
3D Stratigraphic Interpretation of Quaternary Sediments in the Mensa and Thunder Horse Intraslope Basins, Mississippi Canyon, Northern Deep Gulf of Mexico

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ABSTRACT

The stratigraphic and structural evolution of the Quaternary sediments in the Mensa and Thunder Horse intraslope basins in northern deep Gulf of Mexico were studied in detail using a 979 km² 3D seismic dataset. Seven depositional sequences were identified, ranging in age from 1.3 Ma to the Present. Twelve discrete channel systems are present in the three oldest sequences. The twelve channels exhibit wide variations in terms of their morphologies, aggradation, lateral migration, and interpreted sediment grain size. In most cases, the maximum thickness of coarse-grained channel-fill deposits occurs in an upslope area to the west. Channel-fill sediments have eroded into one another, creating complex pattern of cross-cutting fluvial architecture. All channels trend from west to east across the area. This direction of sediment transport is a marked change from the underlying Mio-Pliocene sequences, where sediment transport was from north of the area to the south/southeast.

The four upper sequences are characterized by mass-transport deposits, overbank, and hemipelagic sediments. The mass-transport deposits trend to the east, and erode significant portions of the underlying sequences. The pelagic and overbank sediments are areally widespread of a fairly uniform seismic facies.

Shallow allochthonous salt systems (Thunder Horse and Devil's Tower) had bathymetric expression and influenced the sediment thickness in individual sequences, and the location of channel systems.