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Lithosphere structure from Cordillera Central to Cordillera Oriental (Dominican Republic)

Diana Nuñez (1,2), Diego Cordoba (1), Francisco J. Nuñez-Cornu (2), and Mario O. Cotilla (1)

(1) University Complutense of Madrid, Department of Geophysics, Madrid, Spain (dianane@fis.ucm.es), (2) Centro de Sismologia y Volcanologia de Occidente, University of Guadalajara, Mexico

Located on the northern margin of the Caribbean Plate, the Island of Hispaniola is a tectonic collage produced by the oblique convergence to final collision of the Caribbean island-arc/back arc system with the North American Plate. West-central part of the Hispaniola Island consists of high topography bounded by dominantly reverse and oblique-slip faults along the edges of the uplifted mountain ranges. The eastern part of the island is much lower in elevation than the rest of the island and is not extensively affected by active faulting. Escarpments and lineaments forming west-north-west and north-west-striking boundaries of morphotectonic zones in the central part of the island closely follow island arc terrain boundaries and suggest that Cretaceous to Eocene island-arc structures were reactivated by early Miocene to Recent collisional and transpressional tectonics.
The seismic data presented in this work correspond to Profile D of Caribe Norte project (2009). This profile is W – E oriented in a length of 450 km. The deployment was made of 140 land seismic stations of one vertical component and one land station of three components located near Hato Mayor. These stations were recording from 11th to 17th of April 2009. The seismic sources used in this line have been three land borehole explosions 1 Ton (S1, S2 and S3), one marine shooting line (LM4) and one earthquake occurred while seismic stations were recording the Profile D.
Our study has characterized seismically basins and mountain ranges in the shallow crustal structure. The results have corroborated previous data and have provided slight changes respect to the previous studies in the area. The results establish the marked differences between N and S and from W to E. Particularly, Moho discontinuity increases towards the interior of the island from Bahamas Platform to the interior of the island but gets different maximum depth values being roughly 30 km deep in the western and central, while rises up to 24 km deep, in the eastern area. Moreover, a structure dipping towards eastern interior of the island has been obtained with a dip angle of 18º reaching depths of 120 km. The relocation and P-wave phases analysis of one earthquake registered by CARIBE NORTE land seismic deployment have allowed obtaining these values. This structure could explain deep seismicity in the area.