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Influence of Mouth Bar Processes on Delta Distributary Avulsion

Distributary avulsion is a common process in delta systems. In many of the modern deltas, distributaries have multiple avulsion points. Avulsion process has been described in fluvial channels as well as in submarine channels. In fluvial settings avulsion is mainly related to floods. During a flood, a channel changes its hydraulic geometry and avulsion can occur as a re-equilibrium process. Autocyclic processes which control submarine channels avulsion are channel-wall slumping, debris flows, channel aggradation. In delta systems, high occurrence of avulsion also results from the high sedimentation rates in front of the distributaries. Mouth bar growth in front of distributary change the channel hydraulic geometry in two ways: 1.Extension of the channel, with a consequent decrease in slope that causes the channel to lose its hydraulic efficiency and switch to a shorter path; 2.Friction, because of the increase in surface over which water flows (need many terminal distributary channels). Such processes have been distinguished in flume experiments and modern but are poorly documented in ancient examples. The modern Atchafalaya delta shows multiple terminal distributary channels that result from mouth bar growth which produce channel splitting and avulsion. Delta front deposits of Cretaceous Panther Tongue sandstone exposed in East-Central Utah show similar features in cross-section. A strike view of prodelta front deposits show multiple terminal distributary channels alternating with mouth bar deposits. Occurrence of channel deposits in different positions at different stratigraphic levels suggests that avulsion processes controlled formation of these deposits.