

THE MAJOR TRANSITION ZONES OF THE GULF OF MEXICO: DESOTO AND CAMPECHE CANYONS

J. W. ANTOINE and W. R. BRYANT

Texas A&M University
College Station, Texas

A B S T R A C T

Deep well information throughout the Gulf of Mexico coastal plain has indicated that the Gulf margins can be divided into two distinct provinces, the subsided southeast section which is carbonate and the northwest section that is predominately clastic, with complicated surface and subsurface structure controlled mainly by the influence of upward salt migration. Recent geophysical studies in the offshore areas indicate that DeSoto Canyon represents the transition zone between these clastic and carbonate provinces in the northern Gulf and that the Campeche Canyon plays a similar role in the southwestern section of the basin. In addition to representing clastic-carbonate margins, both these canyons mark the terminus of salt diapirs prevalent toward the west.

The geophysical data from the DeSoto Canyon indicate that erosion has played an important part in its development. Two mechanisms for the formation of the canyon are suggested: 1) the loop current of the eastern Gulf of Mexico and associated circulation in the northeastern Gulf have sufficient velocity along the bottom during specific periods of time to effect a scouring action and/or keep sediments in suspension, and 2) erosion by turbidity flows during periods of low sea level stands associated with glacial stages. The fact that the DeSoto Canyon extends over parts of two distinct geologic provinces, the northeast Florida platform and the Mississippi cone, adds credence to an hypothesis involving erosional rather than tectonic processes.

Although there are insufficient data available to determine the origin of the Campeche Canyon, it is suggested that, unlike the DeSoto Canyon, its topographic expression probably is more the result of adjacent salt tectonics than of erosion. Some workers suggested that an alignment from the DeSoto Canyon to Campeche Canyon may represent a fracture zone across the Gulf basin. The hypothesis that this alignment forms the southeastern boundary of the Gulf of Mexico salt province is contradicted by the presence of diapirs in northwestern Matanzas Province, Cuba, and by the discovery of some possible diapiric structures in the Florida Straits and Yucatan Channel.