Subbottom seismic profiling survey of Lake Azuei, Haiti: Seismic signature of paleo-shorelines in a transpressional environment and possible tectonic implications

Heather Sloan[1], Marie-Helene Cormier[2], Britta Brown[3], Dominique Boisson[4], Kelly Guerrier[5], Casey Keegan Hearn[6], Clifford W Heil Jr[7], Roger P Kelly[8], John W King[7], Roberte Momplaisir[9], LaTonya Hines[1], Rachel Stempel[1], Paul Knotts[1], Steeve J Symithe[10], Oliver F. Lucier[11], Sophia Marie Johanne Ulysse[12] and Nigel J Wattrus[13]

(1)CUNY Lehman College, Bronx, NY, United States, (2)University of Rhode Island, Graduate School of Oceanography, Narragansett, RI, United States, (3)American Museum of Natural History, New York, NY, United States, (4)State University of Haiti, Research Unit in Geosciences, Port-au-Prince, Haiti, (5)State University of Haiti, URGeo-FDS, Port-au-Prince, Haiti, (6)University of Rhode Island Narragansett Bay, Oceanography, Narragansett, RI, United States, (7)Univ Rhode Island, Narragansett, RI, United States, (8)URI GSO, Narragansett, RI, United States, (9)UEH Haiti, Port-au-Prince, Haiti, (10)Purdue University, West Lafayette, IN, United States, (11)Rice University, Houston, TX, United States, (12)Fairbanks, AK, United States, (13)University of Minnesota Duluth, Duluth, MN, United States

The left-lateral Enriquillo-Plantain Garden Fault (EPGF) is one of two major transform faults that form the North American-Caribbean plate boundary. GPS measurements indicate that relative motion evolves from nearly pure strike-slip in western Haiti to highly transpressional near Lake Azuei in eastern Haiti, where the EPGF may terminate against a south-dipping oblique reverse fault. Lake Azuei, one of the largest lakes in the Caribbean region (10 km x 23 km), is surrounded by two high-elevation sierras (> 2,000 m). Because the lake has no outlet to the sea, its level is sensitive to variations in precipitation and is thought to have fluctuated by 10's of meters during the Holocene. A rise of ~5 m over the past 10 years has had a devastating impact, submerging villages, farmland, and roads. A grid of high-resolution (~10 cm) subbottom seismic (CHIRP) profiles acquired in January 2017 captures the subtle signature of the ~5 m-deep shoreline and also images a prominent paleo-shoreline at ~10 m water depth. This 10 m paleo-shoreline is well expressed in the CHIRP data suggesting it was occupied for a long period of time. It is buried beneath a thin (< 20 cm-thick) veneer of sediments, indicating that it was submerged centuries to millennia ago. This paleo-shoreline represents a key horizontal marker that may have been warped by local transpressional tectonics. We therefore catalogued its varying seismic signature with the goal of detecting any subtle but systematic depth variations of the associated shoreline angle around the periphery of the lake. Two sediment cores, collected in water depths of 14 m and 17 m, each bottomed 80-90 cm below the lakebed into a distinctively coarser bed. On-going radiometric dating is expected to constrain the age of this distinctive layer. Should this layer be tied to the perduring 10-m lowstand of the lake, determining its age could help quantify vertical deformation rates around Lake Azuei.

Citation: Sloan, H., M.-H. Cormier, B. Brown, D. Boisson, K. Guerrier, C. K. Hearn, C. W. Heil, R. P. Kelly, J. W. King, R. Momplaisir, L. Hines, R. Stempel, P. Knotts, S. J. Symithe, O. F. Lucier, S. M. J. Ulysse, and N. J. Wattrus, Subbottom seismic profiling survey of Lake Azuei, Haiti: Seismic signature of paleo-shorelines in a transpressional environment and possible tectonic implications. Submitted to the Transform Plate Boundaries: Mechanics and Hazards Session of the 2017 Fall Meeting of the AGU.