Signature of Transpressional Tectonics in the Holocene Stratigraphy of Lake Azuei, Haiti: Preliminary Results from a High-Resolution Subbottom Profiling Survey

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

(1)University of Rhode Island, Graduate School of Oceanography, Narragansett, RI, United States, (2)CUNY Lehman College, Bronx, NY, United States, (3)State University of Haiti, Research Unit in Geosciences, Port-au-Prince, Haiti, (4)State University of Haiti, URGeo-FDS, Port-au-Prince, Haiti, (5)American Museum of Natural History, New York, NY, United States, (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 transform systems that define the Northern Caribbean plate boundary zone. Relative motion across its trace (~ 10 mm/yr) evolves from nearly pure strike-slip in western Haiti to transpressional in eastern Haiti, where the fault system may terminate against a south-dipping oblique reverse fault. Lake Azuei is a large (10 km x 25 km) and shallow (< 30 m deep) lake that lies in the direct extension of the EPGF in eastern Haiti. A single core previously collected in the lake suggests high sedimentation rates at its depocenter (~6 mm/yr). The shallow lake stratigraphy is therefore expected to faithfully record any tectonic deformation that occurred within the past few thousand years. In January 2017, we acquired a grid of high-resolution (~10 cm), shallow penetration (~4 to 5 m) subbottom seismic (CHIRP) profiles spaced 1.2 km apart across the entire lake. A new bathymetric map compiled from these CHIRP data and some prior echosounder survey reveals a flat lake floor (<0.01°) surrounded by steep (~5°) shoreline slopes. The CHIRP profiles highlight several gentle folds that protrude from the flat lakebed near the southern shore, an area where transpressional deformation is presumably focused. Thin (< 20 cm) horizontal strata from the lakebed can be traced onto the flanks of these gentle folds and pinch out in an upward curve. They also often pinch upward onto the base of the shoreline slopes, indicating that young sediments on the lakebed bypassed the folds as well as the shoreline slopes. We interpret this feature as diagnostic of sediments deposited by turbidity currents. The fact that young turbidites pinch out in upward curves suggests that the folds are actively growing, and that active contractional structures (folds and/or blind thrust faults) control much of the periphery of the lake. A few sediment cores were strategically located where beds are pinching out in order to maximize stratigraphic records. Two of these cores successfully penetrated strata imaged by the CHIRP profiles. On-going Pb210 dating of sediment samples from the cores should constrain sedimentation rates and thus help quantify the rates of the tectonic deformation.

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