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Interpretation of High Resolution Seismic Data from a Geologically Complex Continental margin, Northern Gulf of Mexico

The northern Gulf of Mexico is a continental margin of profound geologic complexity and sediment/structural variability. Areas of pronounced structural weakness overlap areas of hydrocarbon production. Hydrocarbons, including gas hydrates in various phases, impact sediment strength/weakness.

A variety of these complexities can be observed in high resolution seismic data. Nearly 30 miles (50 kilometers, km) of high resolution seismic profiles have been processed and reviewed by the Center for Marine Resources and Environmental Technology (CMRET), University of Mississippi, in order to gain an improved understanding of an area of approximately 50 miles^2 (130 km^2) of the Mississippi Canyon. These profiles of the first 400 milliseconds (msec) beneath the sea floor reveal margin structural architecture interrupted by local, rising, thermally-convective salt and other intrusive structures. Salts are known to define the shelf break. Salt structures interrupt the upper-slope descent forming intra-slope basins. As the margin progrades *via* sediment aggradation, salts rise, determining characteristics of future deposition. Salt thermal conductivity provides heat that matures organics.

Combined dynamics of salt, sediments, and hydrocarbons create environments for de-watering, especially of clays. Results of increasing overburden pressure - differential compaction of sands and clays, dewatering - provide the lubricant on which contact and/or faulted surfaces may slide. Fluidized units are known to intrude overlying units, creating flexures and faults as they do so.

Mapping features evident in these profiles has produced the beginnings of a picture of the regional geology of the area. Geologic complexities encountered in this part of the continental slope, apparently complicated by the presence of hydrates in various phases, can be anticipated wherever the association and/or dissociation of these compounds has occurred/is occurring.