Abstract

Little Creek is unique among geologic structures in Louisiana and possibly in the U.S. The surface feature, a collapse structure 4.5 km (2.7 mi) across in Cenozoic strata, has above and concave at depth a broader domal structure marked by areally restricted unconformities in Upper Cretaceous strata. Drilling shows the collapse-structure extends to a minimal depth of nearly 8,000 ft (~2,400 m). H. N. Fisk originally mapped the feature in the late 1930s, at the surface on his geologic map of La Salle Parish and in the subsurface at a regional scale using oil and gas well data. Since his work, little information about the Little Creek structure has appeared in the public domain, though it appears to have garnered attention from some geologists at least intermittently. One of these, J. E. Rogers, interpreted the feature's surface unit as Carnahan Bayou Formation, Fleming Group rather than the Catahoula Formation, primarily on its areal coincidence with a broader collapse structure. On this map, the collapse structure is depicted as linear (a graben), perhaps to diminish its enigmatic aspect. Rogers’s contribution, interpreted the feature's surface unit as Carnahan Bayou Formation of the Fleming Group rather than the Catahoula Formation. Little Creek’s singular suite of characteristics and apparent lack of relation to any other nearby structures with similar features has led to disparate conceptions of origin. Unpublished hypotheses formulated during the 1960s and 1970s include (1) subsidence associated with the collapse structure (M. D. Butler), and (2) response to emplacement of a deep post-Jurassic igneous diapir (D. H. Wilson). Nearly eight decades after its discovery, the structure remains enigmatic, and its distinctive aspects continue to challenge straightforward interpretation.

Evolving Awareness of the Magnitude of Subsidence at Little Creek

Wilson generously shared their thoughts on the vertical axis indicate subsea elevations in feet. Quaternary units not listed in the legend comprise terraced Pleistocene strata (white) and Oligocene Vicksburg Group (gray). The collapse structure exposed at the surface overlies and crosscuts at depth a broader domal structure. The latter is marked by areally restricted unconformities in Upper Cretaceous strata. Drilling shows the collapse-structure extends to a minimal depth of nearly 8,000 ft (~2,400 m). H. N. Fisk originally mapped the feature in the late 1930s, at the surface on his geologic map of La Salle Parish and in the subsurface at a regional scale using oil and gas well data. Fisk speculated that the structure formed by compaction of the Carnahan Bayou Formation of the Fleming Group rather than the Catahoula Formation. Little Creek’s singular suite of characteristics and apparent lack of relation to any other nearby structures with similar features has led to disparate conceptions of origin. Unpublished hypotheses formulated during the 1960s and 1970s to account for the origin of the structure include (1) subsidence associated with the collapse structure (M. D. Butler), and (2) response to emplacement of a deep post-Jurassic igneous diapir (D. H. Wilson). Nearly eight decades after its discovery, the structure remains enigmatic, and its distinctive aspects continue to challenge straightforward interpretation.