

Late Quaternary Depositional Packages of the Mississippi River Incised Valley

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The Mississippi River incised valley developed as a result of fluvial down-cutting in response to lowered base levels associated with multiple periods of continental scale glaciations in North America during the Pleistocene. Knowledge of the sedimentary deposits subsequent to the most recent lowstand is limited to a shelf margin delta that formed ~24-18 ka and the latest transgressive and highstand parasequences deposited from ~7 ka to present. The depositional events and corresponding stratigraphic architecture that took place between ~20-7 ka are not well understood. This study uses previously published and unpublished borehole data, radiocarbon dated peats, and high-resolution shallow seismic profiles to: 1) identify depositional packages that lie within the incised valley, 2) organize them into a chronostratigraphic framework, and 3) relate the chronology of valley fill stratigraphic evolution to globally significant climatic and eustatic controls. Meltwater floods routed to the Mississippi River from proglacial lakes incised into older valley filling deposits followed by braided fluvial aggradation as a result of lowered carrying capacity after floods. The most recent braided fluvial deposits developed during the Younger Dryas stadial period that ended ~11.5 cal ka followed by development of meandering fluvial aggradation as fluvial gradients and discharge decreased due to rising sea level and rerouting of meltwater floods to the St. Lawrence River respectively. This surface is the topstratum-substratum contact. Shelf phase transgressive deltas began to develop within and beyond the incised valley and were periodically abandoned and overstepped by upstream avulsions and rising relative sea-level resulting in the initiation of new distributary networks and associated shelf-phase deltas. Eustatic sea level stabilized near its current elevation ~3-5 ka concomitantly with the end of transgressive parasequence deposition and the beginning of highstand delta plain development.