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The Cantarell breccia system, southern Gulf of Mexico: structural evolution and support for an origin related to the Chixculub meteorite impact

The Upper Cretaceous within the Campeche Basin, southern Gulf of Mexico hosts a world class petroleum system. Cantarell is the most important reservoir that consists of a complex brecciated carbonate reservoir deposited at or around the Cretaceous-Tertiary boundary. Previous sedimentological studies suggests that the Upper Cretaceous Carbonate breccias found in the Cantarell oilfield system and through the Bay of Campeche, were the result of a catastrophic shelf collapse event triggered by the Chixculub meteorite impact. This work presents new evidence from structural and stratigraphic interpretation of 3D seismic and 2D lines which gives light to features that support the platform collapse model. The reservoir consists of thick (up to 300 m), heterogeneous, monomictic and polymictic breccias developed at the K-T boundary, and widely distributed throughout the Campeche Basin. Structural interpretation of the 3D seismic data, together with well stratigraphic markers unraveled a complex Oligocene-Miocene structural deformation history of the Cantarell field, which resulted in several discrete reservoir blocks partitioned by a complex array of thrusts, normal and reverse faults. It is proposed that the structural deformation of the area controlled to a large extent the distribution of the reservoir properties found in the Cantarell area. This idea is tested using the structural model matched against the well log porosity data.