EGU22-11355
https://doi.org/10.5194/egusphere-egu22-11355
EGU General Assembly 2022
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Cuba's northern offshore: a witness to geodynamics evolution of the northern boundary of the Caribbean plate

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The northern boundary of the Caribbean plate is characterized by the oblique collision between the Caribbean (CAR) and North American (NOAM) tectonic plates. The progressive counterclockwise rotation of the two plates accompanying the eastward translation of NOAM vs. CAR is responsible for the increasing obliquity of the collision between these two plates. Consequently, successive southward jumps of major strike-slip faults accommodate the eastward escape of the Caribbean plate and the collisional indentation against the Bahama Banks. During this process, Cuba was progressively welded to the North American Plate. Several strike-slip corridors record this diachronous collision as major left-lateral transfer zones in Cuba: Eastern Yucatan Margin (Upper Cretaceous), Pinar-Varadero (Paleocene), La Trocha (early Eocene), Cauto-Nipe (middle/late Eocene), and Oriente Fault Zone (early Oligocene). The nature and age of the related tectonic events of these tectonic corridors were widely studied onshore. However, offshore northern Cuba remains relatively unknown. We provided a first offshore description of northeastern Cuba based on a multi-channel seismic reflection and swath-bathymetric dataset from the Haiti-SIS cruise. The seismic reflection profiles show that the structural and sedimentary architecture of the insular slope varies significantly from central to eastern Cuba. This lateral variability seems mainly influenced by the proximity with the Bahama Banks, which act as a succession of local indenters. The width of the insular slope varies from 5-10km in central Cuba to more than 50km in width towards the east off the Guacanayabo-Nipe tectonic corridor. In this region, the insular slope shows a thick sedimentary cover suggesting a main subsiding regional block related to the middle/late Eocene onset of the Guacanayabo-Nipe tectonic corridor. Contrasting lateral deformation patterns in this region are probably related to the diachronous strike-slip events related to the activity of the Cauto-Nipe fault. The coexistence of folds, transtensive and transpressive structures affecting the sedimentary infill attests that the local stress regimes of this fault have gradually changed. Our study correlates offshore deformation phases recorded in the offshore northeastern coast of Cuba, with major deformation episodes recorded onshore Cuba from Eocene to present-day. Our tectonostratigraphic evolution of the eastern offshore of Cuba provides new constraints to improve the knowledge of the geodynamics of the northern boundary of the Caribbean plate.