We use an industry grade seismic volume and observations of present-day surface topography to resolve the influence of growth faulting on evolution of Mississippi delta in southeastern Louisiana from the Pleistocene to Recent. The volume of seismic data covers an area roughly 1400 square kilometers in size and it resolves many normal faults with displacements that can be tied to movement of Jurassic Louann Salt in the subsurface. We have defined the Quaternary activity associated with 6 of these normal faults by measuring the progressive offset of strata deposited on the delta surface over time. These measurements of fault displacement were restricted to the sedimentary section positioned 150 to 1500 m beneath the delta surface. Total vertical offsets measured within this Quaternary section range from 60 to 150 m. These fault displacements represent abrupt spatial variations in subsidence rate that are between 4 and 8 percent of the regional, long-term deposition rate. Our best estimates for the Quaternary rates of fault displacement vary between 0.1 and 1 mm/yr. Five faults can be connected to deformation of the modern delta surface. Wetland on the footwall is replaced by open water on the hanging wall of these structures. In spite of this evidence for modern surface deformation, the orientations of buried, seismically resolved channel bodies do not appear to be affected by the positions of active growth faults. We will evaluate the competition between subsidence and sedimentation patterns that leads to this style of channelized stratigraphy.