

The Stratigraphic Architecture of the K/T Boundary Carbonate Breccia Sedimentary Succession in the Cantarell Oil Field: the Most Important Oil-Producing Horizon in Offshore Campeche

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The most important oil-producing stratigraphic interval in the Cantarell Oil Field (Campeche Sound), the Cretaceous-Tertiary (K/T) boundary carbonate sedimentary succession, is a very thick, graded carbonate breccia accumulation. Data from well logs, core description, petrography and stratigraphic relationships indicate that this succession is genetically related to the Chicxulub meteorite-impact event occurred in northern Yucatan at the end of the Cretaceous. This succession lies roughly 300 km west of the Chicxulub crater center and underlies and overlies pelagic sediments of Upper Maastrichtian and basal Paleocene age, respectively. This deposit is composed of, from base to top, four units: unit 1 is an up to 300 m-thick very coarse-grained carbonate breccia; unit 2 is a 10 to 20 m-thick medium to fine-grained carbonate breccia mixed with ejecta material, and unit 3 is a 25-30 m-thick interval of sand and silt to clay-sized constituents of carbonate fragments and abundant impact materials. Unit 4 is a 10 m-thick medium-grained calcareous breccia, with ejecta material, found resting on/or within unit 3 in some wells. Impact materials include altered glassy fragments, shocked quartz and plagioclase, and rare basement fragments. The graded stratigraphic pattern of the deposit suggests probably a single giant, debris flow generated by the platform-margin collapse due to seismic shaking resulting from the meteorite impact. This was followed by ballistic sedimentation and rework by tsunami currents. A base-of-slope apron geometry is interpreted for the calcareous breccia deposit. Units 1 and 2 experienced intense dissolution and massive dolomitization under deep-burial diagenesis as well as fracturing, hence, they are the best reservoir rocks of Cantarell. Unit 3 is the main seal layer.
