
Structure of the Eastern Cuba Block: a protracted evolution of a plate boundary linking Central Atlantic, Gulf of Mexico, proto-Caribbean and Caribbean plates

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Résumé

The Eastern Cuban block presents a complex tectonic history resulting from various interactions between tectonic plates, recorded in the offshore sedimentary record. Our study focuses on the tectonic evolution of the Eastern Cuban offshore region, specifically the Old Bahamas Channel. Using a combination of a multi-channel seismic (MCS) reflection dataset and swath-bathymetric data from the Haiti-SIS cruise, we provided a first offshore description of northeastern Cuba.

Seismic profiles reveal multiple phases of deformation dating back to the Jurassic period. These phases are initially characterized by normal faults and tilted blocks, followed by the development of thrust faults and folds. Furthermore, wrench faults suggest a shear component inherited from pre-existing Jurassic faults.

A Jurassic syn-rift phase led to tilted blocks formation and the deposition of a syn-rift unit, while carbonate reef accretion took place in the Southeastern Bahamas. During the Late Jurassic-Early Cretaceous, the Eastern Cuban block was marked by shear and basement hinge zones at the Proto-Caribbean continental margin. At this time, the Cuba Fracture Zone (FZ) acted as the southern boundary of the Old Bahamas Channel, separating the Proto-Caribbean Ocean from the Bahamian margin.

The collision of the northern border of the Caribbean plate with the Bahamas domain during the Maastrichtian resulted in folding, shortening, localized salt upwelling, and the current Caribbean configuration. Ancient Jurassic faults played a crucial role during the Middle Eocene, influencing the positioning of the current northern boundary of the Caribbean plate. Our results provide valuable insights into the complex tectonic history of Eastern Cuba, elucidating processes such as rifting, subduction, fault zones, collision, and obduction related to

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the plate interactions between the proto-Caribbean, Caribbean and North American plates. This study contributes to a comprehensive understanding of regional geodynamics, proposing estimated ages for seismic sequences and correlating them with available wells data from nearby regions.

Mots-Clés: Eastern Cuban block, Old Bahamas Channel, Tectonic evolution of the Caribbean plate, Northern boundary of the Caribbean plate.