
Predicting Sedimentary System Response to Human Activities: The Once and Future Mississippi Delta

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ABSTRACT

The Mississippi River Delta is in the midst of an environmental transformation of a scale unprecedented in United States history. More than 25% of deltaic wetlands have disappeared since 1932. The entire region is increasingly vulnerable to storm effects. This presentation provides a broad overview of recent geologic history, human impacts on the delta region, and prospects for the near future.

Holocene history of the delta region is well known and reflects filling of a glacial-period incised valley. This occurrence was followed by construction of an extensive and complex delta plain. The modern and future delta region can be understood by placing it in the context of processes and rates that prevailed during its evolution vs. processes and rates that will likely prevail in the near future. For example, mean rates of deposition required to fill the valley and construct the delta plain over the past 11–12 years are ~230 million tons/year, with the remaining supply likely dispersed to the shelf. Prior to the 20th century, sediment was dispersed to the delta plain through crevasse and distributary channels, but continuous levees now render much of the delta plain transport-limited. Moreover, more than 40,000 dams now trap ~50% of the Mississippi's natural sediment load. Total modern loads are ~200 million tons/year. This amount is less than the time-averaged rates for the storage component alone over the entire post-glacial period. The modern delta plain is therefore also severely supply-limited.