

Transpressional Tectonics across the N. American-Caribbean Plate Boundary: Preliminary Results of a Multichannel Seismic Survey of Lake Azuei, Haiti.

Casey Keegan Hearn¹, Marie-Helene Cormier², Heather Sloan³, Nigel J Wattrus⁴, Dominique Boisson⁵, Britta Brown⁶, Kelly Guerrier⁷, John W King⁸, Paul Knotts³, Roberte Momplaisir⁹, Christopher C Sorlien¹⁰, Rachel Stempel³, Steeve J Symithe¹¹ and Sophia Marie Johanne Ulysse¹²

(1)University of Rhode Island, Narragansett, RI, United States, (2)University of Rhode Island, Graduate School of Oceanography, Narragansett, RI, United States, (3)CUNY Lehman College, Bronx, NY, United States, (4)University of Minnesota Duluth, Duluth, MN, United States, (5)State University of Haiti, Research Unit in Geosciences, Port-au-Prince, Haiti, (6)American Museum of Natural History, New York, NY, United States, (7)State University of Haiti, URGeo-FDS, Port-au-Prince, Haiti, (8)Univ Rhode Island, Narragansett, RI, United States, (9)UEH Haiti, Port-au-Prince, Haiti, (10)Earth Research Institute, Santa Barbara, CA, United States, (11)Universite d'Etat d'Haiti, URGeo, Port-au-Prince, Haiti, (12)State University of Haiti, Research Unit in Geoscience, Port-au-Prince, Haiti

On January 12, 2010, a Mw 7.0 earthquake struck Haiti, killing over 200,000 people and devastating the Capital city of Port-au-Prince and the surrounding regions. It ruptured a previously unknown blind-thrust fault that abuts the Enriquillo Plantain Garden Fault (EPGF), one of two transform faults that define the North American-Caribbean plate boundary. That earthquake highlighted how transpression across this complex boundary is accommodated by slip partitioning into strike-slip and compressional structures. Because the seismic hazard is higher for a rupture on a reverse or oblique-slip fault than on a vertical strike-slip fault, the need to characterize the geometry of that fault system is clear. Lake Azuei overlies this plate boundary ~60 km east of the 2010 epicenter. The lake's ~23 km long axis trends NW-SE, parallel to the Haitian fold-and-thrust belt and oblique to the EPGF. This tectonic context makes it an ideal target for investigating the partitioning of plate motion between strike-slip and compressional structures. In January 2017, we acquired 222 km of multichannel seismic (MCS) profiles in the lake, largely concurrent with subbottom seismic (CHIRP) profiles. The MCS data were acquired using a high-frequency BubbleGun source and a 75 m-long, 24-channel streamer, achieving a 24 seismic fold with a penetration of ~200 m below lakebed. With the goal of resolving tectonic structures in 3-D, survey lines were laid out in a grid with profiles spaced 1.2 km apart. Additional profiles were acquired at the SE end of the lake where most of the tectonic activity is presumably occurring. The co-located CHIRP and MCS profiles document the continuity of tectonic deformation between the surficial sediments and the deeper strata. Preliminary processing suggests that a SW-dipping blind thrust fault, expressed up-dip as a large monocline fold, may control the western edge of the lake. Gentle, young folds that protrude from the flat lakebed are also imaged with the CHIRP data. No obvious strike-slip faults are revealed in the MCS or CHIRP imagery. This result is consistent with a published analysis of GPS measurements that suggests oblique convergence on a south-dipping reverse fault along the southern shore of the lake.

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