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### **Cenozoic deformational styles of the Laguna-Madre\_Tuxpan shelf and Mexican ridges fold belt, Mexico**

The Laguna Madre-Tuxpan continental shelf of Mexico overlies Mesozoic basement that consists of transitional crust that formed as a result of the opening of the Gulf of Mexico. In a joint study by the Bureau of Economic Geology and PEMEX Exploración y Producción to investigate Neogene sequences and depositional systems, we found that this region is an ideal location for characterizing the style of updip extensional deformation driven by gravitational sliding, possibly enhanced through coastal uplift. Rapid sedimentation rates during the late Miocene and Pliocene are associated with a nearly continuous set of extensional features coupled with basin accommodation that spans the length of the coast between the Burgos Basin to the north and the eastern termination of the Mexican Volcanic Belt to the south.

Although some earlier investigations link accommodation and the related detachment surface to a mobile substrate, initial and more recent publications regarding the Mexican ridges attribute extensional accommodation and formation of the fold belt to load-driven, gravitational sliding. This assertion is supported by several key observations, including the basins being strikingly linear and extending for tens of kilometers parallel to the coast, basin trends being parallel to strike of east-dipping steps in the detachment topography, active conjugate fault systems being restricted to positions directly above basinward steps, and curved rollover fault geometries. In general, we found that within the southern part of the study area the style of deformation is best described in the context of a flexural-failure mechanism where hanging-wall rocks are folded and fractured as they pass over irregularities in 17 to 21 km of basinward translation along the detachment surface. Mobilization of the substrate is considered to be a secondary, possibly concurrent, process in this area. This process becomes increasingly likely in the north, where more notable expressions of possibly mobile shale can be found.