sediment concentrations in a downstream direction during low flows (< 11,330 m^3s^{-1}), remain relatively constant at median flows (14,160-19,800m^3s^{-1}), and increase during high flows (>22,660 m^3s^{-1}). This indicates the bed of the Lower Mississippi River serves as a sediment sink during low flows and as a suspended-sediment source during high flows.