



SEISMIC HAZARD ASSESSMENT AND PALEOSEISMIC INVESTIGATION

for a Proposed Container Terminal Facility in Puerto Moín, Costa Rica, Central America

PROJECT DESCRIPTION

Earth Consultants International was retained to develop the seismic source model for the Probability Seismic Hazard Assessment (PSHA) of a new port facility proposed in the Puerto Moín area of the Caribbean coast of Costa Rica. In 1991 the area was severely affected by a M7.5 earthquake on the offshore North Panamá Deformed Belt (NPDB) that caused coastal uplift of the region. The historical record suggested a prior similar earthquake in 1822. Many other seismic sources within 100 km of the project site contributed to the PSHA analysis, but a sensitivity analysis indicated the biggest contributor to the seismic hazard is the NPDB, especially if it has a short recurrence interval. This need led to the development of a field investigation program to quantitatively analyze a series of uplifted coral platforms that could provide a paleoseismic record of prior large earthquakes on the NPDB.



The Puerto Moín project is located where the offshore North Panamá Deformed Belt (NPDB) thrusts step westerly into coastal Costa Rica. The NPDB ruptured in 1991, resulting in 1.5+ m of coastal uplift in some areas.

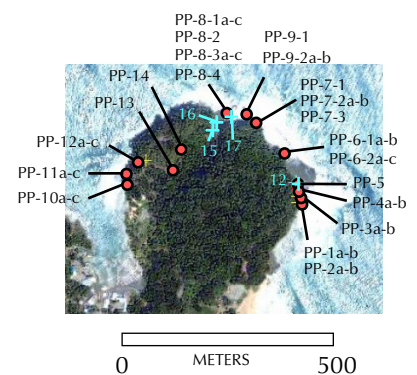
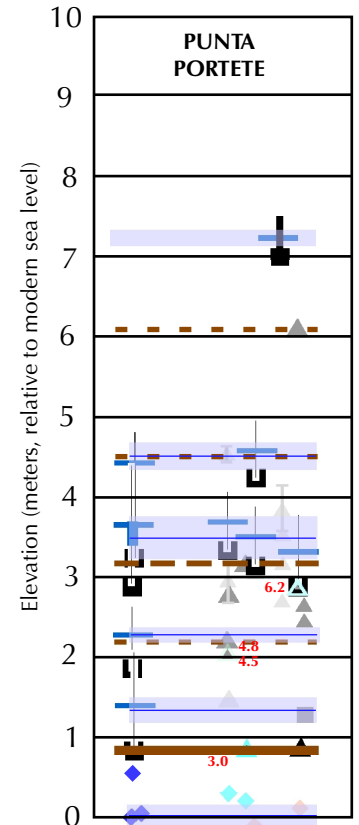
SOLUTION

ECI geologists, with local assistance, mapped and sampled the uplifted coral platforms within the Moín area. Because no survey controls were available, the platform elevations were established using hand surveying based on relative elevation above indicators of current sea level. Sampling of the corals was accomplished using a hand-held core drill, supplemented with larger hand samples where possible. Forty-seven coral samples were obtained, from which twelve were selected for age dating by U-Series analysis. The ages obtained ranged between 1991 and 7000 ybp, and they were interpreted as kill events due to seismic uplift above the corals' survivable water depths. Based on these results, and the spacing of the terraces, we concluded that the average recurrence interval between 1991-style uplifting earthquakes is about 1,400 years (with smaller events occurring about every 200 years), resulting in a Holocene uplift rate of 1.9 ± 0.2 mm/yr.

Marine Terrace 1



Schematic illustration of the uplifted coral platforms at Puerto Moín that were interpreted as paleoseismic indicators of 1991-style M7.5+ earthquakes in the NPDB. This model, developed during the initial site reconnaissance, became the basis for the quantitative investigation completed in the second phase (right).



Plot of uplifted coral platforms on Punta Portete and their U-Series ages, showing good spatial and temporal correlation for coseismic uplifts.

