



Is the extension of the Mexican Mesa Central (southern Basin & Range province) related to a gravitational collapse toward the Gulf of Mexico?

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The middle to late Cenozoic extension that generated the Basin and Range province (western North America) is one of the most important tectonic events to affect the North American plate. The characteristics of this extension have been extensively studied, but its origin is equally extensively debated. Proposed origins can be broadly categorized into interplate mechanisms that focus on various interactions between the Pacific or Farallon and North American plates and intraplate mechanisms that interpret extension to result from the gravitational collapse of a previously overthickened crust. It is commonly admitted that the Basin and Range extension in western Mexico migrated from East to West toward the Gulf of California. Middle to late Miocene extension around the Gulf of California (Gulf Extensional Province) is commonly interpreted as resulting from partitioning of oblique Pacific-North American plate motion into strike-slip displacement along the margin and ENE extension perpendicular to the margin within the North American plate. It is generally assumed that this mechanism also applies to the kinematically similar, predominantly ENE extension that occurred at the same time throughout the southern Basin and Range province. However structural data we collected in the Mesa Central area, along the eastern part of the Mexican Basin and Range province, argue for a post-27My N130° extension toward the Gulf of Mexico that produced highly asymmetrical grabens, with a major motion along their western flanks. Our recent works, based on the interpretation of seismic profiles, also show that the late Oligocene to present deformation along the western margin of the Gulf of Mexico was generated by a crustal shortening. In spite of a low crustal thickness the Mesa Central is an uplifted plateau with a mean altitude of 1800m. This elevation of the Mesa Central is mainly due to the high thermal gradients that characterize the back arc domain. By contrast the crust of the Gulf of Mexico is cold and topographically low. We propose that the extension of the Mesa Central and the shortening along the western margin of the Gulf of Mexico are both the result of a gravitational collapse of the warm and uplifted Mexican plateau toward the cold and topographically low Gulf of Mexico.