

Mega-Furrows of the Continental Rise Seaward of the Sigsbee Escarpment, Northwest Gulf of Mexico

Bean, Daniel A.

Department of Oceanography, Texas A&M University, College Station, Texas 77843

Abstract

An extensive field of mega-furrows has been recently discovered on the seafloor at the base of the Sigsbee Escarpment in the northwestern Gulf of Mexico. Deep-tow data acquired by Texas A&M University and 3-D seismic data supplied by WesternGeco show that the scale of these fields far exceeds anything previously observed in the world's oceans. These data allow individual furrows and the entire field to be resolved in unprecedented detail. The size of the furrows, variations in their morphology, and their orientation relative to large topographic features all provide a geological record of the long-term deepwater flow that produces the furrows. The furrows change geometries in a predictable pattern according to flume experiments of increasing current velocity over fine-grained sediments. Dives with the DSV Alvin confirm the erosion of furrows into fine-grained material and their modern geometries, including steep sides up to $\sim 70^\circ$. Data from near bottom current meters verifies that strong, previously unknown, currents do exist at the base of the Sigsbee Escarpment today. Additional paleo-furrow horizons have been identified below the seafloor and may provide a link to past bottom currents in the Gulf of Mexico. The furrows and associated environmental processes are dominant features of the northwestern Gulf of Mexico and similar features are expected to be found along the rises of most other ocean basins.