

## Characteristics of Faults and Fractures in the Calcareous Breccia of the Cantarell Complex: Implications in the Deformational Evolution and Permeability

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The main NW-SE-oriented thrusting event in the sedimentary sequence that form the actual naturally fractured Cantarell Complex took place during early Miocene time. Associated to this compressional event, a NW-SE normal faults system occurred. Later, in the late Miocene to Pleistocene times the complex was affected by an extensional tectonic event from which at least seven main N-S-trending normal faults have been identified.

To characterize the structural configuration of the K/T boundary calcareous breccia, two principal analyses were conducted: (1) the determination of fault displacement using subsurface structural contour maps and (2) the examination in core samples of fracture distribution. The calculated vertical and horizontal components of fault displacements that affect the calcareous breccia indicate that: (a) there is a genetic relationship between the NW-SE trending normal faults and the NW-SE directions of the thrust faults. (b) The N-S oriented normal faults, oblique to the fold-thrust system, have more irregular profiles of total displacement than the normal faults parallel to the fold-thrust system. The irregular profiles reflect the different evolutionary history of fault linkage and interaction. These shortening and extensional episodes generated several fracture patterns, identified in core samples, parallel to subparallel to the faults. Additionally, an ancient fracture system was also identified displaying a very irregular patterns and arbitrary inclinations. These old fractures were inherited from previous deformational events. Apparently in some cases, the ancient fractures were reactivated during late Miocene to Pleistocene time. The formation of new fractures and the reactivation of old fractures connected some irregular patterns of the ancient fractures and vugs. This connectivity improved significantly the permeability of the breccia reservoir.

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